NOAA TECHNICAL REPORT 50

RATES OF VERTICAL DISPLACEMENT AT BENCHMARKS IN THE LOWER MISSISSIPPI VALLEY AND THE NORTHERN GULF COAST

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Donald L. Evans Secretary

National Oceanic and Atmospheric Administration
VADM Conrad C. Lautenbacher, Jr. USN (Ret.)
Under Secretary of Commerce for Oceans and Atmosphere

Abstract

This report describes the methods and results of our research into the recent rates and spatial distribution of subsidence on benchmarks in the lower Mississippi Valley and northern Gulf Coast region. The analysis was accomplished using first-order leveling data and GPS observations from the National Geodetic Survey (NGS) and water level (tide gauge) data from the National Ocean Service.

This study computed vertical velocities for over 2700 NGS benchmarks based on leveling data collected between 1920 and 1995. Subsidence affects coastal areas of Louisiana, Mississippi, Texas, and Alabama. The highest rates, over 25 mm per year, occur in the Mississippi river delta region and chenier plain of southwest Louisiana. Subsidence gradually slows toward the east, ending in western Florida. Subsidence continues toward the west along the Texas coast beyond the study area. These rates are substantially higher than rates reported in previous studies based on analysis of leveling or on geological investigations. Our analysis of the leveling data also indicates that subsidence rates increased in many areas during the later half of the 20th century. Another region of subsidence is centered on the Mississippi alluvial valley, extending northward from the coast to near Memphis, Tennessee. This subsiding region is flanked by regions of stability or uplift in northwest Louisiana and northeastern Mississippi.

Our evaluation of independent subsidence measures validates the primary results. Displacement rates derived from the leveling network agree, on average, to within 1.5 mm/yr with rates derived from a number of coastal tide gauge stations. We also computed vertical displacement over six or seven years at three Continuously Operating Reference Station (CORS) sites. These values agreed to within about 2 mm/yr with the rates derived from the leveling data for nearby benchmarks. The CORS analysis also shows that subsidence is continuing today at comparable rates.

We draw two primary conclusions from this study. First, subsidence is occurring at substantially higher rates than previously reported. These new rates provide insights into the causes of subsidence and should be integrated into plans to mitigate the effects of subsidence and the resultant inundation of coastal lands. Second, the results of this study prove the need for a Height Modernization program to provide the updated and sustainable elevation reference system that is essential to any efforts to mitigate the impending slow disaster threatened by subsidence.

Contents

Introduction

Subsidence, i.e., the downward displacement of the Earth's surface relative to a fixed datum, is the inexorable "slow disaster" that will gradually change the shape and character of the lower Mississippi Valley and northern Gulf coast. Subsidence threatens critical habitats, large and small cities, farms, and economic infrastructure in several states with eventual inundation by the Gulf of Mexico. The effects of this disaster will be felt by the entire country as inundation gradually destroys America's largest coastal wetland and ravages its energy production heartland. This document addresses the problem of defining accurate subsidence rates on benchmarks, the fundamental height reference points, in this region. We describe the methods used in this study, the sources and quality of the data, the geographic extent, and magnitude of subsidence. This report documents the results of the first comprehensive study of historical subsidence rates relative to a common vertical datum in the lower Mississippi Valley and northern Gulf Coast. This study area includes Louisiana and Mississippi, and parts of Alabama, Florida, Texas, and Tennessee.

To compute accurate rates of subsidence throughout this region, we used data from the authoritative sources of primary vertical control: the National Ocean Service (NOS) and the National Geodetic Survey (NGS). The data we used spans much of the last century and is the basis for the official national systems of vertical reference for terrestrial and maritime application. We obtained and used "reduced" data from both agencies, meaning that the original raw leveling observations had already been through the computational processes used to obtain elevation differences from redundant field observations. For geodetic leveling data, we used field elevations with systematic corrections applied. In the case of the water level observations, we used the monthly mean values. All of the subsequent computation, assembly, and interpretation were original work done specifically for this study. Thus, the subsidence rates and conclusions presented here are completely independent of any of the previous, smaller studies published elsewhere.

The first section of this document outlines the rationale and approach we used to determine subsidence rates. The second section describes the data. A subsequent methods section details our method for computing and assembling this data into a subsidence rates network. We describe in detail the process used in the first leg of the network, the segment from Grand Isle to Raceland. The same process applies to the entire network. Next, we describe our results in detail, including discussions on temporal variation in rates and on benchmark monument type in relation to subsidence rate.

In a separate section, we discuss three tests we used to check the validity of our computed rates. The key to the validity of our rates computations is that the entire system is tied to a single, recognized datum, the North American Vertical Datum of 1988. We do not rely on arbitrary local datums and implied connections between disparate data sources of varying quality and scale. In the final section, we address in general terms the possible causes of the spatial and temporal patterns of subsidence implied by the results. More detailed discussions on subsidence will be available elsewhere. Finally, we address the question of what these rates might tell us about future subsidence.

Several people contributed to this study. Jordan Heltz provided many hours of diligent research assistance and data processing. Clifford Mugnier, Kathy Koepsell, Dr. Chris Pearson, Gilbert Mitchell, David Zilkoski, Dr. Irv Mendelssohn, and Dr. Richard Snay contributed advice at various stages of the project. Myra L. Shinkle provided invaluable editorial assistance.

I. Problem

In a 2001 report to Congress, NGS concluded that the vertical control portion of the National Spatial Reference System (NSRS) in Louisiana was "inaccurate and obsolete." The research described in this report was conducted by NGS and the Louisiana Spatial Reference Center (LSRC)[1] to support the Vertical Time Dependent Positioning (VTDP) project by determining the recent rates of vertical displacement of benchmarks relative to the North American Vertical Datum of 1988 (NAVD 88). Displacement rates derived in this study are the most accurate and precise description available of the vertical motions that affect this region. These rates can be used to extrapolate current elevations for moving benchmarks. When properly validated by new observations, these elevations can be used to update the NSRS. Our initial investigation focused on coastal Louisiana. As our research progressed, we realized that a wider regional examination was necessary to locate the bounds of the subsiding area.

II. Data

The data used in this analysis consists of water level records from the National Ocean Service (NOS) and first-order leveling data from the National Geodetic Survey (NGS). Global Positioning System (GPS) data from Continuously Operating Reference Stations (CORS) were also obtained from NGS.

A. Tide Records

We obtained tide record data from the NOS Center for Operational Oceanographic Products and Services (CO-OPS). Most of the information was available from the CO-OPS Web site at www.co-ops.nos.noaa.gov. For information not available from the Web site, we contacted the staff at CO-OPS.

The tidal data is the monthly means of water level readings at NOS tide gauges. In this study, we used the monthly mean sea level (MSL) values. The monthly means are an average of hourly water level heights for a complete month of data.[2] For some long-term tide gauges that are part of the National Water Level Observation Network (NWLON), CO-OPS publishes linear MSL trends derived from monthly data. For example, Table 1 shows the NOS published trends for NWLON stations in the study area, along with the first year in which data was recorded and the length of the series.[3]

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[1] A partnership with the Center for Geoinformatics at Louisiana State University.
[2] *Sea Level Variations of the United States 1854-1999*, pg. 1
[3] *Sea Level Variations of the United States 1854-1999*, pg. 19

NWLON station name	first year of data	years of data	MSL trend	standard error
			mm/yr	
Pensacola	1923	77	2.14	0.15
Dauphin Island	1966	32	2.93	0.59
Grand Isle	1947	53	9.85	0.35
Eugene Island	1939	36	9.74	0.63
Sabine Pass	1958	42	6.54	0.72

Table 1. NOS water level trends.

For some stations that are not part of the NWLON, CO-OPS provides the computed monthly means data. We obtained monthly means data for shorter-term tide gauges at Cocodrie and Venice, Louisiana, and Waveland, Mississippi. The rate of relative sea level rise at each of these stations was determined by simple linear regression on the monthly means. The slope of the regression line is the rate of change in meters per year. Table 2 shows the linear trends for other tide gauges computed for this study. The standard errors of the trends are much higher for these tide stations than for the NWLON stations because the time spans for the data are much shorter. Plots of the data series are shown in Appendix 1.

NOS tide station name	first year of data	years of data	MSL trend	standard error
			mm/yr	
Venice	1985	14*	34.06	6.26
Cocodrie	1987	13	12.81	2.23
Waveland	1997	6	8.05	9.28

* 4 years of data around a 10 year gap

Table 2. Computed trends from NOS data.

The published information[4] for the tide gauge at Grand Isle is actually a combination of data from two tide gauges, 8761720 (Bayou Rigaud) and 8761724 (East Point), about 1.4 km apart along the northwest shore of Grand Isle. The zero-marks on these two gauges, and thus their data sets, were connected by leveling observations to form a continuous water level observation set. For this study, we analyzed the data sets from the two individual tide gauges independently and developed relative sea level rise values for each station. This information is shown in Table 3. The application and meaning of these two separate rates will be explained in the next section.

NOS tide station name	first year of data	years of data	MSL trend	standard error
			mm/yr	
East Point	1982	20	5.86	0.97
Bayou Rigaud	1947	35	9.93	0.47

Table 3. Water level trends at each Grand Isle gauge.

[4] *Sea Level Variations of the United States 1854-1999.*

B. Leveling Observations

Leveling observation data was acquired from the National Geodetic Survey (NGS). All elevation data used in this study was drawn only from first-order[5,6] leveling projects. The data was acquired in the form of "phase 1" files (p-files). For each leveling line, the p-file contains general information about the leveling run and data about each benchmark. The benchmark information is an ordered list of stations (both PID and designation), stability rating, spur level, distance along the level line, unadjusted height (elevation), number of runs, and an approximate position. It is essential to note that the "unadjusted heights" are exactly that: unofficial, essentially arbitrary elevations relative only to the starting point of that particular leveling line. These values are derived from the very precise elevation differences observed in the leveling survey process. Corrections for known systematic errors[7] (i.e., orthometric, rod, level, temperature, astronomic, refraction, magnetic) were applied automatically to the observations when the p-file was generated.

C. CORS Data

We obtained Global Positioning System (GPS) observation data collected at Continuously Operating Reference Station (CORS) sites directly from the NGS Web site (www.ngs.noaa.gov). The CORS sites employed for this analysis are located near New Orleans, Louisiana, Vicksburg, Mississippi, and Memphis, Tennessee.

III. Method

We computed vertical displacement velocities of benchmarks over intervals of time bounded by the available leveling data. Velocities that are negative indicate subsidence, i.e., the downward motion of the Earth's surface relative to the NAVD 88 datum. Positive velocities indicate upward motion relative to NAVD 88. We will explain in detail the process we used to compute subsidence rates along the highway corridor from Grand Isle to Raceland, Louisiana, as an example of the method used throughout this study.

A. Initial Condition

This analysis started with the data for the currently operating NOS tide gauge at Grand Isle, East Point (8761724) to estimate the total land subsidence rate at that location. In one sense, the tide gauge measures relative sea level rise at a specific location. In the opposite sense, the tide gauge data can be seen as recording the relative subsidence of the land in comparison to a fixed water level datum. If sea level is constant, then the change in tide gauge readings over time record subsidence. If the sea level is actually determined to be rising globally (e.g. eustatic rise), then the difference between the eustatic rise and the displacement recorded in the water level data is the subsidence of the land, and the tide gauge, at that location.

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[5] Schomaker, M.C. and R.M. Berry, *Geodetic Leveling*.

[6] Federal Geodetic Control Committee, *Standards and Specifications for Geodetic Control Networks*.

[7] Balazs, E., and G. Young, *Corrections Applied by the National Geodetic Survey to Precise Leveling Observations*.

B. Rate Computations

The net subsidence rate from the tide gauge was applied to the published elevation of a benchmark near to the tide gauge to compute the likely elevation of that benchmark for the specific year in which differential level connections were made to the benchmark. Holding this computed elevation, we used the observed elevation differences between benchmarks to compute the corrected field elevation at each benchmark along the line for the year in which the observations were made. The difference in elevation at each benchmark common to each of two different leveling observation epochs thus defined the rate at which the monument moved over the time between the two leveling measurements. This is a summary of the process we used to process the leveling data:

1. Obtain "field" elevations, with systematic corrections applied, for all benchmarks in lines running through a single route;
2. Cull the list of benchmarks to those that are common to at least two leveling lines;
3. Compute "observed" elevation differences between adjacent points within this set of "common" benchmarks;
4. Determine and set a starting elevation for one epoch, and a vertical displacement rate, for an initial point (e.g., from a tide gauge);
5. Compute new elevations for all benchmarks, using the observed elevation differences, based on the starting condition.

Differential leveling observation data was taken from the "phase 1" files extracted from the National Geodetic Survey's Integrated Data Base for three level runs. The three leveling lines used in this segment are L25414 (1993), L24680/11 (1982), and L20370 (1965). These are all "first-order" leveling lines, meaning that they are the best differential elevation observations available. Two earlier leveling lines from the 1950s also run through parts of this corridor and may have been used in other analyses. Since these older lines are of lower order, we chose not to degrade the quality of this analysis with data of lesser precision.

The leveling data extraction program computed and applied all available systematic corrections to the observations. In theory, this leaves only small random errors in the height difference observations. A list of all benchmarks common to any pair of lines was compiled. These common points ran along the route LA 1 corridor from benchmark 876 1724 TIDAL 13 at Grand Isle to A 220 near Raceland, Louisiana. Line L20370 (1965) started at point 876 1720 TIDAL 6, at the site of the older tide gauge (8761720). These "common" benchmarks then become the data set used in further analysis.

Next, we computed point-to-point elevation differences between each pair of adjacent benchmarks for each of the three runs. We did this simply by subtracting the corrected field elevation (obtained by the extraction program) for point 2 from the elevation for point 1, and so forth down the line. These are the elevation changes measured from one point to the next at the time the level run was observed. The result of this process was a list of elevation differences, between adjacent benchmarks, for each leveling line. Note that at no point in the process do we use the "adjusted" or published elevation values for the benchmarks. These adjusted elevation values contain the unwanted effects of distribution of the random errors from the network adjustment computation.

A common initial point was needed as a basis for comparison. The tide gauge data at Grand Isle, East Point provides this common datum. The NOS publication *Sea Level Variations for the United States 1854-1999,* Table 3, indicates that the sea level rise at Grand Isle is 9.85 mm per year, using the entire available data set from 1947 through 1999. Further investigation revealed that this trend was assembled from data sets of two different tide gauges, i.e., 8761720 at Bayou Rigaud (1947 into 1982) and 8761724 (1981 to present) at the present U.S. Coast Guard Station.

Analysis of the actual monthly means data obtained from NOS showed that these two tide gauges appeared to subside at different rates. Simple linear regression on the monthly means over the last 20 year period at gauge 8761720 (Figure 1) shows a rate of relative sea level change of 14.7 mm/yr. This is consistent with rates derived in earlier studies, for example Nummedal[8] or Swanson[9].

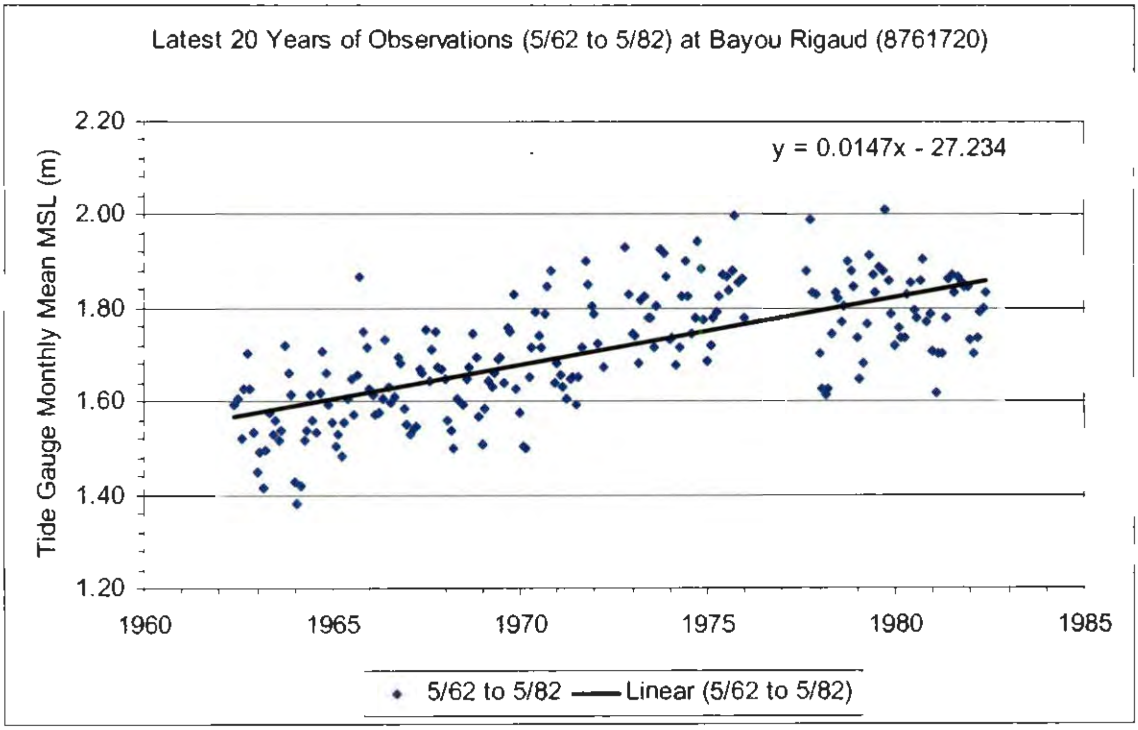


Figure 1. Regression of water level changes for different epochs at Bayou Rigaud.

The monthly mean water levels for gauge 8761724 (East Point), along with the computed regression line, are shown in Figure 2. The computed rate for its 20-year observation epoch was only 5.9 mm/yr. These two tide station locations, separated by only about 1.4 km on the ground, do not appear to be subsiding in the same way.

[8] Nummedal, D., *Rates and Frequencies of Sea-Level Changes: A Review with an Application to Predict Future Sea Levels in Louisiana*, pp. 364-365.

[9] Swanson, R.L., and C.I. Thurlow, *Recent Subsidence Rates along the Texas and Louisiana Coasts as Determined from Tide Measurements*, pp. 2668.

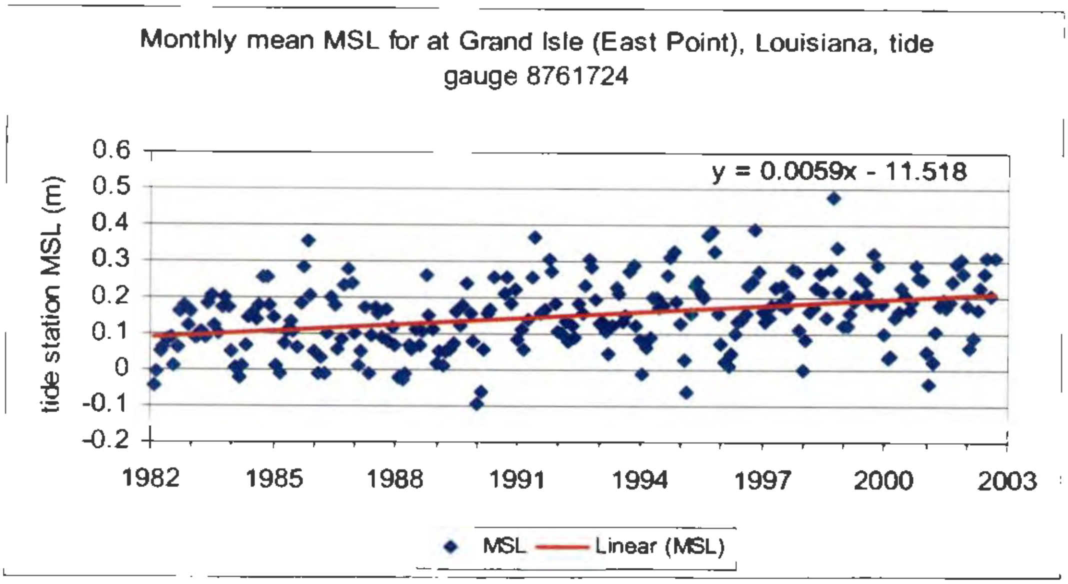


Figure 2. Regression plot of water level change at East Point.

The rate of relative sea level rise includes several components. Land subsidence is perhaps the largest constituent. To derive the real rate of subsidence, any other effects that can be identified and quantified must be removed.

Global eustatic rise acts in the same sense as subsidence, i.e., in the water level record it manifests as a rise in relative sea level. Subtracting the eustatic rise component of sea level rise should leave subsidence as the main identifiable component. Implicit in our study are the assumptions that the eustatic rise component is constant everywhere, and that the tide gauge record is dominated by marine conditions, i.e., not contaminated by fresh water processes.

The selection of a specific value for eustatic rise is difficult because there seems to be no firm agreement among the scientific community investigating this phenomenon. Many published estimates of eustatic rise have been based on examination of worldwide water level records. A mean of estimates (omitting one extreme value) made before 1989 places eustatic rise at 1.2 mm/yr[10]. Five estimates published after 1989 have a mean (after eliminating one extreme value) of 1.9 mm/yr and a median of 1.75 mm/yr[11]. Two completely different approaches to measuring eustatic rise used earth rotation records and satellite altimetry to arrive at maximum values of 1.1 mm/yr and 1.0 mm/yr[12] respectively. After considering these various approaches and values, we adopted a conservative value of 1.25 mm per year as the eustatic rise component of sea level change for Grand Isle.

Using a different eustatic rise value for the starting condition at Grand Isle would change all of the subsidence rate estimates upward or downward by the magnitude that alternative value differs from the number we applied. For example, using an alternative

[10] Gornitz, V.; *Sea Level Rise: A Review of Recent Past and Near-Future Trends.*

[11] Douglas, B.C.; *Global Sea Level Change: Determination and Interpretation*

[12] Morner, N.A.; *The Expected Sea Level Changes in the Next Century.*

value for eustatic rise of 1.75 mm/yr will lower all the subsidence rate estimates developed in this study by 0.50 mm/yr. In some parts of the subsidence network, this represents a relatively insignificant change of 5 or 10 percent in the rate estimate. In peripheral areas, it shifts the interpretation from subsidence to stability or even uplift. Remember, however, that in the coastal areas both subsidence and eustatic rise are acting simultaneously to inundate the land surface. It is the sum of the two rates that predicts how soon any particular location on the Louisiana or Mississippi coast will be at, or below, sea level. Adopting a higher eustatic rate and, thus, "shifting" some velocity from the subsidence rate is essentially irrelevant in the coastal margins because the net result does not change the projected time until potential inundation (i.e., zero elevation).

Applying the value of 1.25 mm/yr to the sea level rise rate measured by tide gauge 8761724, East Point, yields an estimated rate of subsidence for that location on Grand Isle, i.e., -5.90 mm/yr – 1.25 mm/yr (eustatic rise) = -4.65 mm/yr. Similarly, the subsidence rate for the older tide gauge, 876 1720 at Bayou Rigaud, can be computed as –14.7 mm/yr – 1.25 mm/yr = -13.45 mm/yr. Note how these values differ from the NOS published trend of -9.85 mm/ year. This NOS trend value is a combination of data from the two gauges and it still contains the eustatic rise signal.

The adjusted elevation for the last point on the level line, 876 1724 TIDAL 13, was selected as the starting point for this analysis. (TIDAL 13 is not far from the tide gauge (45 m) and subsequent analysis showed its rate of movement was not significantly different from two other benchmarks closer to the gauge site itself.) This published elevation value, 1.210 meters, was assigned as the 1993 value since it was originally determined using the 1993 leveling data. Note that 1.210 m is almost certainly not the correct present elevation of this benchmark, but this is not a problem. The goal is to determine the relative vertical displacements of benchmarks over time. Any reasonable value would suffice at this point in the analysis.

Starting with a value of 1.210 meters, we computed new "field" elevations for the other common points in the line using the original 1993 (L25414) observed elevation differences. The subsidence rate of –4.65 mm/yr was applied to the 1993 elevation (1.210 m) at 876 1724 TIDAL 13 to compute a likely elevation for that point in 1982: 1.306 meters. This value was then used as the starting point to compute new 1982 "field" elevations for each common point in the line, based on the elevation differences from the 1982 level run (L24680/11). Finally, we used the difference in the computed elevations between the 1982 and 1993 runs at each point to compute an annual vertical displacement rate at each benchmark common to the two leveling lines.

Note that the subsidence rate computed at benchmark 876 1720 TIDAL 9 (-11.73 mm/yr) is close to the subsidence trend computed for the latest 20-year cycle at the adjacent tide gauge (8761720), i.e., -13.45 mm/yr. In effect, the leveling data predicts the rate observed at this tide gauge to better than 2 mm/yr when the rate from the first gauge is used as the initial condition. It has been suggested that two locations only 1.4 km apart could not have been subsiding at such different rates, i.e., -4.65 mm/yr at East Point and –13.45 mm/yr at Bayou Rigaud, at essentially the same time. A 20-year period is considered long enough to establish a tidal datum at a given location[13], so the rates derived from these monthly means data should not be unduly influenced by short-term effects. The notable difference in movement between the two sites is likely the result of motion along the Leeville fault, as mapped by Hickey and Sabate (1972)[14].

As noted above, a third level run from 1965, L20370, previously followed the same route and included many of the benchmarks used in the later two surveys. L20370 did not, however, include TIDAL 13, but stopped about 1.4 km short at TIDAL 6. TIDAL 6 was associated with the earlier tide gauge 876 1720 at Bayou Rigaud and is also common to leveling runs L25414 and L24680/11. The new computed field elevations for 1993.333 and 1982.167 at TIDAL 6, referenced to TIDAL 13 and the tide gauge, were used to compute a rate of displacement at TIDAL 6. This rate was then applied to the 1982.167 field elevation to compute the likely elevation of TIDAL 6 in 1965.417. From this starting point, the 1965 elevation differences between adjacent points were used to compute new 1965 field elevations for each point in common with the 1982 run. Another set of subsidence rates were then computed for the time span from 1965 to 1982.

C. Joins

Leveling lines are of finite length, and leveling lines from different years do not generally start and end at the same places. The problem in assembling a network of different leveling lines observed at disparate epochs is how to join the lines through time at the nodes. We made these temporal joins by making a linear interpolation or extrapolation through time at each leveling line connection throughout the process of assembling the subsidence network. Linear interpolation or extrapolation implies that the rate of vertical motion is essentially constant over a given time period. This is a plausible model for large-scale geologic movement over short time spans in the absence of specific and detailed evidence of other events or influences.

At Raceland, we first confronted the problem of making a connection where one level line ends and another begins. Where connected leveling lines were observed at essentially the same time, as in the case of L24680/11 and L24680/10, the solution is a simple matter of assigning the computed elevation from one line to a common point on the connecting line and continuing on with computing elevation differences along that line, and rates between lines, as described above. For example, where lines L25414 and L25406/2 met at benchmark U 221, we simply assigned the elevation computed at that point for L25414 as the starting elevation at U 221 to continue computing elevations for that epoch along L25406/2. This kind of connection without an accompanying temporal shift was the exception, however.

In most cases, connecting to a different leveling line also meant changing the temporal epoch of the leveling data. For example, at point U 221 line L24680/10 (from 1982) took a different direction and we needed to develop a connection to line L20376 toward Cocodrie. L20376 was observed at a mean epoch of 1965.42. With a computed subsidence rate at U 221 of almost 2 cm per year between 1982 and 1993, it seemed likely that the elevation of U 221 in 1965 was not the same as it was 17 years later in

[13] Gill, S.K., and J.R. Schultz, *Tidal Datums and Their Applications*, pp.14.

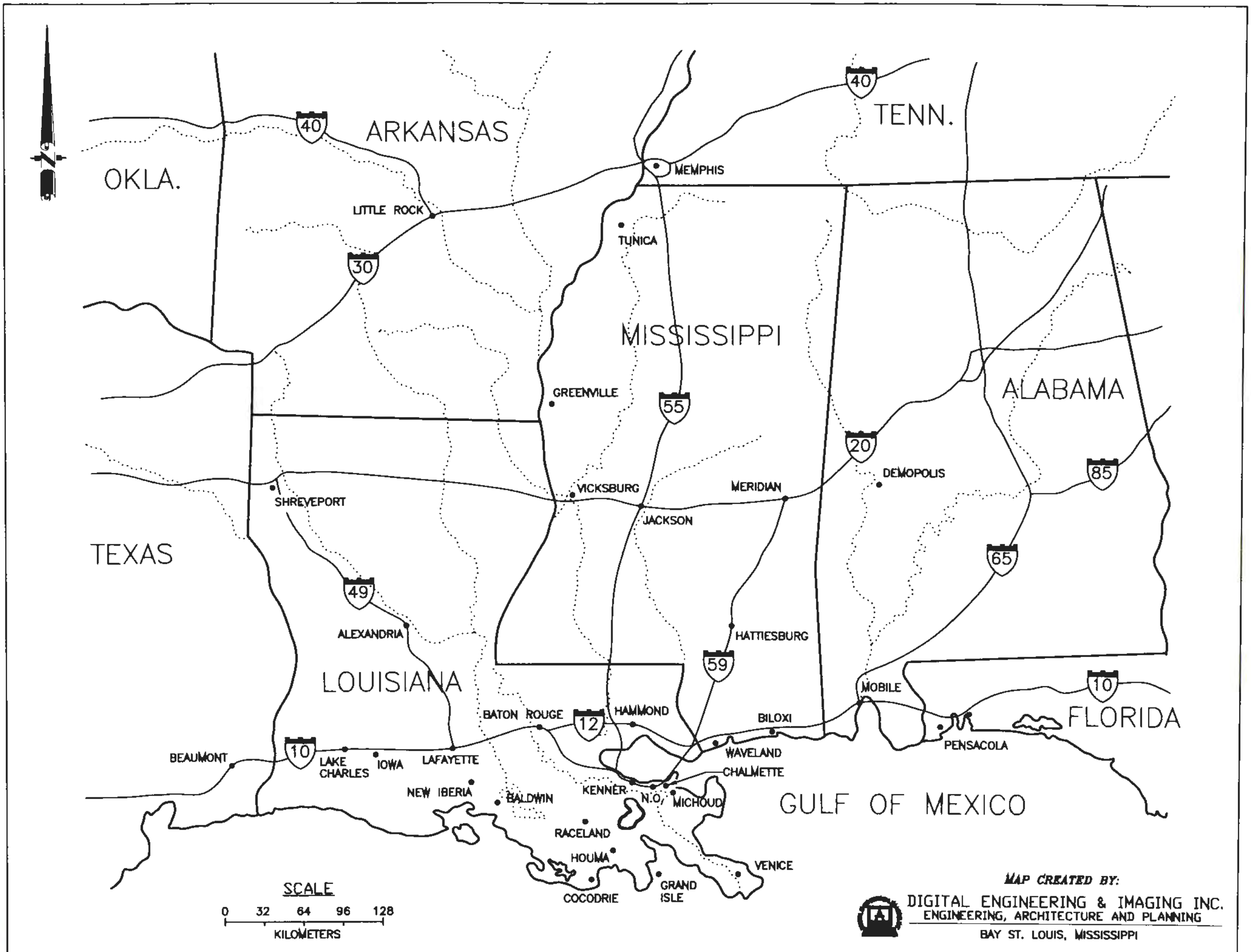
[14] Hickey, H., and R. Sabate, eds. *Tectonic map of Gulf coast region, USA.*

1982. But we lacked any reliable measurement information that might define how the elevation of point U 221 might have changed over that time. The solution we adopted was to use a simple linear extrapolation through time, using the computed rate between 1982 and 1993 and the elevation of U 221 at epoch 1982.167 to compute the likely elevation for that benchmark in 1965.42.

In other cases, the epoch of a connecting line fell within the span of the preceding two leveling lines. An example of this case occurred at point T 190 (AU0356). We first computed rates along a pair of leveling lines running from Raceland toward New Orleans that were observed in 1977 (L24133/18) and 1995 (L25517/2). At benchmark T 190, we lost L24133/18 but connected to L24966/2, observed in 1986. Here, we interpolated the likely elevation of point T 190 in 1986 based on the rate already computed between 1977 and 1995, and using the computed 1995 elevation for that point. Although the actual rate of vertical displacement may not have been constant over the 18 year period between the available leveling epochs, there is no evidence that it was not. Therefore, linear interpolation is again a plausible approach to the problem of connecting pairs of leveling lines from different epochs.

D. Network

Starting at Grand Isle, Louisiana, and following the approach detailed above, we assembled a network of benchmarks with computed subsidence rates that extends about 650 kilometers northward to Memphis, Tennessee, and roughly 650 km east to west between Pensacola, Florida, and Beaumont, Texas. Figure 3 shows the spatial distribution of the benchmarks that comprise our subsidence network. This network includes approximately 2700 benchmarks drawn from 96 different first-order level lines. Figure 4, on the following page, shows the geographical context for this network.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TENN.
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MEMPHIS
LITTLE ROCK
TUNICA
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MISSISSIPPI
GREENVILLE
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VICKSBURG
MERIDIAN
SHREVEPORT
JACKSON
TEXAS
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ALEXANDRIA
HATTIESBURG
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LOUISIANA
MOBILE
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FLORIDA
BATON ROUGE
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HAMMOND
BILOXI
BEAUMONT
LAKE CHARLES
IOWA
LAFAYETTE
WAVELAND
PENSACOLA
CHALMETTE
NEW IBERIA
BALDWIN
KENNER
N.O.
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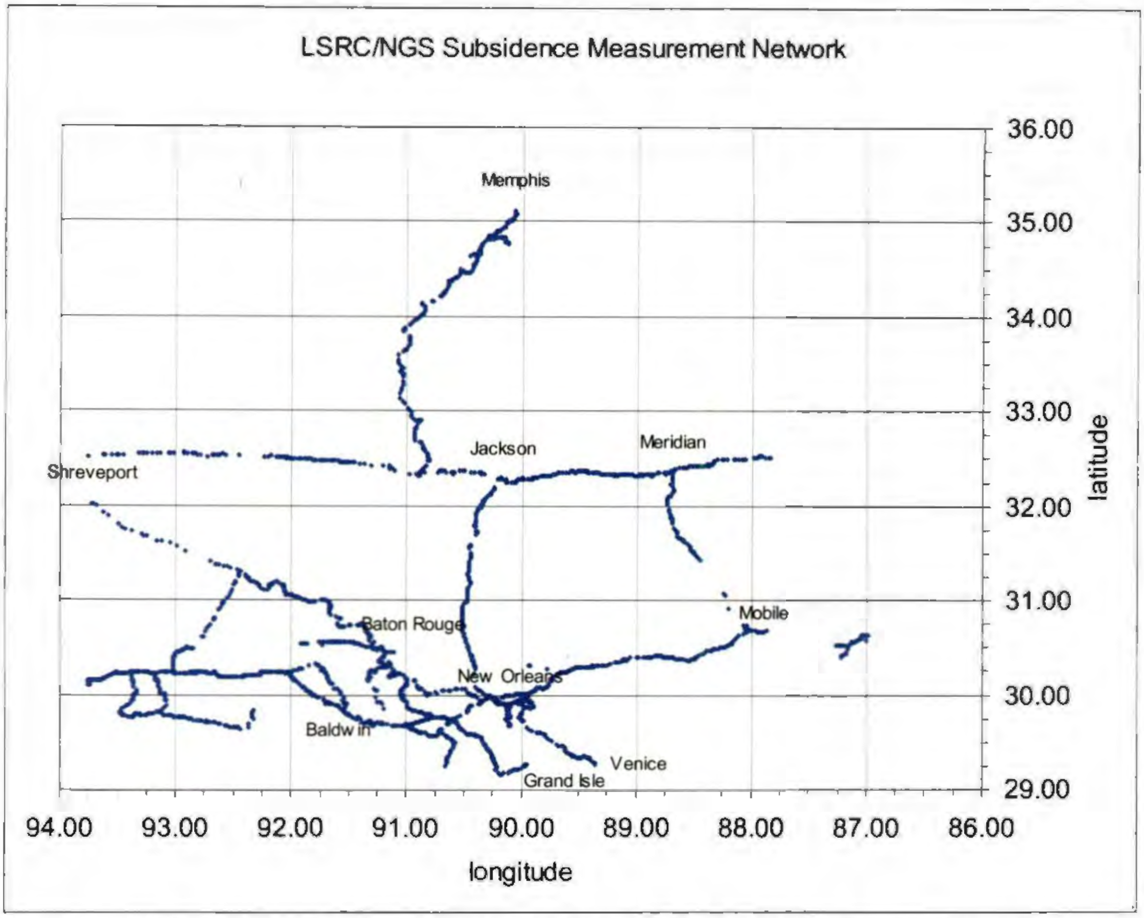


Figure 3. Plot of first-order benchmarks included in the subsidence measurement network.

Charts in Appendix 2 show the individual leveling lines included, their common end points, and how we assembled them into our network. This network was assembled from observational data, with all of the misclosures remaining. We have made no attempt here to form a single homogeneous network through a network adjustment computation, as was done by Holdahl[15], for example. A straightforward vertical network adjustment would incorrectly ignore the temporal incongruities within the data set, e.g., any given point is not expected to have a single elevation value through various epochs, nor a single rate from one epoch to the next. A complete list of all of the benchmarks included in this subsidence network is included in Appendix 3.

IV. Results

A. Description

The compiled network indicates that subsidence has occurred during the past century, and is probably still happening, throughout the lower Mississippi Valley and adjoining coastal plane. Figure 5 is a map of subsidence in this region derived from the latest rates computed for the benchmarks in this study. The general pattern of the distribution shows

[15] Holdahl, S.R., and N.L. Morrison, *Regional Investigations of Vertical Crustal Movements in the U.S., Using Precise Relevelings and Mareograph Data*, pp. 373-390.

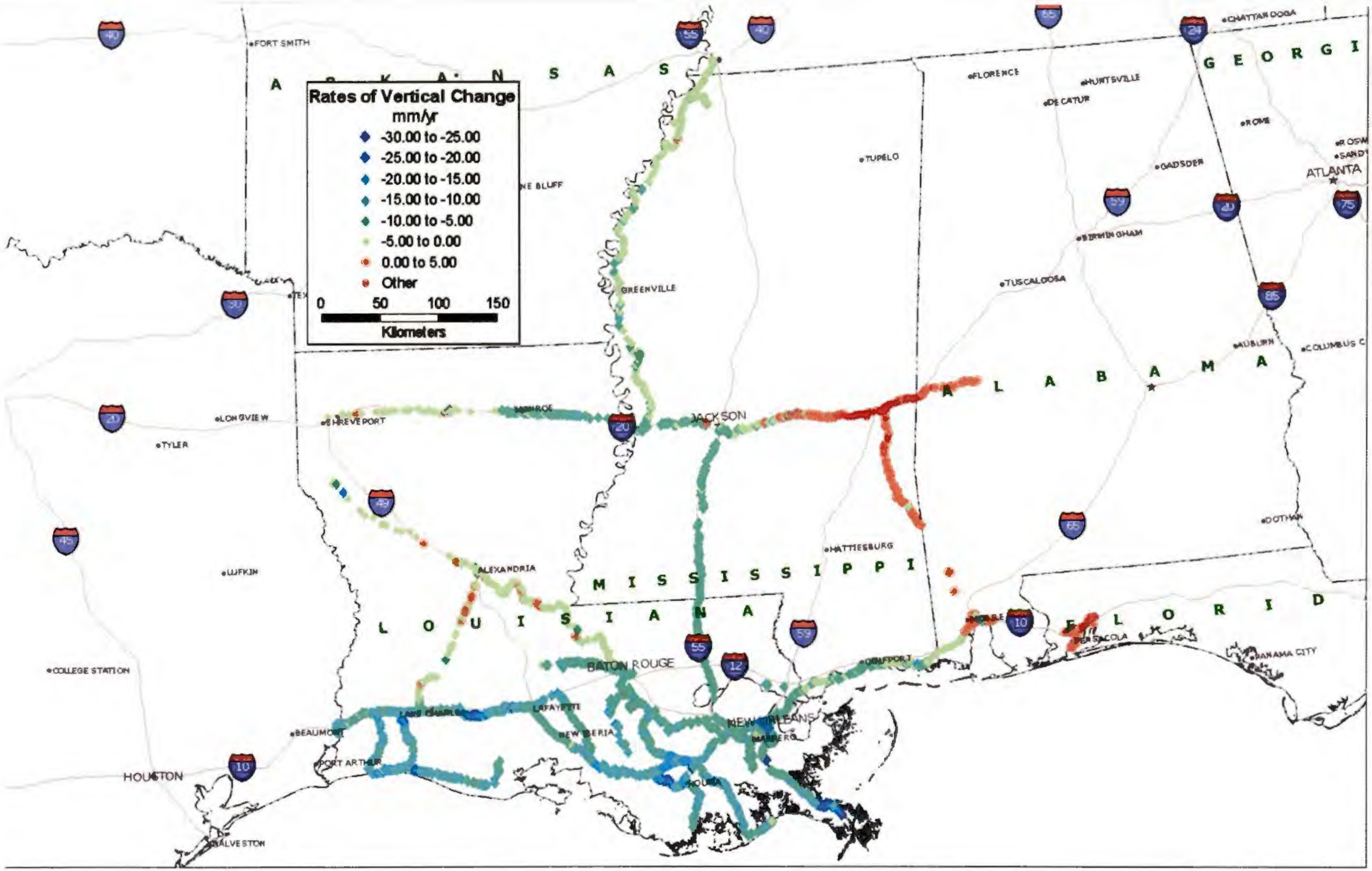
that subsidence rates are greatest in the coastal areas of southeastern Louisiana. Significant rates also appear throughout most of southern Louisiana. Subsidence was also computed along the northern Gulf Coast through Mississippi and about as far east as Mobile, Alabama. Subsidence occurs northward along the Mississippi alluvial valley at least as far as Memphis. Subsidence rates appear to diminish to near stability toward northwestern Louisiana and eastward toward Meridian, Mississippi. Our analysis appears to indicate that there may actually have been some uplift in the region of Meridian.

Note that subsidence rates were computed at benchmarks that had been included in two or more geodetic leveling projects. Leveling lines in this region tend to follow transportation corridors -- highways and railroads. Benchmarks are not located in the engineered roadbeds themselves, but in adjacent right-of-way areas or nearby structures, large and small. As such, they do not represent a unique physical condition applicable only to heavy transportation structures. Rather, they represent a wide sample of the conditions appropriate to their particular environment. For example, in southeast Louisiana the transportation corridors tend to follow the natural levees. The benchmark lines have not sampled the potentially less consolidated alluvial deposits and wetland areas in between.

Appendix 3 gives a computed subsidence rate for each benchmark, along with an approximate date of the end of the epoch ("base year" in table) from which that rate was derived. For many points, there was only one interval of time over which a rate could be computed using first-order leveling data. Those are the benchmarks that were included just twice through the years in first-order leveling projects. Many other lines of benchmarks were visited by three, four, or even five 1st order leveling projects over the years. In these cases, it was possible to develop displacement rates for a number of time epochs. These rates were rarely constant through time. (Refer to a detailed analysis of temporal distribution of rates in the Results section.) This list shows, in most cases, the latest rate computed for a given point, i.e., the rate of vertical movement computed from the two most recent leveling lines to include that point. The most recent rate at each point is the most likely value to describe the current movement of that point in the absence of any other reliable quantitative information about specific locations.

A computed elevation is shown for each benchmark in Appendix 3. These elevations were computed from the measured height differences between adjacent benchmarks. At each connecting point in the network, an extrapolation or interpolation through time was made based on the computed rate and elevation at that point. The result was a new computed elevation for that connecting point for a different date in time. For example, if the computed elevation for connecting benchmark A 100 at approximate date 1975.25 was 1.000 meters and the subsidence rate at the point was computed as -12.00 mm/yr, then the new computed elevation at date 1986.75 is 0.862 meters for benchmark *A 100*. These computed elevations are estimates of the elevation of each particular benchmark at the date shown as the "end of epoch."

All of the computed elevations in the subsidence network are based on the starting condition for benchmark 8761724 TIDAL 13 at Grand Isle, Louisiana. Initially, we used the published elevation for TIDAL 13 of 1.210 meters as the starting value for the network. When we connected the network to the tide gauge at Pensacola, Florida, we



this is a new visual

encountered a group of benchmarks that appeared to have nearly zero subsidence rates. This is confirmed by the essentially zero subsidence shown by the Pensacola water level record. We also discovered that our computed elevations were too high compared to the published elevations of the apparently non-subsiding benchmarks in Florida. The average difference between computed and published elevations for a group of benchmarks with the smallest rates was 0.288 meters.

It is certainly plausible that previous leveling adjustments overestimated the elevation of the benchmarks at Grand Isle due to assumptions about the stability of benchmarks held fixed[16]. If, for example, network adjustment computations made in the 1990s did not correctly account for the subsidence of the particular benchmarks held as fixed, then those fixed elevation values (determined perhaps decades earlier) would have been too high relative to NAVD 88. The result would be that all the elevations in that adjusted network would be too high. So we adjusted the starting condition of the network, the elevation of TIDAL 13, to 0.922 meters (1.210 minus 0.288) and effectively indexed the entire network to the published elevations of benchmarks near Pensacola.

B. Spatial Distribution

The charts in Appendix 4 are plots of the computed subsidence rates along each main leg of our subsidence network. These plots illustrate the variability of the subsidence at individual locations. It is clear that subsidence is both a local and a regional phenomenon. Both components are present in the computed rate for each benchmark.

For example, Figure 6 shows the latest subsidence rates along the corridor from Grand Isle to Raceland. The eastern end of Grand Isle, with its relatively lower rates of subsidence, appears to be relatively stable compared to the rest of the segment of leveling up to Raceland.

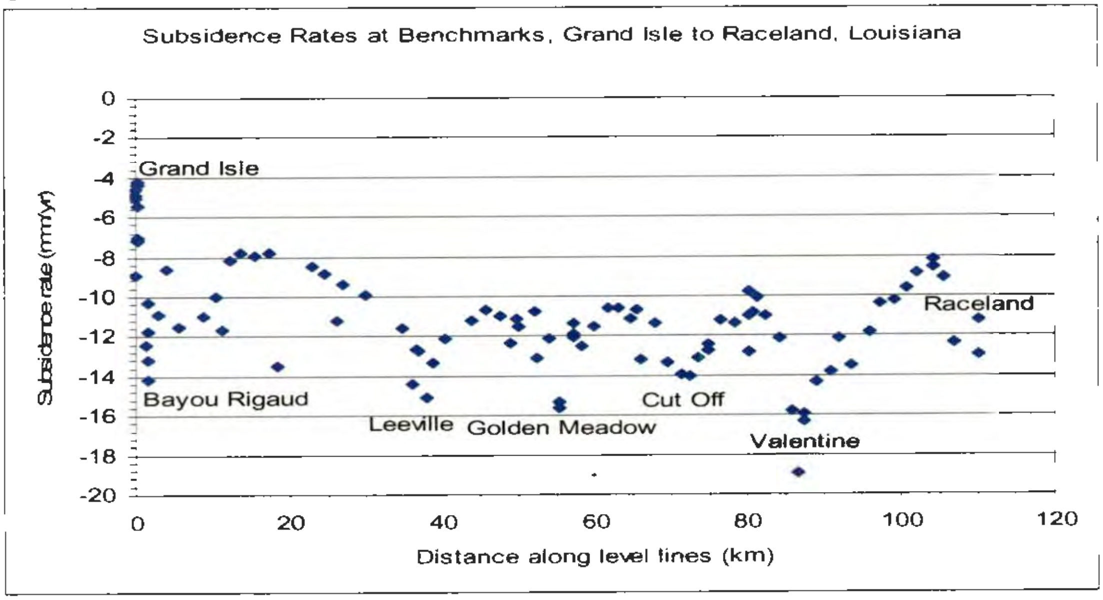


Figure 6. Subsidence rates at benchmarks from 1982 to 1993 interval.

[16] Zilkoski, D.B., and S.M. Reese, *Subsidence in the Vicinity of New Orleans as Indicated by Analysis of Geodetic Leveling Data*, pp. 9.

From Bayou Rigaud onward up the LA route 1 corridor to Raceland, subsidence follows a generally constant regional trend at about -11 mm/yr. On a local scale, however, the graph shows areas of relatively greater or lesser local subsidence.

The subsidence rates along the segment from Vicksburg to Memphis, shown in Figure 7, are another example of local variation superimposed on a regional trend. The data set as a whole shows a trend of subsidence rates decreasing at about 1 mm/yr per 100 km from Vicksburg. A linear regression with this slope explains about 58% of the variation within this data. The remaining variation is due to the varying local environments through which the leveling line runs.

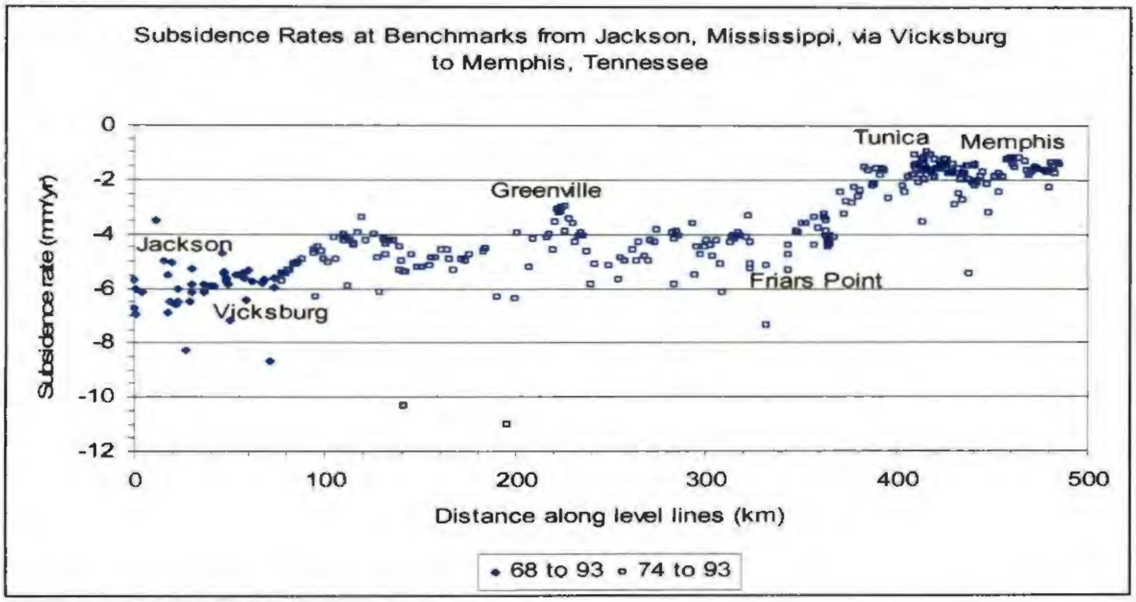


Figure 7. Subsidence rates at benchmarks.

C. Temporal Distribution

A number of segments from our subsidence network included data from more than two leveling lines, sometimes over substantial portions of the segment. This extra data enabled us to compute more than one subsidence rate at many points along each of these segments. Some of these multiple rates are shown on the plots in Appendix 4. Previous studies, for example Jurkowski[17] or Morton[18], created multiple rates by differencing each later leveling line with a common earliest line. This approach actually masks the behavior of benchmarks through time because each longer-period rate contains the earlier epoch within it. We chose instead, in almost all cases, to compute rates between temporally adjacent leveling lines. For example, instead of computing rates between leveling lines from 1934 to 1960, 1934 to 1969, and 1934 to 1993, we computed rates from 1934 to 1960, 1960 to 1969, and 1969 to 1993. This strategy yielded a number of individual data points of subsidence rates at specific benchmarks through time. By analyzing these multiple rate epochs, we can learn something about the short-term vertical displacement behavior of benchmarks in a given corridor. Examining multiple

[17] G. Jurkowski, J. Ni, L. Brown, *Modern Uparching of the Gulf Coastal Plain*, pp. 6249.
[18] R. A. Morton, N.A. Buster, M.D. Krohn, *Subsurface Controls on Historical Subsidence Rates and Associated Wetland Loss in Southcentral Louisiana*, pp. 774-775.

rates can also enable us to make some better inferences about the future movement of these points.

Below, we will analyze in detail the multiple rates computed for benchmarks along several lines: Grand Isle to Raceland, LA; New Orleans to New Iberia, LA; Kenner, LA, to Jackson, MS; and New Orleans, LA, to Biloxi, MS.

1. Grand Isle to Raceland

Along the corridor from Grand Isle to Raceland, we analyzed first-order leveling lines from 1965, 1982, and 1993. The 1965 to 1982 subsidence rates show a marked divergence from the 1982 to 1993 rates, even though they were set to an equal value at the common initial point, TIDAL 6. This divergence could represent an unmodeled, uncorrected systematic error in the first-order geodetic leveling data. This would call into question the error models used for geodetic leveling and, ultimately, the veracity of elevations nationwide. Or this divergence could represent an error in the initial condition, i.e., the rate used to extrapolate backwards in time from the 1982 elevation to a 1965 elevation for TIDAL 6. However, the tidal record for 8761720 shows a fairly consistent vertical displacement trend, at about this level, over this entire time span. The other, and most likely, possibility is that this represents a real change in the rate of subsidence within this corridor over time.

Of the 110 benchmarks examined within the corridor from Grand Isle to Raceland, 94 of these were common to the 1982 and 1993 level lines, and were thus used to compute rates for that epoch. A total of 58 benchmarks were common to the 1965 and 1982 level lines, and so were used to compute rates for that earlier epoch. The mean rates for these two epochs (-7.67 mm/yr for 1965 to 1982, -11.09 mm/yr for 1982 to 1993) are statistically different at the 95% confidence level, while the variances are equal at that level.

Only 42 benchmarks were common to all three leveling runs, however. These 42 benchmarks have two rates computed for each of them, i.e., one rate for 1965 to 1982, and another for 1982 to 1993. Figure 8 shows the two rates for each these 42 benchmarks plotted opposite each other. For each benchmark, the earlier epoch rate is plotted along the horizontal axis against that same mark's later epoch rate along the vertical axis.

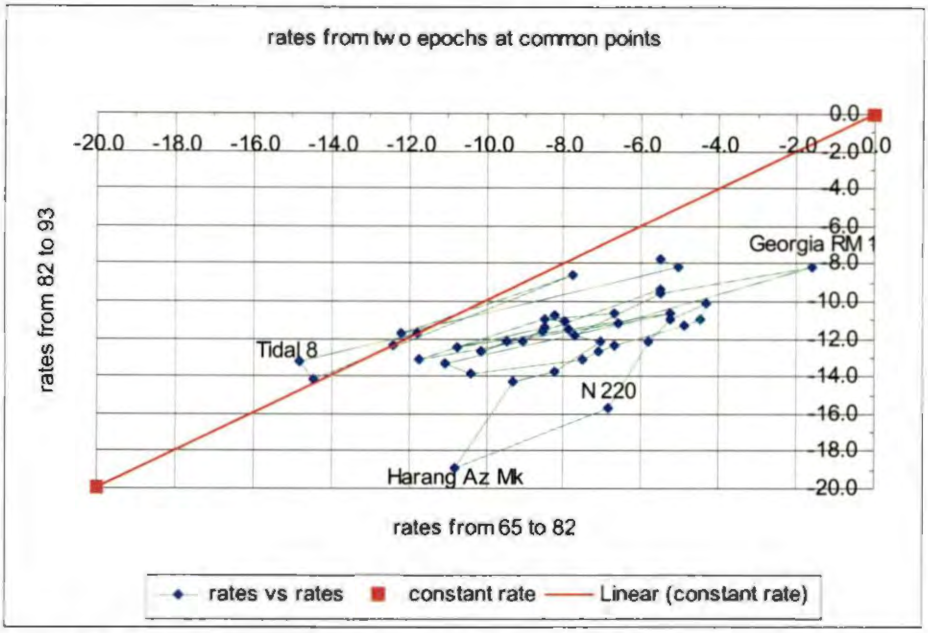


Figure 8. Rates for two epochs at each benchmark.

Figure 8 depicts the change in the rate of subsidence at each benchmark between the two measurement epochs. The diagonal straight line shows the specific condition in which the rate of subsidence would be equal for both epochs. The points that plot on this line are the tidal benchmarks closest to the NOS tide gauge 8761720. This line divides the chart into two distinct regions. Points falling in the upper left half of the chart show a decrease in their subsidence rate from the earlier to later epoch. Points that plot in the lower right half of the chart show an increase in subsidence rates from the 1965 to1982 epoch to the 1982 to 1993 epoch.

The geographic arrangement of the benchmarks is obscured in this type of chart. The thin line connects the points in their geographic order along the line from Grand Isle to Raceland. It appears that there is no simple geographic trend in the rates of subsidence change between epochs. The point labeled Tidal 8 is near the old Grand Isle tide gauge, 8761720. The other three labeled points, which seem to fall apart from the main group, are all close to the Raceland end of the corridor.

Descriptive statistics for the rates for benchmarks common to the two measurement epochs are shown here in Table 4.

	82 to 93 mm/yr	65 to 82 mm/yr	paired differences mm/yr
mean	-11.81	-8.09	-3.73
variance	4.164	8.017	5.537
count	42	42	42

Table 4. Descriptive statistics for rates from Grand Isle to Raceland.

Paired-means analysis shows that the two means are significantly different at the 95% confidence level ($p<0.0001$). The average subsidence rate is higher for the 1982 to 1993 epoch than for the 1965 to 1982 period. The higher mean rate for the later epoch implies an overall faster rate of subsidence along the corridor. There is also less variability among the rates in the later epoch compared to the earlier interval. The change in rates is not consistent or predictable along the corridor. A linear regression model using the earlier rates as the dependent variable and the later rates as the independent variable shows only a weak correlation.

It should not be assumed that subsidence rates generally and suddenly accelerated in 1982. This is merely an artifact of the timing of leveling runs. Rather, these two epochs could be interpreted as chords to a curve that describes a gradual acceleration of subsidence over time. In the case of benchmark N 220, the two rates described by the three data points (elevations determined from leveling runs), Figure 9, are –6.84 and –15.73 mm/yr. A second-order polynomial curve fit to the three data points shows one possible function to describe the actual progress of subsidence rate change over time at N 220.

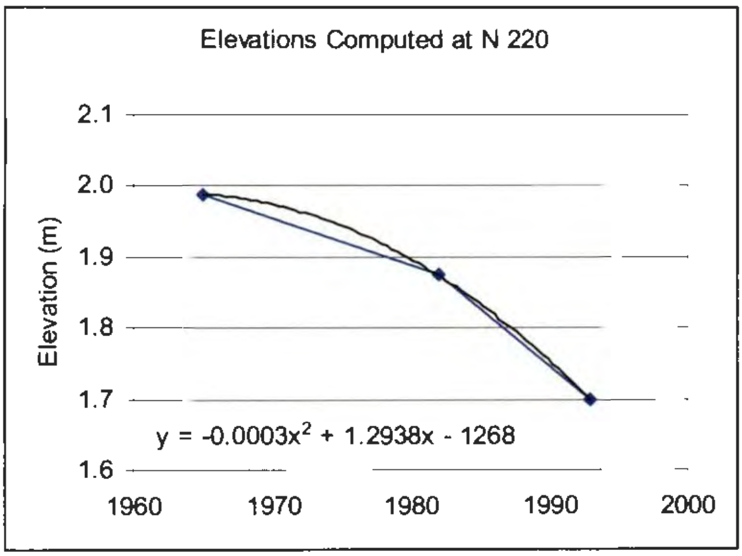


Figure 9. Changes in elevation over time at N 220.

2. New Orleans to New Iberia

For the corridor from just south of New Orleans to New Iberia, Louisiana, we were able to analyze first-order leveling lines observed in 1955, 1964, 1969, 1977, and 1993 or 1995 (on two different parts of the line). The total line length is about 207 kilometers and includes 231 benchmarks. Not all benchmarks are included in all lines or rate epochs. Thus, we computed subsidence rates at benchmarks for temporally adjacent epochs as:

1955 to 1964,
1964 to 1969,
1969 to 1977,
1977 to 1993 (the 1993 and 1995 lines do not spatially overlap),
1977 to 1995.

Table 5 shows descriptive statistics for the computed subsidence rates along this line, by epoch.

Descriptive Statistics: New Orleans to New Iberia
(statistical values in mm/yr)

Epoch	N	N missing	Mean	Standard Deviation	Standard Error of the Mean	Maximum	Minimum
55 to 64	139	92	-6.666	4.102	0.348	-26.73	-1.96
64 to 69	193	38	-7.910	3.640	0.262	-24.65	-0.99
69 to 77	165	66	-11.866	4.996	0.389	-28.55	-5.58
77 to 93	74	157	-7.557	1.746	0.203	-12.75	-4.16
77 to 95	19	212	-9.426	1.454	0.333	-12.47	-7.47

Table 5. Descriptive statistics for subsidence rates. N is the sample size.

Simply inspecting the means and standard deviations seems to indicate that the rates of subsidence are not the same through all epochs of time from 1955 through 1993/95. A Kruskal-Wallis test on the epoch medians appears to confirm this hypothesis. The Kruskal-Wallis test is more appropriate in this case than an ANOVA because it does not rely on the assumption of normal distribution of the sample.

Kruskal-Wallis Test: rate versus epoch

```
  590 cases were used
  565 cases contained missing values
Kruskal-Wallis Test on rate
epoch        N    Median    Ave Rank        Z
1          139    -5.560       401.7     8.40
2          193    -7.430       319.0     2.33
3          165   -10.230       174.8   -10.72
4           74    -7.045       326.2     1.66
5           19    -9.270       208.9    -2.25
Overall    590                 295.5
H = 147.63  DF = 4  P = 0.000
```

The overall p value shows that it is almost certain that at least one of the median rates is different from the others, thus providing strong evidence against the null hypothesis that subsidence was equal through all epochs. The Z scores for epochs one and three appear quite different from each other, and from the others as a group. This tells us little, however, about how the rates might have changed through time.

To investigate the nature of the change in subsidence with time over this corridor, we extracted a representative sample of 22 individual benchmarks for more detailed analysis. These 22 points were drawn from the subset of points that were included in five leveling lines, i.e., each had five different elevation determinations. This sample covers two segments of the New Orleans to New Iberia line: WillsWood to Raceland, and Paradis to Baldwin. These are the segments covered by the leveling from the 1990s.

For each sample benchmark, we plotted the five computed elevation values as a function of time. We then applied a quadratic curve fit to each point's elevations and collected the regression coefficients. Individual regression plots for each sample point are shown in Appendix 5.

Descriptive statistics for regression coefficients:
row 1 = intercept
row 2 = linear term coefficient, in mm/yr
row 3 = quadratic coefficient, i.e., change in rate, in mm/yr/yr

Row	ave coef	stdev	median	max	min	range
1	2.64564	1.23696	2.86924	4.84208	0.696829	4.14525
2	-0.00748	0.00431	-0.00691	-0.00207	-0.023852	0.02178
3	-0.00003	0.00008	-0.00002	0.00028	-0.000125	0.00040

The sample is 22 points along the line from New Orleans to New Iberia. Negative value in row 2 indicates downward tilt, i.e., subsidence. Negative value in row 3 indicates downward "bend" in fitted curve, i.e., subsidence increasing with time. Rate is increasing at coefficient amount in mm/yr/yr. On average, for this line, subsidence rates are increasing by 0.03 mm per year for each year, from a base rate of 7.5 mm/yr. The maximum acceleration in this sample is 0.000125 mm/yr/yr. This implies that the subsidence rate at that benchmark increases by 1.25 mm/yr over a ten-year period.

Figure 10 shows the spatial distribution of the sample points with their quadratic coefficients. It appears that subsidence is increasing at a higher rate for the points in the eastern portion of the line (WillsWood to Raceland), whereas the rate of increase is smaller for the western portion (Paradis to Baldwin). The notable anomaly appears to be point L 167 (AU0232), about 5 miles east of Morgan City. The regression plot for L 167 appears to show that the rate of subsidence is actually decreasing through time at this point.

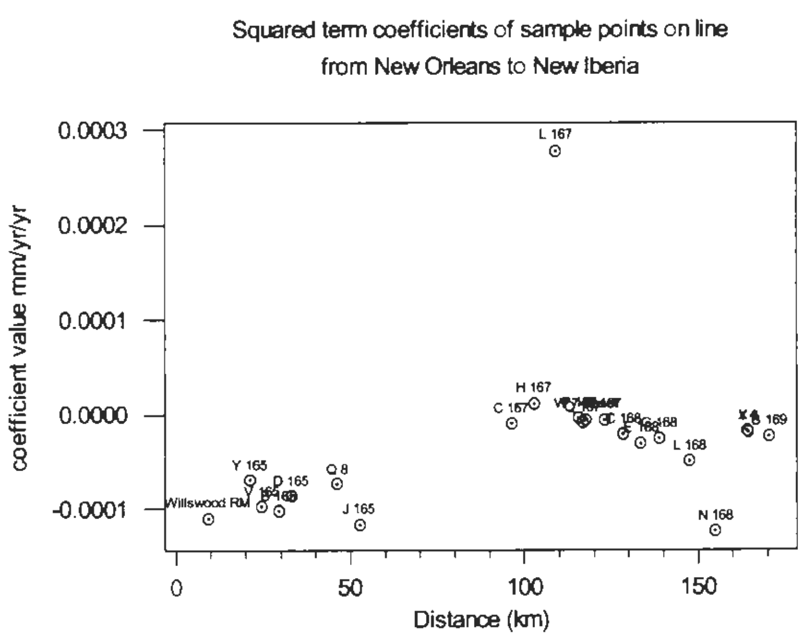


Figure 10. Distribution of accelerations within the sample.

3. Kenner to Jackson

The first-order leveling data for the corridor from Kenner, Louisiana, to Jackson, Mississippi, includes projects from four different years: 1934, 1960, 1969, and 1993. The subsidence rate data is summarized in Table 6. The total line length is about 285 kilometers and the data set contains 195 benchmarks. Inspection of the data appears to indicate that subsidence rates along this corridor have increased through the twentieth century.

Descriptive statistics: Kenner to Jackson
(statistical values in mm/yr)

Epoch	N	N missing	Mean	Standard Deviation	Standard Error of the Mean	Maximum	Minimum
34 to 60	64	131	-0.512	1.161	0.145	-5.05	0.94
60 to 69	134	61	-9.971	2.498	0.216	-18.56	-4.50
69 to 93	192	3	-10.395	1.065	0.077	-15.19	-7.79

Table 6. Descriptive statistics of subsidence rates at benchmarks. N is the sample size.

Again, we used the Kurskal-Wallis test to test the null hypothesis that subsidence rates for all three epochs are equal.

Kruskal-Wallis Test: rate versus epoch

```
  390 cases were used
  195 cases contained missing values
Kruskal-Wallis Test on rate
epoch        N    Median    Ave Rank        Z
1           64   -0.5400       358.5    12.65
2          134   -9.1500       189.7    -0.73
3          192  -10.2150       145.2    -8.68
Overall    390                 195.5
H = 172.36  DF = 2  P = 0.000
```

The P = 0.000 indicates strong evidence against the null hypothesis, i.e., subsidence during at least one of the epochs is different than the others at the 95% significance level. The Z scores show that each of the epochs is different from the other two in terms of its rate of subsidence.

For this section of the network, we examined in detail a sample of 18 benchmarks selected from among the subset of marks that had been included in all four leveling projects through this corridor. Interpretation of the statistical summary of the regression coefficients from each point is less straightforward than for the previous line.

Descriptive statistics for regression coefficients:
row 1 = intercept
row 2 = linear coefficient, in mm/yr
row 3 = quadratic coefficient, i.e., change in rate per year, in mm/yr/yr

Row	mean	stdev	median	max	min	range
1	79.06308	52.69799	88.66814	144.89457	1.88714	143.00743
2	0.00109	0.00317	0.00214	0.00371	-0.01023	0.01394
3	-0.00008	0.00003	-0.00009	-0.00000	-0.00011	0.00011

Inspection of the individual plots in Appendix 5 reveals that many of the quadratic fits have a humped shape. This explains the positive values for the linear coefficients, but also suggests that these results cannot be readily interpreted in terms of slope, and thus subsidence rate. The shapes of the plotted curves imply that positive displacement may have occurred over a portion of this corridor during the 1940s and 1950s. The more likely interpretation is that these values hint at the level of measurement error, not yet formally quantified, inherent within this analysis. For these 18 sample points, the regression plots seem to show an increase in the rate of subsidence over at least the last 30 years of the observation period. In this case, the plot of all the rates computed for all the benchmarks within this corridor, shown in Figure 11, appears to show a general increase in subsidence rates with the passage of time.

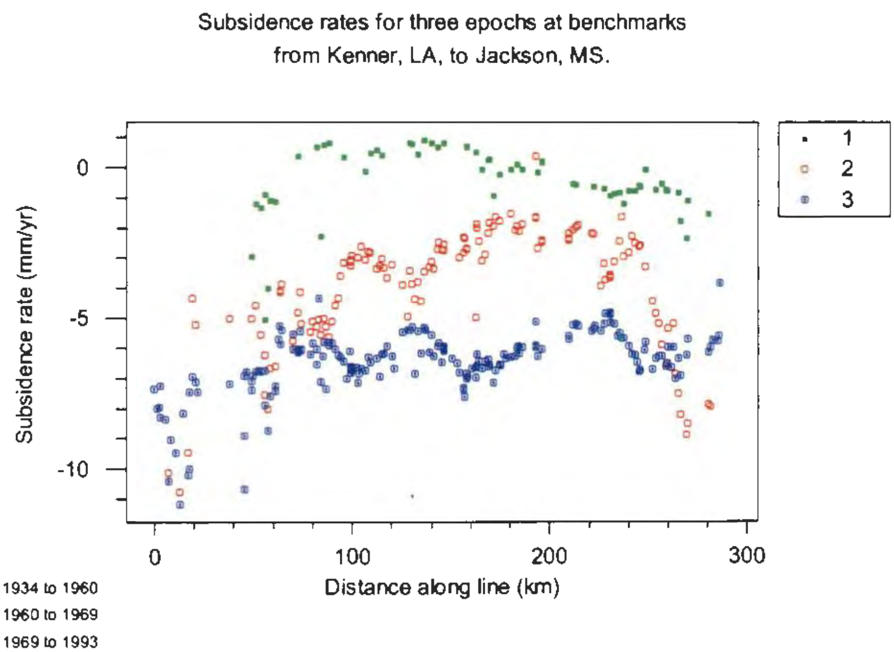


Figure 11. Subsidence rates from Kenner, Louisiana, at left to Jackson, Mississippi, at right.

4. New Orleans to Biloxi

In contrast to the corridors discussed above, the multiple leveling lines between Biloxi and New Orleans show only weak evidence of an increase in the rates of subsidence at benchmarks over time. The Kruskal-Wallis test shows that the median rate of subsidence appears to be increasing slightly over time.

Kruskal-Wallis Test: rate versus epoch

Epoch 1 = 38 to 55, 2 = 55 to 71, 3 = 71 to 77, 4 = 77 to 93.

```
Kruskal-Wallis Test on rate2
epoch        N    Median     Ave Rank       Z
1           53    -5.180        301.3    2.55
2          133    -6.080        269.0    1.47
3          225    -6.870        247.2   -0.80
4           94    -6.995        217.2   -2.64
Overall    505                  253.0
H = 13.42  DF = 3  P = 0.004
```

The p-value of 0.004 indicates a greater than 95% confidence that the null hypothesis may be rejected in favor of the alternative that at least one of the epochs is different from the others. The Z scores show that the difference among epochs is relatively small, although they do appear to confirm a temporal trend among the epochs. The plot of the computed rates versus position of the benchmarks along the lines, Figure 12, illustrates why the statistical tests appear uncertain about changes in subsidence rates within this corridor.

The whole character of the spatial pattern of subsidence changes at about the point where the leveling lines cross the outlet of Lake Pontchartrain into the Gulf, at about the 95 km point along the route from Biloxi. The temporal differences between rates on the Mississippi side of this apparent divide seem dominated by some spatially coherent phenomenon or perhaps an artifact in the leveling data itself. To the west, toward New Orleans, the temporal variations appear more random. The net result is that there appears to be no clear trend in either acceleration or deceleration of subsidence through this corridor.

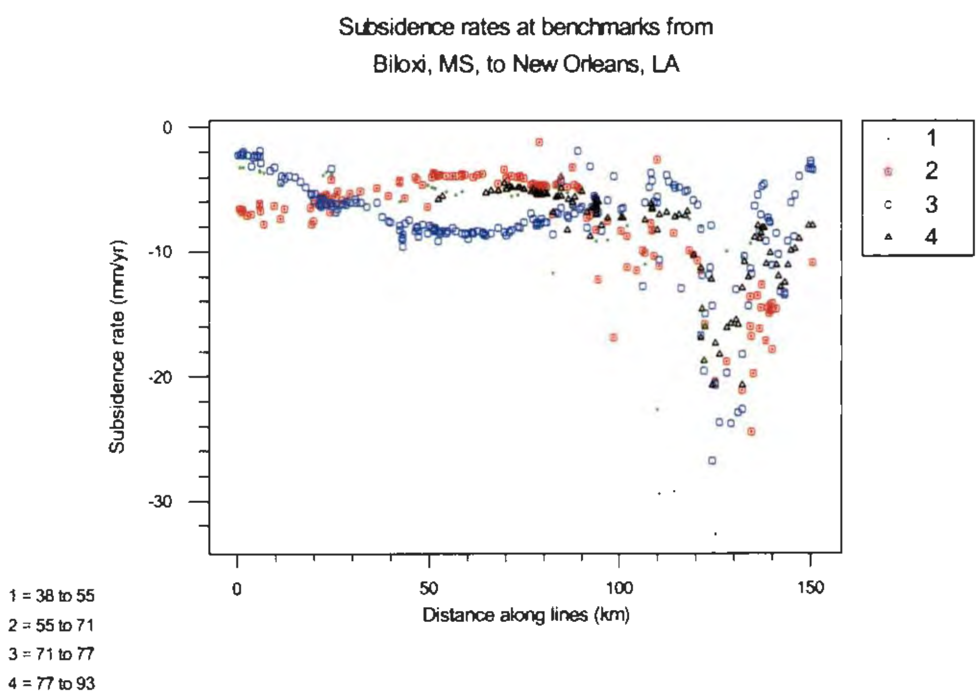


Figure 12. Subsidence rates from Biloxi, Mississippi, at left, to New Orleans, Louisiana, at right.

Note that the 1969 leveling data has been omitted from this presentation of statistical analysis for the sake of clarity. Essentially the same result is achieved when the 1969 data is used in place of the 1971 rates, and when an additional epoch from 1969 to 1971 is included in the analysis.

D. Monument Stability Type

The National Geodetic Survey classifies all survey monuments in its data base by stability type[19]. Stability rating A monuments are thought to be the most stable, i.e., least likely to move over time. Stability A monuments are typically disks, or other markers, set in large structures with deep foundations, e.g., bridge abutments or federal buildings. Stability type B monuments are also considered unlikely to move measurably over time. These are typically the driven-rod type monuments. Stability C monuments are objects such as a disk set in a poured-in-place concrete monument. We recognize the possibility that local conditions can cause the elevations of these monuments to change over time. At the bottom of the hierarchy are the stability type D monuments. These are "surface marks", such as a disk set in a sidewalk slab, that are likely to move with even seasonal variations in soil moisture. NGS provides these ratings as a guide to users of benchmark information.

It is then reasonable to ask if the rates of subsidence measured at benchmarks are related to monument stability type. Do more "stable" monument types subside at lower rates than less stable types in this region? Table 7 is a summary of the entire subsidence network broken down by monument stability type.

Descriptive Statistics: Rate by Type
(statistical values in mm/yr)

Type	N	Mean	Median	StDev	SE Mean	Minimum	Maximum
A	54	-7.928	-7.155	5.302	0.722	-21.10	6.65
B	661	-7.191	-6.730	5.483	0.213	-27.36	7.07
C	1513	-7.088	-7.230	6.080	0.156	-49.28	15.23
D	449	-5.289	-4.810	5.449	0.257	-51.94	6.79

Table 7. Descriptive statistics of subsidence rates by monument type.

An ANOVA of the data set implies that there is a statistically significant difference between the subsidence rates for the various stability types. The p-value of 0.000 indicates strong evidence against the null hypothesis that the rates are the same for all stability types. In fact, the stability type D monuments, the surface monuments, show a lesser mean subsidence rate than the other three types.

One-way ANOVA: Rate versus Type

```
Analysis of Variance for Rate
Source     DF        SS         MS          F        P
Type        3    1317.8      439.3      12.97    0.000
Error    2673   90529.2       33.9
Total    2676   91847.0
                                     Individual 95% CIs For Mean
                                     Based on Pooled StDev
Level       N      Mean      StDev   ----+---------+---------+---------+--
A          54    -7.928      5.302    (---------*---------)
B         661    -7.191      5.483              (--*--)
C        1513    -7.088      6.080                (-*-)
D         449    -5.289      5.449                        (---*--)
                                     ----+---------+---------+---------+--
Pooled StDev =    5.820                -9.0      -7.5      -6.0      -4.5
```

[19] Schomaker, M.C. and R.M. Berry, *Geodetic Leveling*.

Both Tukey's and Fisher's pairwise comparison tests agree that the mean subsidence rate for stability type D is different from each of the others, while the rates for types A, B, and C are all statistically the same.

To check for the possibility of variation in behavior of monument types within different corridors, we extracted data for each of three main branches of the subsidence network and performed separate analyses. For the leveling lines along the corridor from New Orleans to New Iberia, Louisiana, there were no stability type A monuments in the data set. The p-value of 0.184 implies no evidence against the null hypothesis that the mean rate of subsidence is the same for all three stability types.

One-way ANOVA: rate versus stability

```
Analysis of Variance for rate
Source     DF        SS        MS        F        P
stabilit    2      67.0      33.5     1.70    0.184
Error     587   11608.7      19.8
Total     589   11675.7
                                 Individual 95% CIs For Mean
                                 Based on Pooled StDev
Level       N      Mean     StDev  -------+---------+---------+---------
B         111    -8.473     4.237                (-------*--------)
C         405    -8.638     4.258                    (----*---)
D          74    -9.602     5.622   (---------*---------)
                                   -------+---------+---------+---------
Pooled StDev =    4.447                 -10.0      -9.0      -8.0
```

Our analysis of the leveling lines connecting Kenner, Louisiana, with Jackson, Mississippi, shows a similar result. The p-value of 0.493 indicates no evidence against the null hypothesis that the mean rate of subsidence is the same for all four stability types.

One-way ANOVA: rate versus type

```
Analysis of Variance for rate
Source     DF        SS        MS        F        P
type        3      38.3      12.8     0.80    0.493
Error     386    6149.9      15.9
Total     389    6188.2
                                 Individual 95% CIs For Mean
                                 Based on Pooled StDev
Level       N      Mean     StDev  -------+---------+---------+---------
A           9    -7.553     4.276        (------------*------------)
B         129    -8.406     3.930               (--*--)
C         231    -8.703     4.149              (-*--)
D          21    -9.611     1.853  (--------*--------)
                                   -------+---------+---------+---------
Pooled StDev =    3.992                 -10.0      -8.0      -6.0
```

The leveling data in the corridor from New Orleans to Biloxi, Mississippi, yields subsidence rates that reveal similar behavior regarding monument stability type. The p-value of 0.142 in the ANOVA table below implies no evidence against the null hypothesis that the mean rate of subsidence is the same for all four stability types.

One-way ANOVA: rate versus type

```
Analysis of Variance for rate
Source     DF        SS        MS        F        P
type        3     287.8      95.9     1.82    0.142
Error     709   37328.7      52.6
Total     712   37616.4
                                   Individual 95% CIs For Mean
                                   Based on Pooled StDev
Level       N      Mean     StDev  ---+---------+---------+---------+---
A          20   -12.349     6.867   (-----------*----------)
B         182    -8.425     7.217                          (---*----)
C         394    -8.576     7.270                            (--*--)
D         117    -8.486     7.332                         (----*----)
                                   ---+---------+---------+---------+---
Pooled StDev =    7.256           -15.0     -12.5     -10.0      -7.5
```

The relatively miniscule size of the sum of squares due to stability type compared to the SS for error in both cases indicates that the majority of the variation in subsidence rates is attributable to chance rather than to monument configuration.

V. Validation

The subsidence rate network was assembled and computed using one kind of data, first-order leveling, and one starting condition, i.e., the tidal record at Grand Isle East Point. A great many assumptions, judgments, and choices went into assembling the network and computing the vertical displacement rates for each benchmark. What confidence do we have that the rates are valid?

A. Tide Records

One possible measure of the validity of our constructed subsidence network is to examine how the rates computed through the leveling network match the rates predicted at tide gauges other than the starting point at Grand Isle, East Point. The subsidence rates for all benchmarks in the network were computed only from leveling observations, all based on the starting condition set by the East Point tide gauge. Thus, the subsidence values at benchmarks near other tide gauges are independent of the values determined from the tidal records. Table 8 shows the effective subsidence rates for other tide gauges and proximate benchmarks. At each tide station, the total relative sea level rise, as recorded by the water level record, was reduced by the same –1.25 mm/yr eustatic rise value.

tide gauge location	gauge observed rate (mm/yr)	leveling data prediction (mm/yr)	difference in rates (mm/yr)
Grand Isle (Bayou Rigaud)	-13.45	-11.73	1.72
Cocodrie, LA	-11.95	-8.68	3.27
Venice, LA	-32.85	-24.52	8.33
Waveland, MS	-6.75	-4.62	2.13
Pensacola, FL	-0.89	4.33	5.22
Dauphin Island, AL	-1.68	-0.04	1.64
Eugene Island, LA	-8.49	-12.02	-3.53

Table 8. Comparison of tidal rates with leveling rates.

In general, the leveling network predicts the tidal records very well. The largest difference is at Venice, Louisiana. In this case, the tidal record is probably not an especially accurate measure of actual surface subsidence. The location of the gauge itself, within a distributary channel of the river, raises the possibility of an effect from changes in river flow volume in the data. The tidal record at this location consists of fourteen months of observations, a ten-year gap, and another 21 months of observations. The subsidence rate derived from the leveling network is probably the more accurate measure of vertical displacement at this location.

B. CORS Sites

Another independent check on the validity of the subsidence rates computed from the leveling network computations can be derived from computed vertical displacement rates for CORS sites within the network area.

Using a processing approach suggested by Dr. Mark Schenewerk, we used NGS' PAGES software to process vector solutions and determine ellipsoid heights at CORS sites in New Orleans (ENG1), Vicksburg (VIC1), and Memphis (MEM2). We determined the heights within a reference frame defined for each processing session by three IGS sites: CRO1 (St. Croix, U.S. Virgin Islands), NLIB (North Liberty, Iowa), and MDO1 (McDonald Observatory, Texas). In each processing session, we held all of the IGS sites fixed, i.e., constrained the individual sites to their a priori values by assigning each of them the PAGES default weight of 100. This forced PAGES to put all of the "error" into the one free site, the local CORS site, and thus determine its height relative to the fixed reference frame defined by the others.

For each day used, we processed a single session of vectors from one "local" CORS site to each of the IGS sites. In the language of PAGES, we used the CORS as the "hub site". Where a full data set was available, we processed a 23 hour and 45 minute session for each day. A few days were shorter due to lack of data, but none was shorter by more than a few hours. In a few cases where data was missing, we processed vectors to only two out of three of the IGS sites. Ellipsoid heights from these days generally fit well with heights from days using all sites, so we included those in the data set for analysis.

For each local CORS site, we determined ellipsoid heights for a selection of days at each "end" of a six or seven year time period. All the days fell within the last 65 days of their respective year, thus eliminating seasonal effects as far as possible. The final number of days processed and included in the analysis depended on how many samples were needed to bring the expected error of the mean within a limit of 5 mm. A spreadsheet computed, and recomputed, the relevant statistics and sample size needed as each result was added.

Each mean ellipsoid height for each site includes heights processed independently by two different operators. We did this to detect any possible bias in the processing result; no bias or difference between the two operators was evident. Each person worked on each session solution individually to achieve the best possible result in terms of lowest RMS and lowest number of un-fixed integers in each session. We did not, however, break individual vectors out of a session for special processing attention.

A mean ellipsoid height was determined for the antenna reference point (ARP) of the local CORS site at each end of the target period, and the rate of vertical displacement was simply the difference in the two means divided by the number of years between them. This rate is also shown as the slope of the regression line on the graph of the ellipsoid height means. The height error bars shown on the graphs are the mean of all of the height standard deviations determined by PAGES for each solution.

As a final check, a t-test was applied to determine whether or not the mean ellipsoid heights on each end of the temporal space differed statistically by a specific amount. This test amount was chosen to reflect the expected rate of displacement over time. In each case, the t-test indicated that the mean heights from the two epochs did differ by the initial estimate. A 95% confidence interval was also computed on the difference between the means, and on the concomitant displacement rate.

For the ENG1 site in New Orleans we processed ellipsoid height solutions for a sample of 31 days from 1996 and 24 days in 2002, as described above. The difference between the mean heights for each sample was 0.033 meters, with a 95% confidence interval on the difference of the two means of 0.026 to 0.039 meters. Thus, the ENG1 site showed a mean rate of vertical displacement of -5.4 mm per year (-4.3 mm/yr to -6.5 mm/yr at 95%) between 1996 and 2002. This compares to -7.71 mm/yr at benchmark N 278, 1.5 km from this CORS.

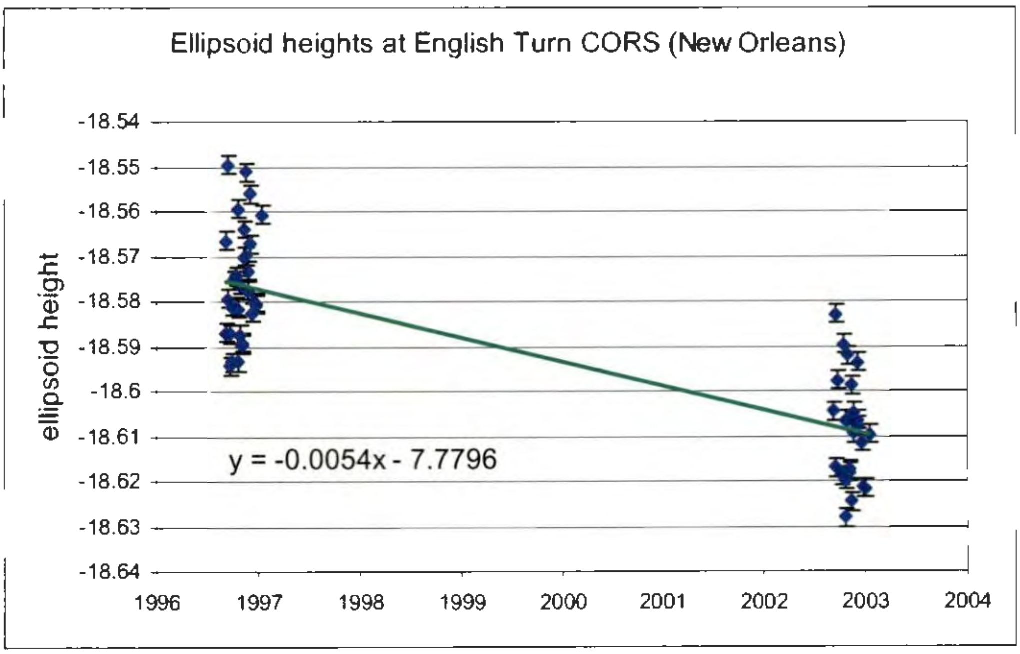


Figure 13. Vertical displacement derived from GPS observations; ellipsoid heights in meters.

Ellipsoid height solutions at ENG1 had a mean standard deviation of 0.012 meters. This is shown as the vertical error bar on the individual observations. The standard error of the mean at each epoch is 0.002 m. The R^2 of the regression line is 65.2%, indicating that this proportion of the variation within the data set is explained by the regression.

For the VIC1 site, across the Mississippi River from Vicksburg, we processed 17 ellipsoid height solutions from 1995 and 2002. The difference between the mean heights for each sample was 0.052 meters. The 95% confidence interval for this difference is 0.045 m to 0.059 m. The VIC1 site showed a mean rate of vertical displacement of -7.4 mm/yr (-6.4 mm/yr to -8.4 mm/yr) between 1995 and 2002. This compares to -6.32 mm/yr at benchmark P 254, 4.7 km from the CORS and on the same side of the river.

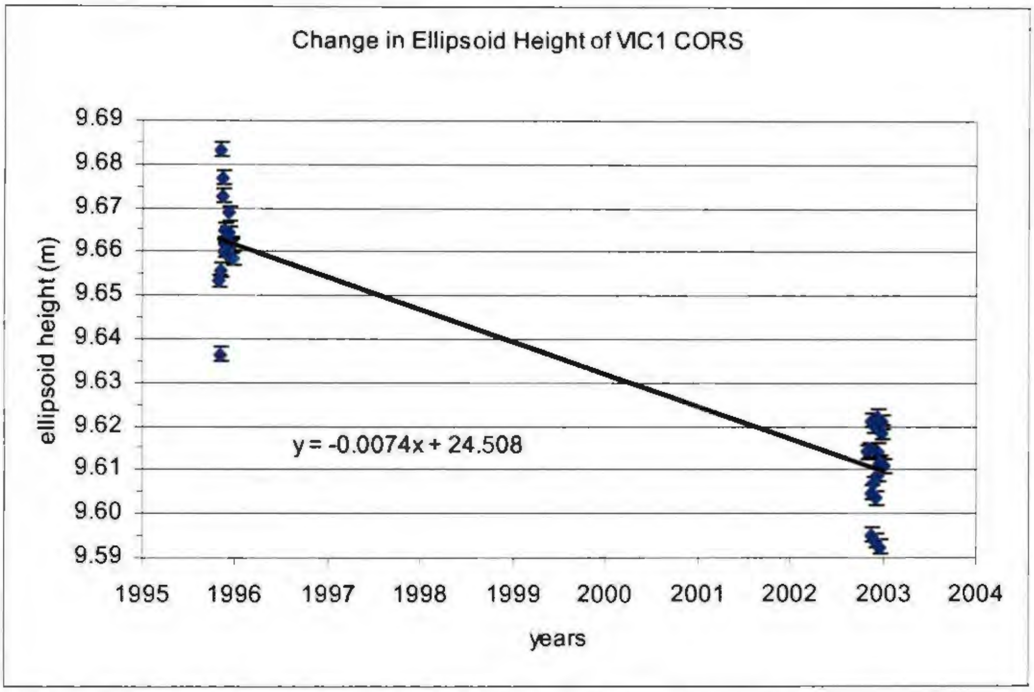


Figure 14. Vertical displacement derived from GPS observations.

Ellipsoid height solutions at VIC1 had a mean standard deviation of 0.016 meters. This is shown as the vertical error bar on the individual observations. The standard error of the mean at each epoch is 0.0025 m for 1995 and 0.0024 m for 2002. The R^2 of the regression line is 88.0%, indicating that this proportion of the variation within the data set is explained by the regression.

For the MEM2 site, across the Mississippi River from Memphis, we processed 11 solutions for 1996 and 14 ellipsoid height solutions for 2002. The difference between the mean heights for each epoch was 0.028 meters, with a 95% confidence interval of 0.025 m to 0.031 m. The MEM2 CORS showed a mean rate of vertical displacement of -4.7 mm/yr (-4.2 mm/yr to -5.1 mm/yr) between 1996 and 2002. This compares to -1.46 mm/yr at benchmark G 75, the closest benchmark in our network to this CORS at 41 km distance and on the Memphis side of the river. We were, unfortunately, unable to find a path through the available first-order leveling data to compute rates at benchmarks any closer to the MEM2 site.

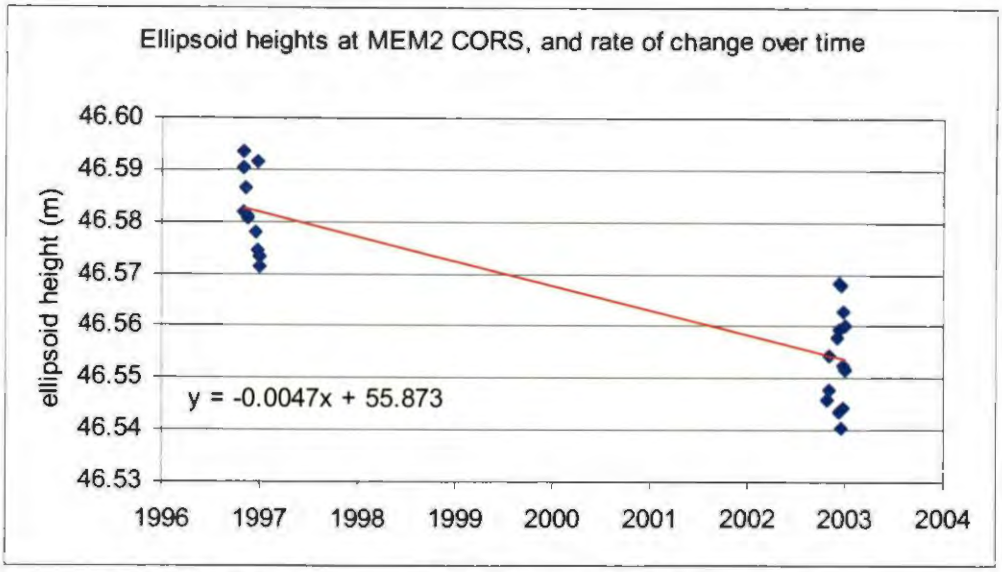


Figure 15. Vertical displacement derived from GPS observations.

Ellipsoid height solutions at MEM2 had a mean standard deviation of 0.017 meters. The standard error of the mean at each epoch is 0.002 m. The R^2 of the regression line is 74.6%, indicating that this proportion of the variation within the data set is explained by the regression.

C. Closures

In a very few locations, we were able to close loops within our subsidence rates network, i.e., compute rates at individual benchmarks from two different directions using different sets of leveling lines. These are not completely independent checks on the vertical displacement rates computed at given marks, however. The two different routes along which rates were computed to a common point necessarily share a common starting condition somewhere. Examining loop closures does give us some feel for the validity of the process and magnitude of possible errors, particularly in regard to interpolation or extrapolation at joins. Four examples will suffice to show the range of rate closures we found in the subsidence network.

At Gibson, Louisiana, we computed two rates by different routes at point N 198 (AU0256). A rate of -10.37 mm/yr was computed between lines from 1982 and 1993, which ran along the U.S. 90 highway corridor between Houma and Gibson. A rate of -12.29 mm/yr was computed between leveling lines from 1969 and 1977 which followed the railroad corridor from the New Orleans area, through Raceland and Lafourche, to Gibson and beyond.

We were also able to make a loop closure between Baldwin and Lafayette, Louisiana. The subsidence rate computed for point P 3 (BK0239) was -8.16 mm/yr as part of the set of leveling lines running from New Orleans to New Iberia, and then from New Iberia to Iowa. This rate was computed for the epoch between 1970 and 1986. A different set of leveling lines, from 1955 and 1965, took the scenic route from Baldwin to Lafayette via Butte La Rose and Breaux Bridge to connect back to the "main" line at P 3. From this data, we computed a rate of -10.22 mm/yr at P 3.

On the Louisiana side of the Mississippi River across from Vicksburg, Mississippi, we connected a huge loop with vertices including New Orleans, Baton Rouge, and Shreveport in Louisiana, and Jackson and Vicksburg in Mississippi. Computing west from Jackson using epochs from 1968 to 1974 and from 1968 to 1996, we derived a displacement rate at point P 254 (CP2351) of -6.23 mm/yr. Coming from the direction of Shreveport and using epochs from 1938 to 1969 and from 1966 to 1969, we computed the rate for P 254 at -2.37 mm/yr.

Where lines converged near the town of Iowa, in western Louisiana, we computed rates at nearby benchmarks using lines taking different routes. Unfortunately, these sets of pairs of lines did not include any common marks. From a series of lines following the U.S. 90 corridor westward from Lafayette, we computed rates at two points: F 267 (BK0607) as -10.85 mm/yr, and E 267 (BK1439) as -11.30 mm/yr. These two rates were computed for the epoch from 1970 to 1986. Another set of level lines followed the U.S. 165 highway and rail corridor from Alexandria to Iowa. Using this data, we computed vertical displacement rates for another point within about one kilometer of the points cited above: A 4145 (BK0608) as -6.70 mm/yr. This rate was computed for the epoch between 1969 and 1986. This was another large loop; its vertices included Alexandria, Baton Rouge, Thibodaux, Lafayette, and Iowa Junction.

These closures are imprecise; rates computed from different directions don't match exactly. Part of the imprecision comes from the fact that the rates are calculated over different time epochs and intervals. Displacement rates at individual marks probably do vary over time depending on a number of local conditions. These variable conditions may be different over different routes. Rates computed through different sets of lines contain different numbers of "joins" at different locations. This means that the assumption of linear extrapolation or interpolation of rates to compute new starting elevations at common points affects each route differently. Leveling data collected in different decades may have been observed with different equipment and procedures, and under different ambient conditions. While all met the then current first-order standard, some variation due to these sources could have been introduced into the data.

The subsidence rates and computed elevations listed in the appendix could be used to compute estimates of the current, or future, elevations of any of the benchmarks in the network. Any such computed elevation values are only estimates, however. Publication of updated elevation values for a subset of these benchmarks must await the conclusion of ongoing height modernization projects and additional analysis.

VI. Discussion

At this point, we hesitate to define a simple model for future subsidence within this study region based on simple linear extrapolation of computed rates into the future. As we have seen, subsidence rates in any given epoch vary across the region with both broad and local conditions. Rates at most individual benchmarks appear to vary through time also, usually in a non-linear manner. Extrapolation models, whether simple or complex, could provide useful information over a large area to a level of accuracy that may be suitable for long-term, large scale planning. However, determination of future elevations at specific locations to a level of accuracy consistent with the requirements of geodetic control will apparently require more, and more current, data.

VII. Conclusions and Recommendations

Thorough consideration and analysis of all of this information has led us to a number of conclusions.

1. There are no valid NAVD 88 elevation reference points in a large portion of the lower Mississippi Valley today. On the other hand, we may also have identified some areas on the periphery of this study region where vertical displacement rates are small enough to be essentially zero.

2. The old leveling data is useless for determining current elevations. The historical data, even that of only ten years ago, describes a topography and spatial relationship between benchmarks that no longer exists. Since benchmarks, even spatially adjacent benchmarks, move at different rates, their relative elevation differences have changed over time. A readjustment of old leveling data seems pointless.

3. We know now that elevations on benchmarks in this region cannot be assumed to be static through time. We suggest this implies that ongoing vertical displacement must be monitored at a few fundamental locations and propagated through a base network using periodic reobservations.

4. Subsidence rates at individual points are not constant through time nor over significant spatial extents. Vertical displacement rates may not even vary according to a linear function. Attempts to make predictive models must account for spatial and temporal variation of rates.

5. Because the elevations used were obsolete, the conversion surface used to transform the G99SSS geoid model into the Geoid 99 model[20] is also inaccurate in this region. One implication of this is that ellipsoid height differences measured from new GPS observations are probably more accurate measures of the true spatial relationship between points than are the differences in orthometric heights estimated from those observations using the current Geoid 99 model. A new geoid model must account for the temporal movement of benchmarks used to create the conversion surface.

6. Expensive benchmark installations are pointless in this environment. Our analysis shows, for example, that sectional rod monuments driven to refusal subside just as fast as concrete benchmarks. Fast, easy, and cheap monuments perform just as well, or poorly, as anything else for elevation reference points in this milieu.

[20] Smith, D.A. and D.R. Roman, *Documentation for the GPS Benchmark Data Set of August 27, 1999*, pp. 1-11.

7. Elevation values cited for any engineering or legal purpose should, in future, be accompanied by metadata. At minimum, this metadata should identify the date, method, and source, or control, from which the elevation was derived.

8. NGS should consider including an "expiration date" as part of the metadata with benchmark elevations. The purpose is to alert users to the expected period of time over which each benchmark is expected to move by a set amount, and thus be out of tolerance.

A major new first-order differential leveling campaign, covering at least the major branches of our subsidence network, could provide very useful data to update subsidence rates. A leveling campaign could also provide a current snapshot-in-time of the vertical relationships among these points. Such a project is highly unlikely, however, due to its high cost. Differential leveling would provide neither the long-term monitoring nor the frequent reobservations needed to create and maintain a viable dynamic reference system.

GPS applications probably hold the key to creating and maintaining a viable dynamic vertical reference system in the lower Mississippi Valley. This is the core of "height modernization." As an initial step, GPS projects could be used to reestablish current valid NAVD 88 elevations at CORS and coastal tide gauge sites within the high-subsidence region by making ties to benchmarks in areas of minimal active displacement. For example, GPS projects, consisting of primary and local networks[21], and using an improved geoid model, could tie these subsiding sites to benchmarks in apparently more stable areas farther east along the Gulf Coast and north through the Mississippi Valley, with NAVD 88 elevations propagated from these locations. These new NAVD 88 elevations, once propagated through the GPS vector chains to our subsiding sites, would serve as the new "zero" time reference for a continuous monitoring program.

Those CORS and tide gauge sites with their newly reestablished NAVD 88 orthometric heights could be used to monitor the continuing displacement, with new elevations assigned as needed. A network of monumented points connecting the CORS and tide gauge sites would form a reference framework, or a base network, from which elevations could be drawn by the user community. Periodic GPS reobservations on the base network could be collected to both validate the measurements from the individual sites and to update the monumented base network. Thus, for example, instead of publishing elevations on over 9000 benchmarks in Louisiana, NGS would publish elevations with dates and rates on a base network of a dozen or so CORS and tide gauges, plus a Louisiana Base Network of perhaps 200 monumented points in between.

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[21] Zilkoski, D.B., J.D. D'Onofrio, and S.J. Frakes, Guidelines for Establishing GPS-Derived Ellipsoid Heights, pp. 3-4

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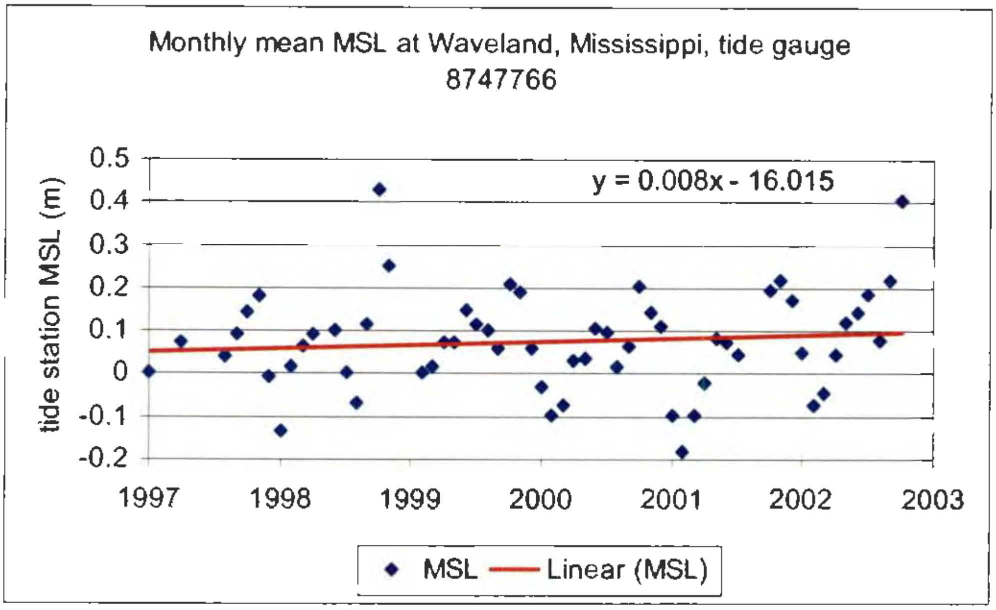
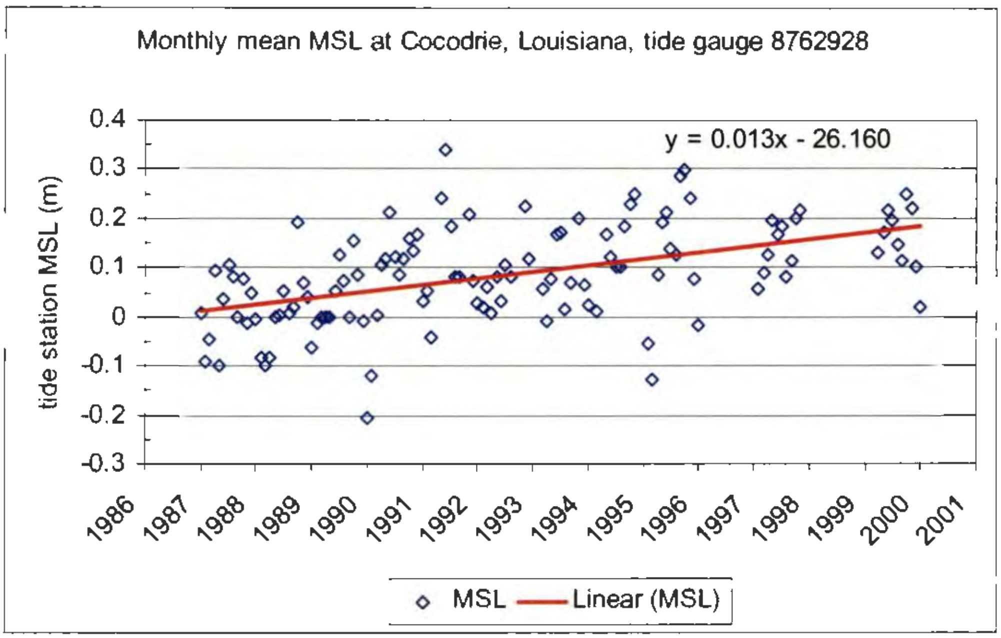
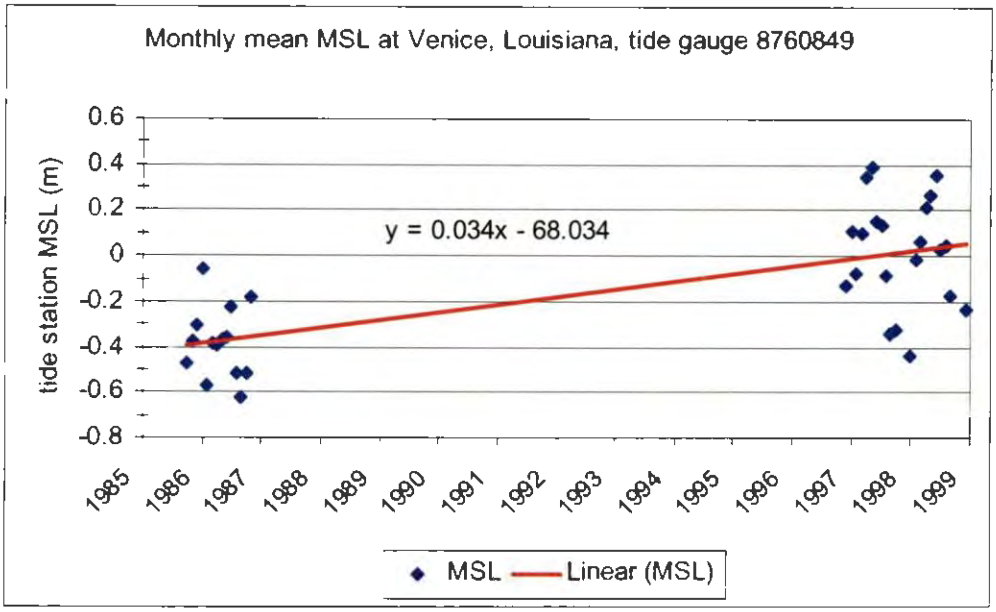
APPENDIX 1

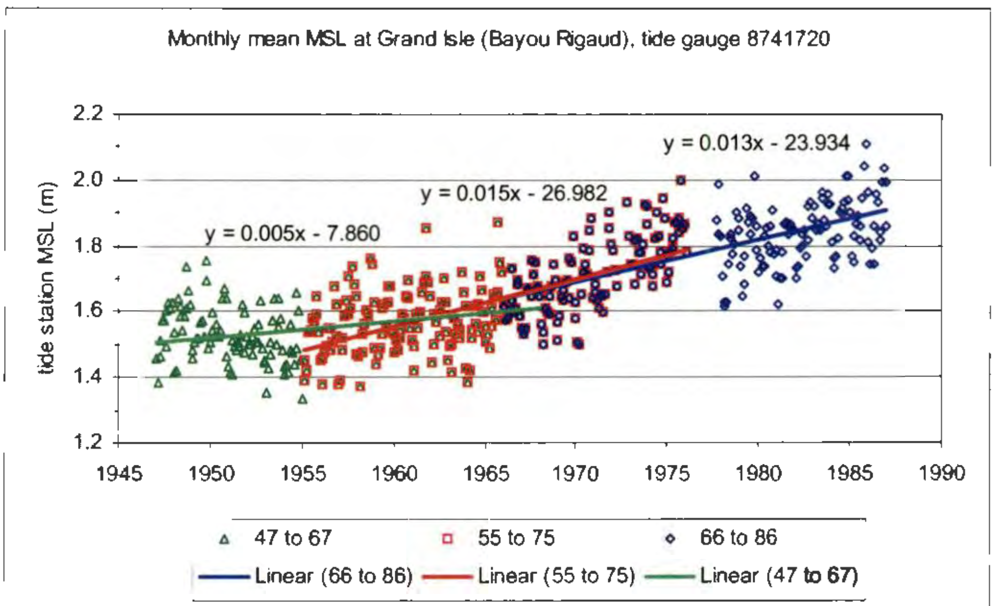
REGRESSION PLOTS FOR ADDITIONAL TIDE STATIONS

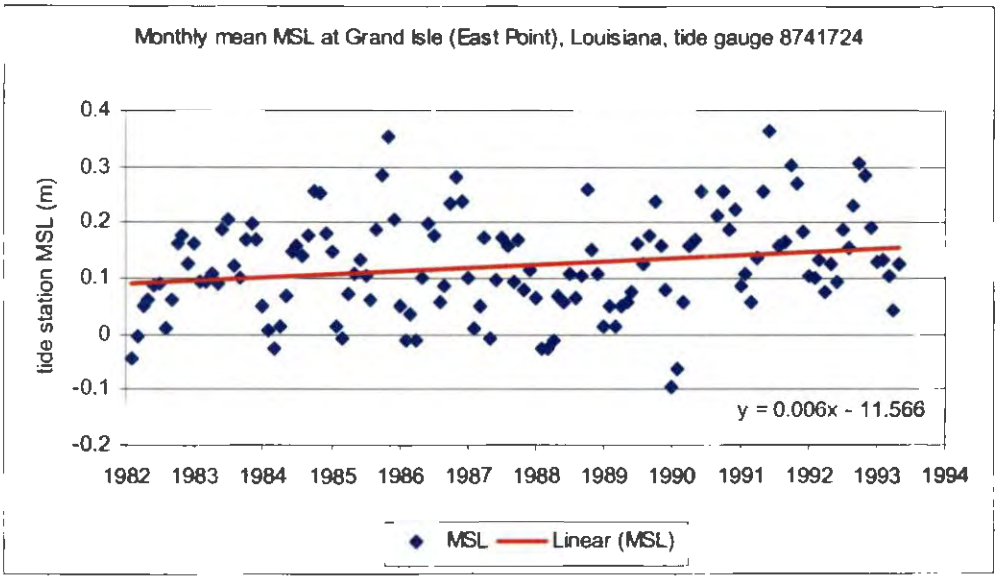
Regression plots for monthly mean water levels at coastal tide stations operated by the National Ocean Service, but which are not included among the stations discussed in *Sea Level Variations of the United States 1854-1999*. The data for these plots came directly from NOS.


Monthly mean MSL at Waveland, Mississippi, tide gauge 8747766
y = 0.008x - 16.015
tide station MSL (m)
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
1997
1998
1999
2000
2001
2002
2003
MSL
Linear (MSL)


Monthly mean MSL at Cocodrie, Louisiana, tide gauge 8762928
y = 0.013x - 26.160
tide station MSL (m)
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
MSL
Linear (MSL)


Monthly mean MSL at Venice, Louisiana, tide gauge 8760849
tide station MSL (m)
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
y = 0.034x - 68.034
1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999
MSL
Linear (MSL)


Monthly mean MSL at Grand Isle (Bayou Rigaud), tide gauge 8741720
tide station MSL (m)
2.2
2.0
1.8
1.6
1.4
1.2
y = 0.013x - 23.934
y = 0.015x - 26.982
y = 0.005x - 7.860
1945 1950 1955 1960 1965 1970 1975 1980 1985 1990
47 to 67
55 to 75
66 to 86
Linear (66 to 86)
Linear (55 to 75)
Linear (47 to 67)


Monthly mean MSL at Grand Isle (East Point), Louisiana, tide gauge 8741724
tide station MSL (m)
0.4
0.3
0.2
0.1
0
-0.1
-0.2
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
1993
1994
y = 0.006x - 11.566
MSL
Linear (MSL)

APPENDIX 2

LEVELING LINES AND CONNECTIONS

Leveling lines included in the subsidence network. Lines shown in the schematic diagram as above or below each other generally followed the same route and included common benchmarks. Leveling data from lines that included common benchmarks were available for analysis and computation of subsidence rates.

Diagram of Leveling Lines and Connections in the LSRC Subsidence Network

Grand Isle to Cocodrie via Houma

Year of Observations						
1934						
1935						
1955						
1960						
1963						
1964						
1965		L20370		L20376		
1966					**L20583**	
1968						
1969						
1970						
1971						
1972						
1974						
1977						
1980						
1981						
1982	**L24680/11**	**> > > > >**	**L24680/10**	**> > > > >**		
1984						
1986						
1991						
1993	**L25414**	**> > > > >**	**> > > > >**	**L25406/2**	**> > > > >**	
1994						
1995						
Tie	< start	TIDAL 6		U 221		Littler RM1
Benchmarks:	TIDAL 13		A 220		D 222	
Location:	Grand Isle		Raceland	Houma		Cocodrie

Lines in bold type were used to compute rates shown in table in appendix 2.

Houma to Gibson along US 90

1934			
1935			
1955			
1960			
1963			
1964			
1965	L20376	**> > > > >**	
1966			
1968			
1969			
1970			
1971			
1972			
1974			
1977			
1980			
1981			
1982	**L24680/10**		
1984			
1986			
1991			
1993	**L25414**	**> > > > >**	
1994			
1995			
	U 221		B 167
		N 198	< stop
	Houma		Gibson

New Orleans to Biloxi, MS along US 90

1934						
1955			L15414/A	> > > > >	> > > > >	
1960						
1964						
1965						
1966						
1969			L21664/2	> > > > >		
1970						
1971			L22314	**> > > > >**	**> > > > >**	
1972						
1974						
1977		**L24133/21**	**> > > > >**	**L24133/22**	**> > > > >**	
1980						
1981						
1982						
1984						
1986						
1991	**L25283/7**					
1993			**L25424/2**			
1994		**L25517/1**				
1995	**L25517/7**					
	G 194		J 92		T 190	
		D 276		V 214		D 3
	New Orleans				Waveland	Biloxi

Marrero to Lafitte

1934				
1955				
1960				
1964				
1965				
1966				
1969				
1970				
1971				
1972				
1974				
1977				
1980				
1981				
1982				
1984	**L24836/1**	**L24836/2**		
1986			**L24966/4**	
1991				
1993				
1994				
1995	**L25517/2**	**L25517/9**	**> > > > >**	
	Q368		F365	
		X367		A Tidal
	Marrero			Lafitte

Raceland to Venice via Gretna

1934								
1935								
1955								
1960								
1963								
1964								
1965								
1966								
1968								
1969								
1970								
1971						**L22356**	**> > > > >**	
1972								
1974								
1977		**L24133/18**						
1980								
1981								
1982	**L24680/11**							
1984						**L24836/4**	**L24836/1**	
1986			**L24966/2**					
1991				**L25283/6**	**L25283/7**			
1993								
1994								
1995	**L25517/2**	**> > > > >**	**> > > > >**	**L25517/6**	**L25517/7**			
	A 220		Y 190		LMS 50		Ferry RM1	
		J 165		Terry		G 194		Darbon
	Raceland			Gretna			Pointe a la Hache	Venice

New Orleans to New Iberia

1934									
1955		< < < < <	< < < < <	L15631	> > > > >	> > > > >	> > > > >		
1960									
1964		< < < < <	< < < < <	L19637	> > > > >	L20199	> > > > >	> > > > >	
1965									
1966									
1969	L21785	> > > > >	> > > > >	> > > > >	> > > > >	> > > > >	> > > > >	> > > > >	
1970									
1971									
1972									
1974									
1977	**L24133/18**	> > > > >	> > > > >	> > > > >	> > > > >	> > > > >			
1980									
1981									
1982									
1984									
1986									
1991									
1993					**L25414**	> > > > >			
1994									
1995	**L25517/2**	> > > > >							
	Y 190		C 192		N 198		B 169		L 201
		A 10		W 165		Q 167		H 4	
	Waggaman		Raceland Jct.		Gibson			New Iberia	

New Iberia to Iowa, LA

1934					
1955	L15631	> > > > >	> > > > >	> > > > >	
1960					
1964					
1965					
1966					
1969					
1970	**L22027**	**> > > > >**	**> > > > >**	**> > > > >**	
1971					
1972				L22921	
1974					
1977					
1980					
1981			**L24680/1**	**> > > > >**	
1982	**L24680/12**	**> > > > >**			
1984					
1986		L24962/2	> > > > >	> > > > >	
1991					
1993					
1994					
1995					
	H 4		TT 17 B		A 4142X
		28 A 017		O1 Reset	
	New Iberia				Iowa

Iowa, LA, to Beaumont, TX

1934					
1955	L15631	> > > > >			
1960					
1964					
1965					
1966					
1969					
1970					
1971					
1972	**L22921**	> > > > >	> > > > >	**> > > > >**	
1974					
1977					
1980					
1981	**L24680/1**	**> > > > >**	**> > > > >**		
1982					
1984					
1986		**L24968**	**> > > > >**	**> > > > >**	
1991					
1993					
1994					
1995					
	A 4142 X		N 58		W 1016
		R 210		T 1199	
	Iowa				Beaumont

Jackson, MS, to Memphis, TN, via Vicksburg

1934									
1935			L6274						
1955									
1960									
1963		L19565	> > > > >						
1964									
1965									
1966									
1968	**L21677**	**> > > > >**	**> > > > >**	**> > > > >**					
1969									
1970									
1971									
1972									
1974					**L23257**	**L23280**	**> > > > >**	**> > > > >**	
1977									
1980									
1981									
1982									
1984							L24753		
1986									
1991									
1993	**L25337**	**> > > > >**	**> > > > >**	**> > > > >**	**L25336**	**> > > > >**	**> > > > >**	**> > > > >**	
1994									
1995									
	Q 224		D 1		P 225		1 B		G 75
		H 210		X 59		82 V 18 W		Y 260	
	Jackson				Vicksburg				Memphis

Kenner, LA, to Jackson, MS

1934					L1486	> > > > >	> > > > >	
1955								
1960				L17766	> > > > >	> > > > >		
1964								
1965								
1966								
1969	**L21785**	> > > > >	**L21828**	**> > > > >**	**> > > > >**	**> > > > >**	**> > > > >**	
1970								
1971								
1972								
1974								
1977	**L24133/18**	**> > > > >**						
1980								
1981								
1982								
1984		**L24836/3**						
1986								
1991								
1993			**L25338**	**> > > > >**	**> > > > >**	**> > > > >**	**> > > > >**	
1994								
1995								
	Y 190		S 188		R 18		Y 9	
		R 276		H 146		W 9		P Reset
			Kenner					Jackson

Biloxi, MS, to Pensacola, FL

1934					
1955	**L15444**	**> > > > >**			
1960					
1964					
1965					
1966					
1969	**L21664/1**	**> > > > >**	**> > > > >**		
1970					
1971					
1972					
1974			**L23869**	**> > > > >**	
1977					
1980				**L24537/2**	
1981					
1982					
1984					
1986					
1991					
1993					
1994					
1995					
	D 3		U 112		G 9
		Q 165		C 302	
	Biloxi				Pensacola

Year of Observations	Kenner to Baton Rouge, via Donaldsonville and Plaquemine					
1920						
1934						
1935						
1937						
1938						
1939						
1940						
1944						
1950						
1955						
1961						
1963						
1964	L19622/1	L19631	>>>>>>>>	>>>>>>>>	>>>>>>>>	
1965						
1966						
1968						
1969						
1970						
1976						
1977			**L24133/17**	**>>>>>>>>**	**>>>>>>>>>**	
1982						
1986	**L24970**	**>>>>>>>>>**	**>>>>>>>**	**>>>>>>>**	**>>>>>>>>**	
1993						
1996						
Tie		D 147		X 290		V 197
Benchmarks:	J 146 RESET		H 192		D 197	
		Norco		Plaquemine		Baton Rouge

	Donaldsonville to Thibodaux	
1920		
1934		
1935		
1937		
1938		
1939		
1940		
1944		
1950		
1955		
1961		
1963		
1964		
1965	**L20373**	**>>>>>>>>**
1966		
1968		
1969		
1970		
1976		
1977		
1982	**L24680/9**	**>>>>>>>>**
1986		
1993		
1996		
		G192
	H192	
		Thibodaux

Plaquemine to Morgan City

1920			
1934			
1935			
1937			
1938			
1939			
1940			
1944			
1950			
1955			
1961			
1963			
1964			
1965	L20202	L20211	>>>>>>>
1966			
1968			
1969			
1970			
1976	L24133/15	>>>>>>>	
1977			
1982			
1986			
1993			L25414
1996			
	X 290		S 200
		PM 51 USE	
		Crescent	

Baton Rouge to Port Barre

1920				
1934				
1935				
1937				
1938				
1939				
1940				
1944				
1950				
1955				
1961				
1963				
1964				
1965				
1966				
1968				
1969				
1970				
1976		L24133/13	L24133/5	
1977	L24133/17	L24133/10		
1982				
1986	L24962/1	>>>>>>>>>	>>>>>>>>>	
1993				
1996				
		P 287		B 206
	C204		Q 291	
		Port Allen		Port Barre

Baton Rouge to Alexandria to Iowa Junction

1920								
1934						**L1149**		
1935								
1937								
1938								
1939								
1940								
1944								
1950								
1955								
1961								
1963								
1964	**L20196**	**L20205**	**>>>>>>>>**					
1965								
1966				**L20711**	**L20719**			
1968								
1969							**L21850**	
1970					**L22017**	**>>>>>>>>**		
1976		**L24133/1**	**L24133/2**					
1977				**L24160**				
1982								
1986	**L24962/1**						**L24967/1**	
1993								
1996								
		D 206		Gabriel Cap		F15		O 1 Reset
	C 204		B 208		P 13		W 16	
	Baton Rouge		Simmesport		Alexandria		Kinder	

Alexandria to Shreveport to Vicksburg, MS

1920	74220	>>>>>>>>								
1934										
1935										
1937		**L10394**								
1938	**L8354**		**L8455**	>>>>>>>>						
1939										
1940										
1944										
1950				**L13495/27**						
1955										
1961										
1963										
1964										
1965										
1966					**L20693**					
1968										
1969			**L21824**	**>>>>>>>>**	**>>>>>>>>**	**>>>>>>>>**	**>>>>>>>>**	**L21677**	**>>>>>>>>**	
1970										
1976										
1977	**L24160**	>>>>>>>>							**L23257**	
1982						**L24711**				
1986										
1993										
1996							**L25615/1**	**L25615/2**		
	P 13		M 12		T 1		U254		H225	
		South S-10		B118		S 245		A1811		Z 59
	Alexandria		Shreveport		Monroe		Tallulah		Delta	

Lafayette to Baldwin, via Butte La Rose

1920						
1934						
1935						
1937						
1938						
1939						
1940						
1944						
1950						
1955	**L15631**				L15631	
1961						
1963						
1964						
1965	**L20343**	**>>>>>>>>>**	**>>>>>>>>>>**			
1966				**L20589**	**>>>>>>>>>>>>>**	
1968						
1969						
1970						
1976			**L24133/7**	**>>>>>>>>>**	**>>>>>>>>>>>>>>**	
1977						
1982		**L24680/7**	**>>>>>>>>>>>**			
1986						
1993						
1996						
	P 3		Lenora Cap		Charenton RM4	
		M 17		C 219		B 169
		Breaux Bridge		Butte La Rose		Baldwin

Jackson, MS, to Meridian, MS, to Demopolis, AL

1920					
1934					
1935					
1937					
1938					
1939					
1940					
1944				**L11057**	
1950					
1955					
1961	**L18304**	**>>>>>>>>>**	**>>>>>>>>>**		
1963					
1964					
1965					
1966					
1968	**L21677**	**L21418**	**>>>>>>>>>**	**>>>>>>>>>**	
1969					
1970					
1976					
1977					
1982					
1986					
1993					
1996					
	P Reset		B 73		PBM 5
		Y 213		U 156	
	Jackson		Meridian		Demopolis

Meridian, MS, to Mobile, AL

1920				
1934				
1935				
1937				
1938				
1939				
1940			**L8967**	
1944				
1950				
1955				
1961	**L19601**			
1963				
1964				
1965				
1966				
1968				
1969				
1970				
1976				
1977				
1982	**L24537/1**	**>>>>>>>>>**	**>>>>>>>>>**	
1986				
1993				
1996				
	B 73		448 ALGS	
		45 V A		Y 120
	Meridian		Vinegar Bend	

APPENDIX 3

TABLE OF RATES, ELEVATIONS, AND POSITIONS

base year

Final data for the points in the subsidence network. The "~~End of epoch~~" value for each point is the date for the computed elevation shown. It is usually the latest date for which first-order leveling data was available at that point. Use this date, along with the computed elevation and rate, to extrapolate elevations into the future.

base year	PID	Designation	computed elevation (m)	latitude	longitude	rate (mm/yr)
1984.50	AT0005	R 195	-0.706	292020	892956	-24.08
1984.50	AT0006	Z 91	-0.529	292020	892932	-21.57
1984.50	AT0007	S 195	-0.777	292018	892838	-21.67
1984.50	AT0016	V 195 RESET 1970	0.377	292108	892724	-20.26
1984.50	AT0025	W 195	0.015	292109	892624	-21.12
1984.50	AT0032	X 195 RESET 1967	-1.974	292040	892530	-18.61
1984.50	AT0033	C 196	-1.543	292040	892524	-17.23
1984.50	AT0034	E 279	0.114	292032	892450	-14.79
1984.50	AT0037	Z 195	0.172	292008	892422	-15.50
1984.50	AT0043	A 196 RESET 1967	-0.686	291928	892346	-15.43
1984.50	AT0046	G 279	-0.811	291824	892246	-15.52
1984.50	AT0060	H 279	-1.209	291650	892136	-15.49
1984.50	AT0076	DARBON	1.256	291556	892110	-24.52
1984.50	AT0195	W 194	0.524	292846	894140	-11.56
1984.50	AT0196	F 195	1.909	292836	894130	-14.73
1984.50	AT0200	MILAN 2	-0.138	292805	894053	-13.66
1984.50	AT0205	G 195	1.394	292750	894040	-14.83
1984.50	AT0208	A 279	-0.220	292718	893900	-12.74
1984.50	AT0209	B 26 USE	0.611	292709	893800	-8.52
1984.50	AT0213	X 194	1.039	292702	893714	-8.60
1984.50	AT0214	T 91	0.812	292640	893658	-10.10
1984.50	AT0223	J 195	-0.518	292438	893641	-12.32
1984.50	AT0231	EMPIRE AZ MK 2 1934 1966	-0.013	292326	893606	-12.70
1984.50	AT0234	K 195	1.934	292314	893550	-13.25
1984.50	AT0235	L 195	0.558	292308	893540	-11.32
1984.50	AT0245	M 195	0.424	292202	893406	-14.55
1984.50	AT0247	C 279	-0.242	292150	893324	-14.17
1984.50	AT0248	N 195	-0.813	292146	893324	-24.55
1984.50	AT0252	MASTAGE AZ MK RESET 1955	-0.429	292138	893236	-23.47
1984.50	AT0254	MASTAGE RESET	-0.377	292138	893222	-20.24
1984.50	AT0258	Q 195	-0.252	292119	893157	-15.37
1984.50	AT0259	P 195	-0.185	292116	893138	-16.02
1984.50	AT0262	B 196	-0.779	292034	893052	-27.36
1993.33	AT0266	Z 222	1.766	291430	895844	-8.65
1993.33	AT0275	876 1720 TIDAL 7	1.295	291515	895759	-14.17
1993.33	AT0276	876 1720 TIDAL 8	1.359	291515	895759	-13.22
1993.33	AT0277	876 1720 TIDAL 9	0.908	291515	895759	-11.73
1993.33	AT0278	876 1720 TIDAL 6	0.775	291520	895801	-12.40
1995.17	AT0289	CHALMETTE ECC RM 1	2.858	295632	895939	-8.85
1995.17	AT0294	F 152	1.900	295625	895826	-11.96
1995.17	AT0297	A 151	2.645	295610	895752	-12.63
1995.17	AT0302	A 194	2.737	295555	895726	-11.53
1995.17	AT0304	H 194	2.333	295550	895633	-12.67
1995.17	AT0306	J 194	2.293	295547	895600	-13.22
1995.17	AT0309	G 194	1.434	295528	895521	-11.45
1984.58	AT0311	B 194	0.926	295458	895443	-9.46

1984.58	AT0314	K 194	2.032	295407	895407	-9.04
1984.58	AT0322	VIOLET 2 RM 3	2.683	295355	895406	-10.61
1984.58	AT0328	D 151	1.083	295320	895349	-9.92
1984.58	AT0332	L 278	2.123	295233	895345	-8.09
1984.58	AT0333	F 194	2.016	295216	895340	-8.48
1984.58	AT0336	M 278	1.351	295152	895404	-8.34
1984.58	AT0339	F 3138 RESET	0.427	295136	895446	-6.93
1984.58	AT0340	C 194	0.693	295132	895457	-7.00
1984.58	AT0342	F 3340 RESET	0.053	295131	895511	-14.06
1984.58	AT0344	H 151 RESET 1964	0.868	295139	895542	-8.61
1984.58	AT0349	E 151	1.511	295152	895637	-15.73
1984.58	AT0351	N 278	1.481	295230	895724	-7.71
1984.58	AT0357	D 194	1.696	295136	895818	-7.78
1984.58	AT0359	Q 278	1.450	295057	895828	-7.63
1984.58	AT0364	S 278	2.336	294916	895947	-7.76
1984.58	AT0370	T 278	2.223	294817	895959	-15.01
1984.58	AT0374	S 151 USE	4.356	294413	895940	-7.74
1984.58	AT0376	R 194	1.414	294345	895917	-5.58
1984.58	AT0383	U 151 USE	3.389	294310	895856	-20.54
1984.58	AT0398	D 281	1.138	293853	895649	-8.56
1984.58	AT0401	P 194	1.358	293833	895547	-8.45
1984.58	AT0407	A 152	0.729	293727	895410	-6.91
1984.58	AT0412	E 281	0.755	293637	895157	-9.05
1984.58	AT0419	Q 194	1.954	293630	895107	-7.81
1984.58	AT0424	B 91 RESET 1966	0.748	293556	894939	-8.46
1984.58	AT0428	E 152	2.347	293508	894821	-9.54
1984.58	AT0429	E 91	2.619	293440	894745	-10.50
1984.58	AT0438	FERRY RM 1	1.389	293406	894750	-10.78
1984.50	AT0448	B 195	1.661	293242	894626	-13.08
1984.50	AT0458	C 195	0.562	293210	894548	-13.90
1984.50	AT0466	E 195	0.790	293050	894348	-9.74
1995.17	AT0468	J 278	1.373	295946	895622	-18.77
1995.17	AT0471	239 RESET	1.323	295856	895644	-21.24
1995.17	AT0474	H 278	0.311	295740	895722	-13.66
1995.17	AT0478	K 152 RESET	-0.010	295716	895726	-13.77
1995.08	AT0482	P 196	0.733	295546	895952	-2.73
1995.08	AT0483	Q 196	1.814	295530	895906	-4.53
1995.08	AT0485	S 196	0.316	295515	895841	-3.19
1995.08	AT0498	5	-0.323	295438	895954	-8.01
1984.50	AT0674	B 279	0.931	292507	893647	-12.12
1993.33	AT0675	X 358	1.112	291400	895935	-11.53
1993.33	AT0676	W 358	0.777	291444	895817	-10.91
1993.33	AT0679	V 358	0.623	291511	895738	-10.30
1993.33	AT0680	T 358	0.688	291551	895718	-7.04
1993.33	AT0681	876 1724 C TIDAL	0.737	291551	895719	-5.45
1993.33	AT0682	876 1724 B TIDAL	0.709	291552	895727	-4.22
1993.33	AT0683	876 1724 A TIDAL	0.770	291553	895728	-4.36
1993.33	AT0684	12	0.953	291553	895728	-4.96
1993.33	AT0685	11	0.926	291553	895728	-4.64

1993.33	AT0686	876 1724 TIDAL 14	1.052	291553	895728	-8.90
1993.33	AT0687	10	0.902	291553	895728	-5.04
1993.33	AT0688	876 1724 TIDAL 13	0.922	291553	895728	-4.65
1993.33	AT0689	876 1724 D TIDAL	0.647	291552	895725	-7.23
1995.17	AT0759	G 189 RESET	1.256	295628	895750	-12.06
1995.08	AT0760	V 375	0.642	295501	895818	-3.43
1995.08	AT0761	X 375	1.268	295420	895910	-1.09
1995.17	AT0763	SB 002 B	-0.682	295734	895941	-7.44
1995.17	AT0764	SB 003 C	-0.552	295729	895924	-9.12
1995.17	AT0765	SB 004 B	-0.895	295717	895854	-8.24
1995.17	AT0766	SB 005 C	-0.658	295659	895821	-9.78
1995.17	AT0767	SB 006 B	0.005	295644	895818	-9.95
1995.17	AT0768	SB 007 C	0.909	295626	895728	-11.05
1995.17	AT0769	SB 008 B	0.935	295618	895713	-10.21
1995.17	AT0770	SB 009 C	1.128	295609	895647	-11.16
1995.17	AT0771	SB 010 B	0.665	295609	895636	-9.77
1995.17	AT0773	SB 012 B	-0.040	295609	895524	-9.87
1995.17	AT0774	SB 013 C	-0.213	295553	895501	-13.99
1995.17	AT0775	SB 014 B	0.038	295527	895430	-9.76
1995.17	AT0776	SB 015 C	0.491	295513	895414	-12.49
1995.17	AT1382	STREAK	0.056	295818	895643	-20.62
1995.17	AT1395	LOWE 1	0.443	295818	895640	-20.85
1995.17	AT1404	CHALMETTE 3 RM 3	1.610	295630	895938	-9.00
1995.17	AT1405	CHALMETTE 3 AZ MK	0.601	295649	895928	-8.38
1995.17	AT1406	CHALMETTE 4	1.987	295631	895939	-8.91
1995.17	AT1407	T 387	0.184	295652	895736	-12.11
1995.08	AT1408	LMS 50	5.765	295557	895953	-4.85
1976.88	AU0004	M 240	1.351	295812	913238	-7.40
1976.88	AU0005	MILE 89.4 USE	2.075	295722	913250	-9.68
1976.88	AU0007	MILE 90 USE	1.647	295653	913304	-11.24
1976.88	AU0009	L 240	2.013	295512	913236	-19.63
1976.88	AU0010	K 240	2.161	295427	913211	-9.57
1976.88	AU0013	LOCK 1 USE	5.794	295407	913110	-9.91
1976.88	AU0015	J 240	0.905	295359	913049	-9.12
1976.88	AU0018	CHARENTON RM 4	4.072	295314	913118	-11.08
1976.88	AU0020	A 4081 LAGS	3.930	295255	913131	-11.74
1976.88	AU0022	A 4082 LAGS	4.687	295229	913129	-12.48
1976.88	AU0023	A 4084 LAGS	4.489	295200	913137	-12.72
1976.88	AU0024	H 240	4.672	295105	913209	-13.81
1976.88	AU0025	BALDWIN SE BASE	4.139	295020	913243	-9.52
1986.50	AU0053	A 146	4.339	295948	902444	-7.70
1976.88	AU0069	E 210	2.068	295839	911548	-11.51
1976.88	AU0074	A 210	1.319	295548	911446	-10.82
1976.88	AU0076	K 209	0.889	295450	911343	-9.66
1976.88	AU0078	79	1.344	295423	911251	-9.83
1976.88	AU0084	X 219	0.822	295048	911119	-13.99
1976.88	AU0105	TERREBONNE	2.140	294209	911249	-11.68
1986.50	AU0132	XIII	7.375	295934	904914	-12.19
1993.42	AU0136	B 169	3.624	295003	913305	-9.31

1993.42	AU0138	Q 201	2.076	294939	913244	-9.17
1993.42	AU0139	A 169	4.037	294925	913228	-9.06
1993.42	AU0142	A 277	2.454	294911	913211	-10.43
1993.42	AU0143	C 4006	2.443	294846	913149	-9.96
1993.42	AU0144	C 4007	1.827	294813	913115	-10.42
1993.42	AU0145	Y 275	2.107	294751	913051	-10.41
1993.42	AU0146	J 201	2.616	294725	913028	-11.48
1993.42	AU0147	X 4	4.372	294730	913004	-11.45
1993.42	AU0148	Y 4	4.411	294729	913001	-11.58
1993.42	AU0149	Z 4 RESET	4.395	294726	913000	-11.77
1993.42	AU0150	X 275	2.084	294731	912956	-11.62
1993.42	AU0154	H 277	3.059	294643	912945	-13.96
1993.42	AU0156	HANSON	3.738	294617	912859	-14.69
1993.42	AU0158	N 201	2.352	294533	912804	-17.14
1993.42	AU0160	W 168	0.609	294439	912644	-17.67
1993.42	AU0162	N 168	2.435	294423	912619	-17.20
1993.42	AU0167	M 168	2.969	294501	912552	-15.70
1993.42	AU0169	M 201	1.898	294534	912509	-14.44
1993.42	AU0170	D 201	2.161	294531	912449	-14.38
1993.42	AU0172	VERDUN RM 4	2.355	294502	912347	-14.68
1993.42	AU0173	VERDUN RM 3	2.279	294502	912347	-12.40
1993.42	AU0174	VERDUN	1.931	294502	912347	-15.55
1993.42	AU0175	L 168	2.434	294416	912326	-14.57
1993.42	AU0178	J 168	2.803	294247	912305	-12.63
1993.42	AU0179	B 201	2.602	294227	912259	-12.46
1993.42	AU0181	LAKE RESET	5.690	294153	912218	-12.82
1993.42	AU0183	W 275	1.298	294216	912116	-13.40
1993.42	AU0185	G 168	2.431	294245	912021	-13.32
1993.42	AU0186	F 168	2.652	294247	912022	-13.40
1993.42	AU0187	A 201	2.738	294302	912000	-13.90
1993.42	AU0188	Z 200	2.199	294313	911936	-14.11
1993.42	AU0189	TECHE	1.974	294328	911843	-14.18
1993.42	AU0190	TECHE RM 3	2.078	294328	911842	-14.37
1993.42	AU0191	TECHE RM 4	2.223	294328	911842	-13.63
1993.42	AU0192	BENOIT	2.893	294322	911826	-13.22
1993.42	AU0193	V 275	1.932	294252	911804	-12.98
1993.42	AU0194	E 168	2.391	294232	911815	-12.73
1993.42	AU0195	U 275	2.248	294222	911813	-12.00
1993.42	AU0196	X 200	3.218	294143	911809	-12.31
1993.42	AU0197	W 200	2.550	294116	911802	-11.81
1993.42	AU0198	B MC 24	2.662	294106	911755	-11.52
1993.42	AU0199	D 168 RESET	2.291	294043	911736	-11.88
1993.42	AU0200	V 200	1.757	294041	911717	-12.02
1993.42	AU0201	C 168	1.866	294047	911649	-11.84
1993.42	AU0202	T 275	1.955	294052	911642	-11.91
1993.42	AU0203	B 168	1.708	294132	911614	-11.78
1993.42	AU0204	B MC 28	1.886	294146	911609	-13.99
1993.42	AU0206	Z 167	1.500	294235	911504	-11.59
1993.42	AU0207	Y 167	1.200	294238	911432	-11.29

1993.42	AU0208	U 200	0.459	294239	911431	-11.17
1993.42	AU0209	V 167	0.817	294200	911346	-11.41
1993.42	AU0211	CORBIN	1.515	294151	911311	-11.00
1993.42	AU0212	T 200	2.099	294142	911305	-11.12
1993.42	AU0213	K 7 RESET	2.423	294131	911254	-11.62
1993.42	AU0214	S 200	4.775	294136	911234	-12.67
1993.42	AU0215	W 7 RESET	4.055	294137	911230	-11.34
1993.42	AU0216	MAX	2.055	294140	911221	-11.04
1993.42	AU0217	PTS 23	1.745	294139	911221	-10.73
1993.42	AU0218	F 198	2.292	294139	911216	-10.96
1993.42	AU0219	Q 167	2.907	294138	911157	-11.03
1993.42	AU0220	P 167	3.313	294131	911115	-11.65
1993.42	AU0223	G 198	1.355	294131	911115	-11.16
1993.42	AU0225	E 198	3.745	294116	910937	-11.61
1993.42	AU0232	L 167	2.502	294014	910732	-13.76
1993.42	AU0234	U 276	3.462	294007	910600	-12.26
1993.42	AU0237	T 276	0.369	294007	910534	-12.28
1993.42	AU0239	H 167	1.953	294003	910333	-13.43
1993.42	AU0241	V 276	0.836	293954	910222	-11.88
1993.42	AU0242	A 167	0.609	294006	910134	-11.32
1993.42	AU0243	W 276	1.459	294021	910059	-11.60
1993.42	AU0244	B 167	1.135	294033	910044	-11.44
1993.33	AU0245	T 298	1.255	294051	910025	-9.72
1993.42	AU0246	C 167	2.127	294110	910004	-13.61
1993.33	AU0247	Q 298	2.911	294105	905954	-11.17
1993.33	AU0248	C 227	0.605	294103	905934	-9.98
1993.33	AU0249	D 227	1.789	294103	905905	-9.88
1993.33	AU0251	U 298	0.236	294120	905952	-9.99
1993.33	AU0256	N 198	2.317	294121	905929	-10.37
1977.17	AU0257	D 167	1.605	294125	905907	-14.80
1977.17	AU0258	E 167	2.011	294136	905800	-14.82
1977.17	AU0259	WELL 6	0.537	294133	905757	-12.54
1977.17	AU0260	F 167	2.663	294146	905710	-12.43
1977.17	AU0261	G 167	2.372	294156	905609	-14.55
1977.17	AU0262	X 166	1.409	294212	905515	-11.61
1977.17	AU0263	CHACAHOULA RM 2	1.407	294223	905435	-11.92
1977.17	AU0264	CHACAHOULA RM 1	1.514	294223	905435	-12.13
1977.17	AU0265	D 8	2.158	294223	905441	-12.53
1977.17	AU0266	P 198	2.970	294224	905440	-12.49
1977.17	AU0267	Y 166	1.451	294230	905421	-13.53
1977.17	AU0268	W 166	2.399	294253	905324	-17.81
1977.17	AU0269	V 166	2.345	294316	905231	-19.19
1977.17	AU0270	U 166	2.116	294340	905137	-17.50
1977.17	AU0271	T 166	2.373	294402	905043	-16.15
1977.17	AU0272	X 276	1.771	294413	905015	-15.25
1977.17	AU0273	S 166	2.239	294426	904947	-15.06
1977.17	AU0274	L 198	3.384	294441	904910	-15.12
1977.17	AU0275	SCHRIEVER NB RM 3	3.514	294445	904901	-15.33
1977.17	AU0276	Y 276	5.224	294453	904847	-15.92

1977.17	AU0277	Q 166	4.439	294510	904758	-15.01
1977.17	AU0278	Z 276	2.331	294537	904649	-12.98
1977.17	AU0279	N 166	5.116	294552	904611	-15.66
1977.17	AU0280	G 192	7.055	294558	904554	-13.57
1977.17	AU0281	TT 27 F USGS	3.730	294557	904553	-13.31
1982.46	AU0284	R 229	4.440	294636	904628	-13.99
1982.46	AU0288	Q 229	3.596	294726	904724	-15.60
1977.17	AU0289	K 166	4.158	294604	904512	-14.11
1977.17	AU0290	J 166	2.122	294557	904416	-13.26
1977.17	AU0291	F 192	3.204	294553	904350	-13.92
1977.17	AU0293	H 166	2.374	294539	904218	-15.49
1977.17	AU0294	G 166	2.315	294531	904114	-15.62
1977.17	AU0295	F 166	1.977	294522	904019	-17.18
1977.17	AU0296	X 165	2.086	294514	903919	-14.46
1977.17	AU0297	W 165	2.685	294506	903818	-12.60
1977.17	AU0298	D 192	2.122	294503	903808	-12.01
1977.17	AU0299	K 165	1.010	294456	903720	-12.25
1977.17	AU0300	Y 191	1.225	294446	903619	-12.21
1977.17	AU0301	O 8	0.581	294445	903533	-12.73
1995.17	AU0302	Y 298	1.323	294452	903432	-11.68
1995.17	AU0303	X 298	0.140	294454	903421	-11.27
1977.17	AU0304	E 192	2.851	294454	903431	-12.14
1995.17	AU0305	J 165	0.583	294454	903428	-12.48
1995.17	AU0306	C 192	1.326	294522	903330	-10.49
1995.17	AU0309	Q 8	1.042	294657	903126	-10.04
1995.17	AU0313	R 298	2.782	294924	902837	-9.69
1995.17	AU0314	S 298	1.201	294930	902831	-9.99
1995.17	AU0315	R 8	2.794	294930	902830	-10.66
1995.17	AU0316	G 165	0.237	294957	902741	-10.47
1995.17	AU0318	TT 14 F	0.418	295116	902710	-11.17
1995.17	AU0319	SC 106	0.647	295111	902720	-10.96
1995.17	AU0320	E 165	0.154	295137	902713	-10.60
1995.17	AU0322	D 165	0.360	295219	902657	-9.77
1995.17	AU0323	TT 13 F	0.324	295246	902613	-8.97
1995.17	AU0324	U 8	0.400	295250	902610	-9.27
1995.17	AU0326	B 165	1.177	295320	902513	-8.68
1995.17	AU0329	V 165	0.453	295421	902226	-7.76
1995.17	AU0330	U 165 RESET	1.342	295436	902124	-7.69
1995.17	AU0331	Z 191	0.881	295445	902106	-7.49
1995.17	AU0332	E 299	0.583	295449	902041	-8.19
1995.17	AU0333	S 276	1.243	295449	902038	-8.87
1995.17	AU0335	Z 300	1.157	295512	902034	-7.68
1995.17	AU0340	60 LLD	1.841	295552	901909	-8.99
1995.17	AU0342	B 319	2.591	295658	901756	-7.68
1995.17	AU0345	D 319	2.880	295754	901531	-8.97
1995.17	AU0346	E 319	3.388	295737	901431	-8.50
1995.17	AU0347	F 319	3.496	295656	901355	-8.85
1995.17	AU0352	WILLSWOOD RM 2	1.368	295527	901340	-8.38
1995.17	AU0353	JF 58	2.366	295534	901315	-7.47

1995.17	AU0356	Y 190	2.164	295509	901227	-7.92
1995.17	AU0356	Y 190	2.164	295509	901227	-7.92
1993.33	AU0385	Q 154 RESET	0.272	291348	901244	-14.38
1984.58	AU0402	R 276	3.719	295536	901224	-9.03
1994.92	AU0413	Q 147	0.747	295811	900938	-7.86
1994.92	AU0417	M 188	1.017	295829	900917	-7.90
1994.92	AU0419	A 276	1.775	295914	900820	-8.91
1994.92	AU0420	U 147	0.806	295914	900743	-9.75
1994.92	AU0422	L 188	2.341	295919	900700	-9.94
1994.92	AU0423	P 188	1.359	295927	900635	-11.07
1994.92	AU0425	45 B	-0.002	295940	900604	-12.45
1994.92	AU0427	W 147	-0.437	295935	900533	-12.80
1994.92	AU0428	Y 147	0.408	295935	900513	-11.96
1994.92	AU0429	A 148	1.661	295921	900513	-11.01
1994.92	AU0431	F 156	-1.210	295925	900415	-10.11
1994.92	AU0434	D 3120	0.161	295944	900345	-10.93
1994.92	AU0435	P 193	0.365	300000	900332	-8.02
1993.33	AU0451	BOWIE 2	0.285	294220	903720	-9.34
1986.50	AU0463	SHELL 20	4.125	295948	902438	-7.29
1986.50	AU0466	B 146	4.281	295931	902414	-9.88
1986.50	AU0471	C 188	2.636	295920	902353	-10.30
1986.50	AU0472	P 93	1.755	295837	902325	-9.27
1986.50	AU0481	B 188	4.053	295629	902121	-9.65
1986.50	AU0489	V 188	3.167	295616	902018	-9.17
1986.50	AU0493	E 146	4.029	295631	901922	-10.42
1986.50	AU0494	K 93	3.868	295701	901846	-9.33
1986.50	AU0504	A 188	1.818	295813	901722	-11.35
1986.50	AU0508	G 146	2.681	295832	901543	-11.46
1993.25	AU0512	H 146	2.357	295829	901508	-7.92
1986.50	AU0512	H 146	2.387	295829	901508	-9.96
1993.25	AU0518	J 146 RESET	2.127	295821	901438	-7.96
1986.50	AU0518	J 146 RESET	2.158	295821	901438	-10.06
1993.25	AU0520	S 188	2.237	295801	901345	-7.34
1984.58	AU0526	Q 276	1.588	295708	901251	-7.97
1984.58	AU0530	Q 188	1.959	295627	901247	-9.73
1984.58	AU0531	46	2.551	295610	901235	-10.37
1995.17	AU0676	Q 189	-0.040	295733	900034	-7.23
1995.17	AU0682	U 157	1.480	295410	900602	-8.71
1995.17	AU0686	J 190 RESET	0.691	295337	900603	-8.79
1995.17	AU0689	P 190	1.455	295142	900554	-6.50
1995.17	AU0691	S 190 RESET	0.633	295111	900631	-6.14
1995.17	AU0692	T 190	0.482	295136	900636	-6.13
1995.17	AU0693	U 190	0.899	295239	900650	-5.79
1995.17	AU0697	V 157	1.900	295353	900613	-9.00
1995.17	AU0729	W 190	1.420	295452	901029	-8.85
1993.25	AU0766	NEW ORLEANS W BASE 2	0.545	295845	901422	-8.26
1993.25	AU0775	HANSEN	0.903	295858	901440	-7.23
1995.17	AU0934	GRETNA 2	0.431	295516	900305	-8.76
1995.17	AU0935	GRETNA	1.042	295504	900329	-9.43

1995.17	AU0941	T 157	1.772	295454	900351	-9.41
1995.17	AU0944	WTPS RESET	-0.337	295450	900248	-7.44
1995.08	AU0948	F 190	-0.345	295528	900202	-0.85
1995.17	AU0952	SHEAR	0.875	295430	900423	-9.20
1995.17	AU0963	HARVEY RM 2	2.012	295431	900502	-9.61
1995.17	AU0964	HARVEY RM 3	3.168	295428	900502	-9.27
1995.17	AU0965	1601	6.417	295434	900503	-9.29
1993.25	AU1085	P 276	-0.643	295915	901625	-8.34
1993.25	AU1086	R 18	1.278	295944	901708	-10.38
1993.33	AU1091	F 220	1.603	293620	902923	-12.13
1993.33	AU1094	G 220	1.642	293550	902904	-13.79
1993.33	AU1097	H 220	1.472	293537	902801	-14.29
1993.33	AU1100	HARANG RESET	2.175	293527	902706	-16.32
1993.33	AU1101	HARANG RM 3	1.470	293527	902707	-15.91
1993.33	AU1104	HARANG AZ MK	3.154	293520	902637	-18.92
1993.33	AU1105	N 220	1.410	293512	902614	-15.73
1993.33	AU1107	P 220	1.549	293503	902519	-12.12
1993.33	AU1109	Q 220	1.090	293439	902417	-11.01
1993.33	AU1112	S 220	1.802	293432	902337	-10.10
1993.33	AU1115	LAROSE AZ MK RESET	2.289	293427	902318	-10.84
1993.33	AU1117	LAROSE	1.908	293419	902259	-11.01
1993.33	AU1118	LAROSE RM 3	2.035	293419	902259	-12.80
1993.33	AU1123	R 220	0.972	293319	902103	-11.25
1993.33	AU1125	TT 36 L	0.994	293245	902021	-12.42
1993.33	AU1126	R 155	1.176	293245	902021	-12.71
1993.33	AU1127	K 220	1.521	293205	902008	-13.13
1993.33	AU1130	G 221	1.198	293055	901958	-13.90
1993.33	AU1131	L 220	1.460	292956	901943	-13.35
1984.58	AU1143	G 281	1.093	294747	900017	-8.25
1984.58	AU1146	222/2 CAP	1.455	294732	900020	-8.23
1984.58	AU1152	U 278	0.757	294648	900050	-6.02
1984.58	AU1153	Q 151	2.643	294550	900102	-7.13
1995.08	AU1163	T 196	-1.247	295547	900155	-0.89
1995.08	AU1169	V 196 RESET	-1.500	295425	900105	-51.94
1995.08	AU1170	A 200	-1.268	295446	900104	-5.55
1995.08	AU1175	Z 196	-1.262	295437	900024	-4.33
1995.08	AU1176	U 196	-0.434	295516	900052	-0.90
1995.08	AU1178	W 196 RESET	-1.211	295527	900112	-3.21
1993.33	AU1207	M 220	0.536	292603	901750	-10.62
1993.33	AU1209	U 220	0.373	292516	901717	-11.53
1993.33	AU1212	V 220	0.512	292437	901630	-12.47
1993.33	AU1213	X 220	0.245	292405	901620	-11.35
1993.33	AU1216	C 154 RESET	-0.051	292320	901553	-15.59
1993.33	AU1225	W 220 RESET	0.000	292319	901552	-15.32
1993.33	AU1226	Y 220	0.157	292232	901534	-12.13
1993.33	AU1228	E 154	-0.061	292146	901518	-13.11
1993.33	AU1229	Z 220	-0.025	292142	901515	-10.79
1993.33	AU1231	POLE	0.591	292023	901445	-11.12
1993.33	AU1236	ICE	-0.056	291918	901421	-10.99

1993.33	AU1238	LEE	0.492	291822	901406	-10.67
1993.33	AU1242	C 221	0.290	291725	901353	-11.22
1993.33	AU1245	E 221	0.693	291549	901304	-12.10
1993.33	AU1255	JESSE	0.284	291406	901235	-12.68
1993.33	AU1257	J 221	0.063	291305	901303	-11.60
1993.33	AU1265	MARSH	0.271	290934	901051	-9.41
1993.33	AU1277	B 155 RESET	0.556	291053	900605	-13.48
1993.33	AU1285	Y 222	0.380	291217	900331	-7.77
1993.33	AU1289	P 221	0.943	291238	900258	-8.18
1993.33	AU1291	N 221	1.593	291216	900224	-11.69
1993.50	AU1298	F 233	1.442	293035	903515	-10.45
1993.50	AU1299	G 233	1.214	292957	903437	-10.25
1993.50	AU1300	H 233	0.647	292927	903424	-11.32
1993.50	AU1301	J 233	2.521	292855	903446	-12.73
1993.50	AU1302	K 233	2.040	292807	903525	-13.66
1993.50	AU1303	L 233	1.777	292741	903520	-13.71
1993.50	AU1304	M 233	1.667	292700	903535	-14.03
1993.50	AU1305	N 233	0.831	292603	903546	-14.89
1993.50	AU1306	P 233	0.901	292519	903609	-12.44
1993.50	AU1307	Q 233	0.770	292428	903628	-10.76
1993.50	AU1308	R 233	1.426	292340	903646	-9.55
1993.50	AU1309	S 233	3.217	292308	903712	-14.94
1993.50	AU1312	V 233	1.546	292057	903740	-11.60
1993.50	AU1313	W 233	0.670	292016	903816	-9.46
1993.50	AU1314	X 233	3.460	291956	903834	-11.68
1993.50	AU1317	Y 233	0.449	291909	903844	-7.97
1993.50	AU1319	Z 233	0.692	291750	903856	-7.11
1993.50	AU1320	R 231	1.071	291654	903840	-7.57
1993.50	AU1321	P 232	0.255	291633	903847	-7.21
1993.50	AU1323	LITTLER RM 4	0.503	291444	903942	-8.05
1993.50	AU1325	LITTLER RM 1	0.382	291444	903942	-8.68
1993.33	AU1344	A 220	3.539	294345	903556	-11.18
1993.33	AU1353	GEORGIA RM 1	3.107	294140	903305	-8.18
1993.33	AU1358	Z 219	2.795	293956	903213	-9.59
1993.33	AU1366	E 4606	1.977	293803	903032	-11.79
1982.46	AU1369	S 228	5.018	295512	905916	-9.31
1982.46	AU1370	U 228	4.802	295439	905913	-9.95
1982.46	AU1371	A 229	4.810	295354	905914	-12.20
1982.46	AU1372	TT STA 53 USGS	4.702	295331	905920	-10.89
1982.46	AU1373	B 229	4.663	295249	905921	-10.51
1982.46	AU1374	V 228	4.754	295216	905913	-10.29
1982.46	AU1376	X 228	4.549	295111	905811	-9.39
1982.46	AU1377	Y 228	3.906	295042	905735	-9.54
1982.46	AU1378	Z 228	5.226	295024	905716	-9.89
1982.46	AU1379	C 229	4.339	294951	905616	-8.95
1982.46	AU1380	D 229	1.853	294945	905523	-9.01
1982.46	AU1381	E 229	4.290	294932	905449	-9.88
1982.46	AU1382	F 229	4.315	294909	905343	-10.72
1982.46	AU1383	G 229	3.964	294856	905251	-12.03

1982.46	AU1384	1336+40 USE	5.464	294843	905210	-12.96
1982.46	AU1385	TT 29 F USGS	4.168	294843	905210	-13.12
1982.46	AU1386	H 229	2.322	294825	905133	-13.17
1982.46	AU1387	J 229	4.279	294802	905035	-13.41
1982.46	AU1388	K 229	4.001	294755	905019	-14.37
1982.46	AU1389	Y 229	3.825	294745	904938	-17.32
1982.46	AU1390	M 229	5.348	294751	904920	-15.46
1982.46	AU1391	TT 28 F USGS	4.251	294752	904840	-16.15
1982.46	AU1392	N 229	3.529	294743	904805	-18.70
1993.33	AU1396	F 227	1.281	293855	905808	-10.91
1993.33	AU1398	G 227	1.171	293834	905740	-12.54
1993.33	AU1399	ARSENAUX	1.131	293817	905714	-14.20
1993.33	AU1401	ARSENAUX RM 2	1.119	293810	905659	-14.74
1993.33	AU1402	B 4649	1.166	293753	905607	-16.58
1993.33	AU1403	H 227	0.836	293752	905552	-17.00
1993.33	AU1404	K 227	1.526	293743	905502	-18.58
1993.33	AU1405	J 227	2.245	293741	905503	-18.75
1993.33	AU1406	L 227	1.077	293710	905411	-20.94
1993.33	AU1407	M 227	1.345	293630	905320	-23.48
1993.33	AU1409	N 227	1.350	293622	905219	-22.65
1993.33	AU1411	P 227	2.080	293628	905138	-21.51
1993.33	AU1412	Q 227	2.213	293624	905137	-21.50
1993.33	AU1413	TT 37 F	1.554	293630	905117	-21.15
1993.33	AU1415	R 227	1.455	293620	905019	-22.27
1993.33	AU1418	S 227	1.412	293540	904937	-20.09
1993.33	AU1420	B 4668	2.293	293509	904912	-19.77
1993.33	AU1424	T 227	2.975	293340	904734	-15.37
1993.33	AU1425	U 227	2.373	293339	904735	-15.06
1993.33	AU1426	W 227	1.861	293332	904712	-14.77
1993.33	AU1428	X 227	2.517	293356	904614	-14.43
1993.33	AU1433	Y 227	2.241	293430	904437	-14.64
1993.33	AU1434	ABLE AZ MK	3.842	293431	904347	-14.28
1993.33	AU1435	Y 221	2.296	293441	904318	-14.05
1993.33	AU1436	Z 221	1.364	293520	904313	-16.60
1993.50	AU1437	U 221	2.122	293554	904308	-18.21
1993.50	AU1439	S 221	2.229	293552	904213	-18.22
1993.50	AU1440	T 221	1.215	293550	904143	-16.78
1993.50	AU1441	A 222	1.141	293528	904044	-15.36
1993.50	AU1444	D 222	2.569	293347	903852	-7.29
1993.33	AU1464	J 109	0.696	294302	903654	-10.38
1993.50	AU1489	C 4612	3.751	293553	904237	-16.87
1993.50	AU1499	CB	1.629	293456	904026	-11.62
1993.50	AU1500	DB	1.641	293448	904014	-10.59
1993.50	AU1501	EB	1.647	293447	904013	-10.28
1993.50	AU1504	A 233	2.146	293312	903819	-7.22
1993.50	AU1505	B 233	2.887	293231	903740	-5.62
1993.50	AU1506	C 233	2.294	293209	903709	-5.61
1993.50	AU1507	D 233	2.336	293155	903620	-6.29
1993.50	AU1508	E 233	1.956	293117	903556	-10.04

1986.50	AU1510	194/2 CAP	5.789	295943	904849	-12.62
1982.46	AU1616	1 DLH USGS	5.786	295937	910310	-13.47
1982.46	AU1617	L 228	4.659	295924	910222	-12.63
1982.46	AU1618	STA 5 USGS	6.523	295926	910125	-11.74
1982.46	AU1619	TT 56 LS USGS RESET 1955	5.791	295921	910118	-11.62
1982.46	AU1620	M 228	5.550	295824	910113	-9.31
1982.46	AU1621	2 DLH USGS	5.501	295745	910134	-10.48
1982.46	AU1622	N 228	5.371	295718	910146	-9.60
1982.46	AU1623	T 228	5.054	295644	910134	-9.54
1982.46	AU1624	P 228	5.800	295630	910122	-9.52
1982.46	AU1625	3 DLH USGS	5.387	295628	910125	-9.85
1982.46	AU1626	Q 228	5.280	295600	910040	-9.44
1982.46	AU1627	R 228	5.238	295536	905941	-9.35
1969.33	AU1685	C 170	3.369	295122	913425	-10.23
1969.33	AU1688	D 170	3.251	295146	913450	-12.38
1969.33	AU1689	BALDWIN NW BASE RM 1	3.951	295222	913459	-10.72
1969.33	AU1690	BALDWIN NW BASE RM 4	5.107	295244	913522	-9.19
1969.33	AU1692	BALDWIN NW BASE RESET	5.064	295243	913523	-9.32
1969.33	AU1693	BALDWIN NW BASE RM 3	4.493	295244	913522	-9.75
1969.33	AU1694	E 170	4.663	295242	913552	-18.45
1969.33	AU1695	S 201	3.413	295247	913601	-10.25
1969.33	AU1696	F 170	4.976	295307	913648	-10.36
1969.33	AU1701	H 170	4.478	295354	913830	-10.44
1969.33	AU1703	ST PETER USE	5.305	295424	913928	-7.47
1969.33	AU1705	A 170	4.647	295414	913947	-5.97
1969.33	AU1706	Z 169	4.191	295409	913951	-6.53
1969.33	AU1707	Y 169	4.211	295407	913950	-6.59
1969.33	AU1708	A 4100 LAGS	4.520	295433	913954	-5.57
1969.33	AU1711	Q 4	6.045	295452	913958	-5.71
1969.33	AU1712	J 170	5.795	295447	914011	-5.20
1969.33	AU1713	R 201	4.611	295452	914020	-5.65
1969.33	AU1715	4026 LAGS	5.084	295524	914102	-4.04
1969.33	AU1717	K 170	5.070	295443	914141	-5.46
1969.33	AU1728	M 170	5.418	295630	914234	-6.66
1969.33	AU1729	G 201	4.269	295700	914315	-5.27
1969.33	AU1735	PTS 29 USGS	5.998	295830	914518	-5.56
1969.33	AU1738	T 170	5.676	295855	914618	-5.74
1969.33	AU1739	F 201	5.156	295921	914720	-6.14
1969.33	AU1741	4006 LAGS	6.032	295928	914735	-6.86
1969.33	AU1743	C 3869 LAGS	5.914	295945	914815	-7.48
1969.33	AU1744	E 201	5.004	295955	914837	-6.58
1984.58	AU1991	L 194	1.765	294452	900026	-6.19
1995.17	AU2013	A 358	1.347	294418	903505	-10.84
1993.33	AU2014	B 358	3.154	294340	903552	-12.99
1993.33	AU2015	C 358	3.040	294229	903419	-12.36
1993.33	AU2016	D 358	3.400	294204	903336	-9.12
1993.33	AU2017	GEORGIA 2	3.418	294139	903306	-8.54
1993.33	AU2018	E 358	3.265	294039	903229	-8.90
1993.33	AU2019	K 358	0.363	293912	903209	-10.22

1993.33	AU2020	L 358	1.909	293837	903116	-10.35
1993.33	AU2021	Q 358	2.267	293658	902940	-13.46
1993.33	AU2022	P 358	1.553	293422	902302	-9.75
1993.33	AU2023	M 358	0.954	293354	902148	-11.37
1993.33	AU2024	N 358	1.231	293129	902003	-14.05
1993.33	AU2025	J 358	1.095	292906	901922	-11.38
1993.33	AU2026	H 358	1.128	292820	901851	-13.20
1993.33	AU2027	R 358	0.471	292801	901841	-10.66
1993.33	AU2028	G 358	0.717	292738	901831	-11.15
1993.33	AU2029	F 358	0.509	292650	901807	-10.57
1993.33	AU2030	SANDAS 2 RM 5	0.144	292408	901621	-11.91
1993.33	AU2031	SANDAS 2	0.150	292407	901621	-12.02
1993.33	AU2032	S 358	-0.086	292042	901450	-11.49
1993.33	AU2033	Q 359	0.833	292008	901436	-12.35
1993.33	AU2034	P 359	1.480	291455	901242	-13.33
1993.33	AU2035	N 359	0.792	291439	901225	-15.11
1993.33	AU2036	JESSE RM 1	0.333	291406	901236	-12.75
1993.33	AU2040	K 359	0.640	291053	901151	-9.92
1993.33	AU2042	H 359	1.351	290925	901032	-11.22
1993.33	AU2043	G 359	0.152	290954	900944	-8.87
1993.33	AU2044	F 359	0.309	291015	900844	-8.50
1993.33	AU2047	U 358	1.034	291113	900524	-7.81
1993.33	AU2048	C 359	0.929	291140	900431	-7.94
1993.33	AU2049	B 359	0.464	291231	900158	-10.01
1993.33	AU2050	A 359	0.714	291304	900113	-10.99
1993.33	AU2081	A 364	0.678	294119	905927	-10.00
1993.33	AU2082	R 359	0.781	293924	905824	-9.99
1993.33	AU2083	C 364	1.488	293630	905117	-21.10
1993.33	AU2084	S 359	1.774	293423	904825	-16.83
1993.33	AU2085	T 359	2.360	293420	904547	-14.47
1993.33	AU2086	U 359	2.262	293457	904316	-15.00
1993.33	AU2087	V 359	2.124	293532	904310	-16.46
1993.33	AU2088	B 364	2.005	293610	904304	-17.44
1993.33	AU2089	W 359	0.571	293655	904240	-18.85
1993.33	AU2090	X 359	1.900	293752	904214	-15.12
1993.33	AU2091	Y 359	1.021	293834	904122	-14.92
1993.33	AU2095	C 361	1.598	294120	903822	-12.52
1993.33	AU2096	K 109 RESET	1.284	294149	903748	-20.70
1993.33	AU2100	D 361	1.737	294242	903706	-9.57
1993.33	AU2101	BOWIE 2 AZ MK	1.129	294241	903706	-12.69
1993.33	AU2102	E 361	2.840	294349	903625	-14.28
1995.17	AU2110	G 365	0.096	295439	901248	-7.14
1995.17	AU2111	H 365	0.371	295436	901224	-7.41
1995.17	AU2112	J 365	0.228	295437	901210	-7.02
1995.17	AU2113	H 368	-0.391	295433	901140	-6.86
1995.17	AU2118	N 368	-1.010	295320	900833	-7.34
1995.17	AU2119	K 365	-0.564	295322	900833	-7.55
1995.17	AU2123	Q 368	0.606	295232	900654	-6.66
1995.17	AU2125	R 368	0.537	295232	900558	-7.47

1995.17	AU2126	X 367	1.304	295237	900556	-7.17
1995.17	AU2127	Y 367	0.690	295229	900548	-7.20
1995.17	AU2128	Z 367	1.027	295210	900550	-6.70
1995.17	AU2147	X 368	0.683	295044	900712	-6.00
1995.17	AU2148	A 365	1.027	295011	900700	-6.37
1995.17	AU2149	Y 368	0.742	294956	900652	-6.27
1995.17	AU2150	B 365	0.787	294950	900647	-6.43
1995.17	AU2151	C 365	0.476	294912	900632	-6.58
1995.17	AU2152	Z 368	0.336	294906	900634	-6.55
1995.17	AU2153	A 369	0.956	294818	900704	-5.99
1995.17	AU2154	PUMP AZ MK	1.149	294809	900718	-5.49
1995.17	AU2155	PUMP RM 1	0.655	294800	900722	-5.77
1995.17	AU2156	PUMP	0.890	294758	900722	-5.37
1995.17	AU2157	PUMP RM 2	0.759	294758	900724	-5.72
1995.17	AU2158	MARRERO RM 2	0.710	294736	900719	-6.50
1995.17	AU2159	MARRERO RM 3	1.407	294737	900718	-6.07
1995.17	AU2160	MARRERO	2.726	294736	900717	-5.76
1995.17	AU2161	C 369	0.559	294659	900645	-5.71
1995.17	AU2162	D 369	2.223	294643	900600	-6.19
1995.17	AU2163	B 369	1.729	294607	900602	-5.62
1995.17	AU2164	F 369	24.628	294545	900600	-6.29
1995.17	AU2165	E 369	1.645	294520	900600	-6.11
1995.17	AU2166	F 365	0.990	294537	900609	-5.76
1995.17	AU2167	E 365	0.611	294538	900559	-5.72
1995.17	AU2168	D 365	0.458	294541	900537	-5.48
1995.17	AU2180	T 371	6.876	295511	901229	-10.51
1995.17	AU2242	JPW 52 B	-0.265	295433	901100	-6.83
1995.17	AU2244	JPW 58 C	-0.575	295354	900837	-12.09
1995.17	AU2245	JPW 57 B	-0.338	295410	900900	-7.13
1995.17	AU2246	JPW 56 C	-0.353	295413	900910	-9.51
1995.17	AU2247	JPW 55 C	-0.940	295418	900921	-18.83
1995.17	AU2248	JPW 54 B	-0.819	295421	900930	-6.74
1995.17	AU2249	JPW 53 C	-0.234	295435	900954	-12.54
1995.17	AU2250	JPW 59 C	-0.237	295340	900826	-8.46
1995.17	AU2296	JPW 105 C	0.515	294536	900630	-5.60
1995.17	AU2297	JPW 106 B	0.375	294533	900700	-5.79
1995.17	AU2298	JPW 107 C	0.329	294528	900718	-9.86
1995.17	AU2299	JPW 108 B	0.638	294507	900800	-5.79
1995.17	AU2300	JPW 109 C	0.453	294456	900807	-6.00
1995.17	AU2301	JPW 110 B	0.222	294428	900747	-5.97
1995.17	AU2302	JPW 111 C	0.289	294357	900728	-5.75
1995.17	AU2303	JPW 112 B	0.347	294315	900702	-6.09
1995.17	AU2304	JPW 113 C	0.604	294245	900635	-6.15
1995.17	AU2305	JPW 114 C	0.381	294212	900607	-8.33
1995.17	AU2306	JPW 115 B	0.707	294126	900546	-5.76
1995.17	AU2307	JPW 116 C	-0.429	294051	900603	-6.14
1995.17	AU2308	JPW 117 B	0.215	294008	900641	-5.95
1995.17	AU2310	876 1899 B TIDAL	-0.105	294007	900642	-5.58
1995.17	AU2311	876 1899 A TIDAL	0.740	294001	900642	-6.11

1995.17	AU2312	876 1899 C TIDAL	-0.048	294006	900642	-5.59
1995.17	AU2313	876 1899 D TIDAL	0.139	294008	900632	-5.50
1995.17	AU2315	LAFITTE RM 1	0.333	294006	900635	-6.08
1995.17	AU2316	SB 001 G	-0.718	295740	900003	-7.47
1995.17	AU3323	TERRY	-0.717	295528	900217	-7.44
1995.17	AU3343	Z 193 RESET	-1.399	295549	900219	-2.59
1995.17	AU3366	D 387	0.804	295609	900216	-0.51
1986.25	AV0077	W 215	2.212	293912	922908	-10.37
1986.25	AV0079	X 215	1.199	293902	922810	-10.83
1986.25	AV0080	N 112	2.975	293852	922726	-12.19
1986.25	AV0082	M 112	1.999	293842	922639	-11.96
1986.25	AV0084	MOUND AZ MK	2.374	293848	922626	-12.11
1986.25	AV0085	MOUND RM 4	2.208	293848	922610	-12.31
1986.25	AV0086	MOUND RM 3	1.643	293848	922608	-12.58
1986.25	AV0163	C 223	0.563	293926	922214	-11.92
1986.25	AV0165	E 223	0.520	294119	922158	-12.61
1986.25	AV0169	J 223	2.838	294441	921939	-13.08
1986.25	AV0170	K 223	4.058	294445	921941	-13.21
1986.25	AV0171	L 223	1.260	294528	921946	-8.86
1986.25	AV0172	M 223	1.058	294608	921954	-8.74
1986.25	AV0173	N 223	1.003	294658	922021	-8.19
1986.25	AV0174	P 223	2.221	294754	922030	-9.28
1986.25	AV0175	VE 629 WELL	0.656	294815	922029	-8.91
1986.25	AV0176	Q 223	0.822	294833	922029	-8.87
1986.25	AV0177	R 223	0.531	294911	921951	-8.85
1986.25	AV0178	S 223	0.734	294931	921859	-8.42
1986.25	AV0271	M 213	0.591	294609	925941	-12.61
1986.25	AV0272	N 213	1.727	294603	925839	-11.76
1986.25	AV0273	P 213	2.594	294553	925740	-11.73
1986.25	AV0276	TTS 184 LS	1.981	294541	925649	-11.38
1986.25	AV0277	Q 213	1.824	294529	925553	-12.62
1986.25	AV0278	R 213	2.653	294515	925457	-11.86
1986.25	AV0280	S 213	2.566	294443	925259	-11.67
1986.25	AV0281	T 213	2.396	294429	925204	-11.70
1986.25	AV0282	TTS 186 LS	1.327	294417	925115	-10.97
1986.25	AV0283	U 213	1.295	294404	925009	-10.81
1986.25	AV0284	MARSH	0.747	294346	924905	-11.21
1986.25	AV0286	TTS 187 LS RESET	1.567	294333	924756	-10.81
1986.25	AV0287	W 213	0.918	294320	924658	-11.55
1986.25	AV0288	X 213	1.466	294307	924552	-11.27
1986.25	AV0291	MILLER RM 1	0.566	294247	924444	-9.32
1986.25	AV0293	DOLAND RM 2	0.630	294244	924405	-10.33
1986.25	AV0295	DOLAND AZ MK	0.649	294307	924354	-13.72
1986.25	AV0296	DOLAND	1.016	294244	924404	-10.62
1986.25	AV0297	DOLAND RM 1	0.762	294247	924402	-13.64
1986.25	AV0298	Y 213	0.439	294233	924255	-10.14
1986.25	AV0301	Z 213	0.563	294230	924153	-10.26
1986.25	AV0304	H 215	3.002	294224	924027	-10.12
1986.25	AV0306	J 215	0.745	294207	923933	-10.46

1986.25	AV0311	L 215	0.500	294135	923726	-9.12
1986.25	AV0314	M 215	1.851	294106	923624	-9.08
1986.25	AV0317	P 215	1.869	294012	923421	-8.96
1986.25	AV0318	Q 215	1.862	294014	923408	-9.39
1986.25	AV0320	R 215	1.879	294005	923328	-9.03
1986.25	AV0321	S 215	1.877	294002	923313	-9.08
1986.25	AV0325	U 215	1.892	293934	923119	-9.54
1986.25	AV0331	R 112 RESET	1.396	293918	923009	-9.43
1982.17	AV0332	H 211	2.199	295947	932107	-12.05
1982.17	AV0333	J 211	1.217	295934	932203	-10.38
1982.17	AV0334	K 211	1.107	295843	932159	-10.11
1982.17	AV0336	L 211	0.486	295750	932204	-9.69
1982.17	AV0337	M 211	0.375	295653	932210	-9.40
1982.17	AV0338	TT 147 USGS	2.027	295613	932232	-9.70
1982.17	AV0340	P 211	2.496	295548	932238	-9.23
1982.17	AV0341	Q 211	0.520	295516	932249	-10.05
1982.17	AV0343	S 211	0.265	295343	932317	-12.38
1982.17	AV0344	T 211	2.662	295325	932408	-9.31
1982.17	AV0345	U 211	2.357	295301	932459	-14.02
1982.17	AV0346	V 211	1.077	295246	932533	-12.69
1982.17	AV0347	W 211	0.543	295222	932628	-12.90
1982.17	AV0352	X 211	0.551	295102	932758	-12.32
1982.17	AV0355	A 212	2.387	294907	932812	-12.56
1982.17	AV0356	B 212	0.473	294843	932831	-12.65
1982.17	AV0357	C 212	2.375	294802	932830	-12.73
1982.17	AV0358	D 212	1.155	294717	932804	-12.21
1982.17	AV0359	E 212	0.404	294631	932748	-12.88
1982.17	AV0360	F 212	1.013	294619	932705	-12.35
1982.17	AV0361	HENRY AZ MK	1.275	294618	932616	-13.72
1982.17	AV0363	HOLLYND RM 4	1.483	294605	932441	-15.73
1982.17	AV0364	HOLLYND	1.295	294604	932440	-16.77
1982.17	AV0366	H 212	0.616	294559	932247	-15.29
1982.17	AV0367	J 212	0.807	294601	932202	-12.51
1982.17	AV0368	K 212	0.760	294628	932104	-12.76
1982.17	AV0373	60+00 USE	1.547	294654	932048	-17.12
1982.17	AV0374	L 212	1.569	294744	932058	-17.20
1982.17	AV0375	M 212	1.060	294809	932054	-14.95
1982.17	AV0376	N 212	2.320	294809	932043	-4.68
1982.17	AV0377	TT 154 LS USGS	0.945	294754	931941	-16.38
1982.17	AV0381	Q 212	1.395	294741	931843	-14.58
1982.17	AV0382	R 212	1.433	294715	931807	-14.27
1982.17	AV0388	T 212	1.321	294709	931714	-15.19
1982.17	AV0389	U 212	0.861	294712	931605	-12.42
1982.17	AV0390	V 212	1.185	294717	931506	-12.67
1982.17	AV0391	W 212	1.505	294723	931355	-12.42
1982.17	AV0392	X 212	0.679	294751	931331	-12.08
1982.17	AV0393	Y 212	0.823	294807	931241	-13.08
1982.17	AV0394	TT 179 LS USGS	0.906	294815	931155	-14.48
1982.17	AV0395	Z 212	0.821	294817	931101	-13.30

1982.17	AV0396	A 213	1.118	294829	930955	-11.50
1982.17	AV0397	TT 180 LS USGS	0.676	294835	930852	-11.32
1982.17	AV0398	B 213	1.111	294839	930757	-11.97
1982.17	AV0399	C 213	0.810	294855	930725	-12.59
1982.17	AV0400	D 213	0.953	294859	930641	-13.00
1986.25	AV0400	D 213	0.900	294859	930641	-13.00
1986.25	AV0401	E 213	0.243	294812	930643	-13.47
1986.25	AV0404	G 213	2.022	294709	930559	-17.29
1986.25	AV0410	H 213	1.265	294704	930505	-21.94
1986.25	AV0411	TTS 182 LS	0.948	294651	930349	-23.61
1986.25	AV0412	J 213	1.335	294639	930248	-19.82
1986.25	AV0413	K 213	0.896	294619	930147	-15.03
1986.25	AV0414	L 213	1.999	294614	930043	-13.57
1986.25	AV0415	T 214	1.542	295944	930519	-9.89
1986.25	AV0416	U 214	0.933	295849	930521	-9.43
1986.25	AV0419	Y 214	1.013	295649	930505	-9.93
1986.25	AV0420	DRAWBRIDGE	2.101	295555	930444	-10.81
1986.25	AV0423	F 215	0.763	295321	930449	-10.04
1986.25	AV0426	D 215	0.769	295137	930517	-10.90
1986.25	AV0428	C 215	0.655	295101	930601	-11.72
1986.25	AV0430	A 215	0.903	294937	930639	-12.55
1969.00	BG0088	B 163	40.577	303153	871544	4.65
1969.00	BG0231	V 9	0.580	303718	870158	5.28
1969.00	BG0232	TIDAL 1 STA III 93	3.000	303723	870208	3.88
1969.00	BG0233	K 165	9.279	303734	870121	5.39
1969.00	BG0234	L 165	21.096	303741	870022	5.08
1969.00	BG0239	H 165	2.857	303631	870234	5.20
1969.00	BG0240	F 165	9.303	303602	870235	4.76
1969.00	BG0242	G 165	18.366	303537	870320	5.14
1969.00	BG0243	E 165	19.289	303511	870236	5.15
1969.00	BG0250	872 9742 TIDAL 2	2.251	303419	870017	1.55
1969.00	BG0251	872 9742 TIDAL 3	1.881	303419	870018	4.65
1969.00	BG0256	B 165	20.967	303439	870414	5.16
1969.00	BG0257	A 165	24.833	303437	870420	5.28
1969.00	BG0258	Z 161	31.187	303433	870430	5.37
1969.00	BG0259	386 USE	20.601	303423	870443	5.14
1969.00	BG0260	Y 161	19.876	303417	870451	5.10
1969.00	BG0261	R 9	11.225	303352	870542	5.02
1969.00	BG0263	X 161	6.351	303333	870642	4.42
1969.00	BG0264	W 161	1.506	303258	870733	5.13
1969.00	BG0265	Q 9	2.715	303307	870724	4.86
1969.00	BG0266	V 161	1.097	303203	870753	2.23
1969.00	BG0270	872 9816 TIDAL 1	1.319	303055	870942	0.46
1969.00	BG0273	872 9816 TIDAL 3 1951	0.987	303055	870941	2.68
1969.00	BG0285	U 161	8.751	303145	871118	4.93
1969.00	BG0286	W 112	34.569	303137	871148	4.55
1969.00	BG0287	V 112	33.181	303139	871200	4.29
1969.00	BG0288	U 112	34.613	303141	871210	4.72
1969.00	BG0300	C 163	31.645	303153	871252	-20.35

1969.00	BG0302	T 112	22.459	303153	871308	4.84
1969.00	BG0305	Z 111	16.511	303155	871402	4.69
1969.00	BG0307	Y 111	26.075	303155	871448	5.23
1969.00	BG0446	M 165	22.897	303747	865943	5.07
1969.00	BG0447	P 165	22.936	303750	865938	4.60
1969.00	BG0449	Q 165	34.361	303802	865851	5.54
1980.33	BG1724	872 9840 TIDAL 12	4.699	302453	871256	4.44
1980.33	BG1730	872 9840 TIDAL BASIC	3.751	302431	871252	4.58
1980.33	BG1731	G 9	3.983	302434	871254	4.33
1980.33	BG1732	872 9840 TIDAL 8	3.831	302430	871248	4.32
1980.33	BG1739	G 163	7.871	302502	871238	4.25
1980.33	BG1740	M 25	14.787	302516	871207	4.00
1980.33	BG1754	Q 163	19.156	302527	871142	4.15
1980.33	BG1757	T 163	10.385	302550	871033	3.94
1980.33	BG1758	M 161	19.069	302639	871025	3.76
1980.33	BG1760	N 161	17.842	302731	871000	4.28
1980.33	BG1763	O 11	3.448	302901	870939	3.99
1980.33	BG1768	R 161	3.079	302957	870937	4.27
1969.00	BG2542	K 407	52.942	304036	875201	2.86
1969.00	BG2546	H 407	52.992	304015	875352	2.59
1969.00	BG2549	T 406	39.323	304000	875441	2.75
1969.00	BG2551	U 406	5.632	304006	875538	2.35
1969.00	BG2552	V 406	0.500	304012	875619	-13.87
1969.00	BG2554	W 406	5.082	304022	875716	1.93
1969.00	BG2555	X 406	0.371	304029	875802	-12.56
1969.00	BG2557	Y 406	0.673	304045	875937	-8.40
1980.33	BH0009	198 ALGS	33.016	305507	881154	1.88
1969.00	BH0033	Y 120	0.705	304225	880300	2.18
1969.00	BH0051	MERIDIAN STONE USGS	3.608	304136	880230	2.33
1969.00	BH0056	Y 9 RESET 1946	3.464	304201	880244	2.34
1969.00	BH0060	S 367	2.848	304239	880304	2.32
1969.00	BH0061	T 367	3.249	304231	880301	2.17
1969.00	BH0063	R 367	3.085	304329	880332	2.54
1969.00	BH0105	Q 367	8.573	304354	880343	2.45
1969.00	BH0107	R 404	41.186	303008	881514	-0.88
1969.00	BH0108	S 404	39.690	303023	881426	-0.75
1969.00	BH0110	325 1 ALGS	40.656	303027	881403	-0.81
1969.00	BH0115	T 404	30.704	303057	881314	-0.97
1969.00	BH0116	G 405	26.903	303124	881224	-0.56
1969.00	BH0118	H 10	22.122	303131	881202	-1.52
1969.00	BH0119	H 405	19.171	303159	881102	-0.52
1969.00	BH0120	J 405	17.719	303247	881027	-0.21
1969.00	BH0122	K 405	17.823	303318	881003	-0.04
1969.00	BH0123	J 10	10.926	303407	880932	-0.07
1969.00	BH0124	L 405	3.419	303535	880836	-0.36
1969.00	BH0125	M 405	4.620	303612	880814	0.18
1969.00	BH0126	K 10	5.166	303636	880758	0.36
1969.00	BH0129	S 405	6.958	303743	880642	0.62
1969.00	BH0130	L 10	6.972	303750	880626	0.56

1969.00	BH0136	P 405	8.379	303854	880431	0.23
1969.00	BH0137	F 405	18.288	303242	881016	-0.33
1969.00	BH0142	A 407	4.345	304106	880039	1.11
1969.00	BH0145	Z 406	1.957	304050	880004	0.46
1969.00	BH0215	S 3	3.173	302729	882401	-1.59
1969.00	BH0217	S 189	2.662	302638	882520	-1.85
1969.00	BH0218	R 189	1.782	302623	882545	-2.15
1969.00	BH0225	GROVE RM 1	2.600	302524	882723	-3.35
1969.00	BH0227	Q 189	2.235	302502	882752	-3.52
1969.00	BH0228	Q 3	2.053	302425	882852	-4.13
1969.00	BH0229	L 189	5.254	302353	882941	-4.16
1969.00	BH0230	M 189	5.071	302253	882933	-4.88
1969.00	BH0231	N 189	4.269	302251	882929	-5.06
1969.00	BH0232	P 189	4.365	302250	882932	-5.95
1969.00	BH0234	K 189	5.160	302321	883033	-5.60
1969.00	BH0236	C 404	6.331	302755	882309	-1.46
1969.00	BH0239	E 404	22.094	302829	882104	-1.39
1969.00	BH0240	C 10	26.573	302835	882032	-1.32
1969.00	BH0242	F 404	27.844	302857	881935	-1.46
1969.00	BH0243	N 404	30.213	302913	881837	-1.56
1969.00	BH0245	P 404	34.027	302931	881728	-1.57
1969.00	BH0246	ORCHARD	40.547	302937	881659	-1.20
1969.00	BH0247	ORCHARD RM 1	39.219	302938	881659	-1.95
1969.00	BH0250	Q 404	38.796	302956	881600	-1.12
1977.50	BH0281	T 189	6.517	302344	885312	-4.90
1977.50	BH0282	Z 191	7.133	302358	885327	-5.09
1977.50	BH0284	Y 191	6.869	302355	885410	-5.32
1977.50	BH0291	X 191	7.587	302355	885452	-5.50
1977.50	BH0295	BILOXI RM 1	5.494	302347	885558	-4.50
1977.50	BH0296	BILOXI	6.796	302346	885600	-4.75
1977.50	BH0297	W 191	8.401	302353	885619	-5.23
1977.50	BH0301	V 191	7.712	302347	885830	-5.01
1977.50	BH0302	V 17	8.030	302343	885926	-6.16
1969.00	BH0304	P 3	4.489	302251	883119	-5.71
1969.00	BH0305	J 189	3.397	302220	883210	-7.27
1969.00	BH0321	H 189	4.744	302200	883255	-5.46
1969.00	BH0326	G 189	4.239	302200	883328	-5.12
1969.00	BH0327	F 189	4.686	302202	883339	-6.14
1969.00	BH0328	Z 192	6.987	302217	883339	-3.80
1969.00	BH0329	Y 192	6.958	302220	883353	-4.45
1969.00	BH0331	X 192	2.991	302239	883506	-16.21
1969.00	BH0335	W 192	4.884	302255	883617	-4.94
1969.00	BH0336	V 192	4.900	302300	883637	-3.84
1969.00	BH0337	K 3	2.685	302241	883648	-5.14
1969.00	BH0338	U 192	2.683	302308	883713	-4.71
1969.00	BH0340	T 192	3.914	302316	883755	-4.79
1969.00	BH0342	S 192	5.153	302317	883842	-4.95
1969.00	BH0343	R 192	5.702	302318	883909	-5.03
1969.00	BH0349	Q 192	2.841	302328	884007	-4.73

1969.00	BH0350	J 3	6.156	302331	884052	-6.20
1969.00	BH0351	P 192	5.267	302332	884125	-4.41
1969.00	BH0352	N 192	3.353	302344	884230	-4.67
1969.00	BH0353	M 192	7.166	302345	884317	-4.59
1969.00	BH0358	D 192	5.505	302410	884412	-4.36
1969.00	BH0359	C 192	6.191	302420	884516	-4.67
1969.00	BH0365	B 192	6.279	302428	884558	-4.51
1969.00	BH0367	A 192	6.872	302435	884644	-4.75
1969.00	BH0368	Z 189	6.692	302444	884743	-4.69
1969.00	BH0369	Y 189	6.935	302454	884843	-4.74
1969.00	BH0371	G 3	7.295	302456	884940	-4.44
1969.00	BH0379	X 189	5.837	302449	885018	-4.41
1969.00	BH0382	BRIDGE RM 1	3.580	302438	885030	-4.93
1969.00	BH0383	BRIDGE	3.560	302438	885029	-5.07
1969.00	BH0384	BRIDGE RM 2	3.500	302438	885030	-5.21
1969.00	BH0393	MORROW	3.422	302347	885133	-4.73
1969.00	BH0394	W 189	3.811	302345	885150	-4.70
1969.00	BH0395	V 189	4.881	302344	885226	-5.07
1969.00	BH0396	DUKATE	3.600	302345	885226	-4.96
1969.00	BH0397	U 189	5.931	302347	885249	-5.09
1977.50	BH0398	D 3	7.338	302346	885313	-4.95
1977.50	BH0399	PBM BILOXI MRC	7.351	302354	885329	-4.96
1977.50	BH0847	U 191	7.814	302337	890004	-5.50
1977.50	BH0857	W 168	10.021	302320	890340	-6.72
1977.50	BH0858	S 191	2.348	302342	890328	-5.48
1977.50	BH0862	R 191	7.020	302233	890414	-5.76
1977.50	BH0863	Q 191	6.119	302223	890440	-6.70
1977.50	BH0869	P 191	7.673	302212	890523	-5.67
1977.50	BH0870	N 191	7.560	302210	890528	-5.31
1977.50	BH0874	L 191	7.445	302216	890544	-5.49
1977.50	BH0875	R 17	9.215	302230	890543	-5.33
1977.50	BH0876	K 191	6.562	302302	890545	-5.73
1977.50	BH0877	F 191	8.738	302254	890630	-5.94
1977.50	BH0878	CBC 32.97 USNCB	9.673	302256	890646	-5.20
1977.50	BH0881	S 17	8.623	302208	890541	-5.38
1977.50	BH0882	G 191	6.981	302201	890607	-5.26
1977.50	BH0884	GULFPORT RM 2	4.566	302140	890634	-5.53
1977.50	BH0886	GULFPORT RESET	4.733	302140	890634	-3.58
1977.50	BH0889	E 191	6.625	302148	890645	-6.26
1977.50	BH0891	D 191	7.517	302134	890727	-5.38
1977.50	BH0894	C 191	7.471	302112	890833	-5.59
1977.50	BH0898	A 191	7.966	302049	890943	-5.16
1977.50	BH0903	Y 190	9.026	302018	891120	-5.07
1977.50	BH0914	W 190	3.981	301931	891344	-4.87
1977.50	BH0917	V 190	4.072	301855	891526	-5.71
1977.50	BH0925	U 190	2.973	301833	891712	-5.06
1977.50	BH0926	T 121	1.564	301833	891714	-5.04
1977.50	BH0932	EAST	5.176	301900	891741	-5.89
1977.50	BH0934	WEST	4.590	301909	891916	-4.91

1977.50	BH0942	R 190	3.723	301909	892029	-5.15
1977.50	BH0943	X 17	6.285	301850	892020	-6.64
1977.50	BH0944	874 7438 TIDAL 2	6.702	301839	891940	-4.79
1977.50	BH0946	T 190	6.973	301833	891936	-4.62
1977.50	BH0952	W 121	5.263	301828	892221	-4.62
1977.50	BH0953	Y 17	5.869	301808	892217	-5.04
1977.50	BH0954	M 190	2.550	301845	892241	-4.73
1977.50	BH0956	P 190	2.374	301844	892234	-4.81
1977.50	BH0964	Z 17	4.139	301756	892358	-4.86
1977.50	BH0967	J 190	3.100	301755	892502	-4.73
1977.50	BH0968	Z 121	3.412	301759	892524	-4.81
1977.50	BH0969	H 190	2.095	301757	892622	-4.71
1977.50	BH0970	A 18	1.736	301801	892622	-4.83
1977.50	BH0972	G 190	3.351	301759	892650	-4.81
1977.50	BH0978	F 190	4.466	301802	892818	-4.93
1977.50	BH0981	E 190	5.186	301802	892859	-4.77
1977.50	BH0982	D 190	5.350	301803	892948	-4.75
1994.92	BH1065	A 3129 RESET	-0.122	300046	895946	-15.81
1994.92	BH1067	227 RESET	0.114	300048	895927	-15.45
1994.92	BH1071	C 157 RESET	0.267	300048	895842	-15.77
1994.92	BH1073	231	-0.172	300052	895800	-16.08
1994.92	BH1076	C 276	0.551	300054	895657	-18.18
1994.92	BH1083	D 276	0.702	300042	895621	-17.36
1994.92	BH1084	F 189	0.024	300100	895554	-20.68
1994.92	BH1087	W 152	1.041	300136	895501	-16.00
1994.92	BH1089	WASTE WELL 2	1.301	300123	895446	-12.16
1994.92	BH1092	GATE 11	0.175	300144	895454	-18.76
1994.92	BH1094	FOLGER	0.642	300207	895434	-14.60
1994.92	BH1095	FOLGER RM 1	0.338	300208	895434	-16.86
1994.92	BH1096	A 3135	0.307	300202	895432	-11.32
1994.92	BH1102	H 153	0.260	300238	895333	-10.27
1994.92	BH1104	E 276	-1.095	300308	895247	-6.70
1994.92	BH1106	E 189	0.313	300318	895232	-7.06
1994.92	BH1109	D 189	0.290	300352	895154	-6.96
1994.92	BH1110	F 276	0.524	300426	895142	-7.15
1994.92	BH1119	C 189	0.543	300424	895025	-6.85
1994.92	BH1121	A 3120	0.322	300359	894930	-7.00
1994.92	BH1123	A 3122	0.736	300356	894903	-8.19
1994.92	BH1131	E 3144	4.691	300400	894818	-6.50
1994.92	BH1132	R 153	3.083	300359	894818	-6.45
1994.92	BH1133	E 3145	4.736	300406	894813	-6.09
1994.92	BH1136	A 92	0.665	300444	894731	-7.39
1994.92	BH1145	E 193	0.773	300648	894541	-7.24
1994.92	BH1147	E 92	0.895	300708	894546	-7.27
1994.92	BH1150	G 92	0.630	300837	894451	-7.21
1994.92	BH1155	G 193	1.248	300919	894417	-7.84
1994.92	BH1158	E 3168	1.856	300947	894425	-5.90
1994.92	BH1160	PIKE RM 3	2.677	300959	894415	-6.21
1994.92	BH1161	OR 179 WELL	1.287	300959	894417	-5.80

1994.92	BH1162	PIKE RM 2	2.362	300959	894414	-6.60
1994.92	BH1163	C 193	2.462	301000	894415	-5.82
1994.92	BH1164	PIKE RESET	2.379	300959	894414	-6.99
1994.92	BH1165	PIKE RM 4	2.558	300958	894414	-6.36
1994.92	BH1167	J 92	2.359	301004	894412	-5.66
1986.42	BH1168	E 3170	5.521	301007	894408	-6.55
1993.25	BH1170	S 156	1.722	301031	894344	-8.75
1993.25	BH1171	T 156	1.762	301050	894314	-6.77
1995.17	BH1191	236	0.431	300030	895622	-17.44
1993.25	BH1193	F 236	5.856	301805	893012	-5.21
1993.25	BH1194	V 214	4.637	301742	893050	-5.02
1993.25	BH1195	C 122	4.784	301710	893147	-5.02
1993.25	BH1196	D 122	5.289	301639	893240	-4.45
1993.25	BH1197	C 190	5.102	301631	893253	-4.94
1993.25	BH1198	C 215	5.214	301612	893321	-4.68
1993.25	BH1199	B 235	4.753	301603	893336	-4.74
1993.25	BH1201	F 122	3.192	301537	893423	-4.76
1993.25	BH1202	B 190	1.345	301528	893438	-4.79
1993.25	BH1203	G 122	2.243	301505	893519	-4.95
1993.25	BH1204	H 122	1.941	301436	893615	-5.13
1993.25	BH1205	A 190	1.531	301424	893636	-4.93
1993.25	BH1210	143 STAUNTON C	3.712	301420	893656	-5.33
1993.25	BH1211	EAST PEARL RIVER	2.850	301420	893656	-5.14
1993.25	BH1212	A 193	0.642	301418	893711	-5.37
1993.25	BH1213	E 3186	4.282	301413	893743	-5.20
1993.25	BH1214	EAST MIDDLE BOLT	2.745	301412	893745	-5.35
1993.25	BH1215	E 3185	4.268	301408	893817	-5.23
1993.25	BH1216	142	4.299	301404	893843	-5.31
1993.25	BH1217	R 92	1.261	301355	893941	-6.84
1993.25	BH1218	WEST PEARL BRIDGE	2.599	301352	894007	-5.61
1993.25	BH1219	141	4.164	301352	894008	-5.48
1993.25	BH1220	Q 92	2.415	301352	894038	-4.84
1993.25	BH1222	P 92	0.925	301257	894120	-8.24
1993.25	BH1223	B 193	1.952	301254	894125	-5.73
1993.25	BH1224	N 92	1.923	301227	894149	-6.00
1993.25	BH1225	U 156	1.263	301215	894201	-5.56
1986.42	BH1252	U 20	4.083	301640	894658	-8.82
1986.42	BH1261	A 21	3.636	301812	895510	-8.51
1986.42	BH1263	TT 70 L RESET	4.006	301835	895612	-12.12
1995.17	BH1442	Z 297	0.044	300032	895620	-16.95
1995.17	BH1443	236 AZ MK	0.698	300042	895621	-17.48
1994.92	BH1444	WYNOT RM 4	2.433	300435	895122	-9.31
1994.92	BH1445	J 319	2.037	300522	894642	-8.33
1994.92	BH1446	K 319	0.210	300551	894556	-7.10
1969.00	BH1459	PBM KEENER BOLT USE	5.300	302450	885030	-4.28
1969.00	BH1460	PBM KEENER CAP USE	6.535	302450	885030	-4.65
1969.00	BH1463	N 405	8.371	303919	880354	0.68
1969.00	BH1464	N 10	5.363	303933	880327	1.61
1969.00	BH1465	H 406	2.300	303958	880259	1.12

1969.00	BH1466	J 406	4.194	304011	880240	1.33
1969.00	BH1467	K 406	3.992	304029	880236	1.10
1969.00	BH1468	L 406	3.043	304056	880228	1.75
1969.00	BH1469	M 406	3.424	304125	880228	1.47
1969.00	BH1470	N 406	3.204	304140	880235	2.20
1969.00	BH1471	R 406	4.407	304401	880225	2.39
1969.00	BH1472	S 406	2.552	304326	880213	1.29
1969.00	BH1473	210 ALGS	0.840	304255	880202	-0.48
1969.00	BH1474	B 407	2.422	304216	880158	0.97
1969.00	BH1475	C 407 ALHD	1.257	304136	880148	0.82
1969.00	BH1476	D 407 ALHD	2.478	304135	880151	0.55
1969.00	BH1477	E 407 ALHD	2.157	304134	880152	1.81
1986.42	BH1537	WES 16	3.257	301000	894413	-6.20
1986.42	BH1538	WES 15	1.140	301001	894416	-6.09
1986.42	BH1539	WES 14	1.616	300954	894418	-6.24
1995.17	BH1769	V 371	0.286	300013	895619	-18.10
1995.17	BH1802	D 374	0.104	300028	895621	-17.61
1995.17	BH1806	U 375	1.033	300004	895628	-21.70
1995.17	BH1806	U 375	1.033	300004	895628	-21.70
1995.17	BH3007	WES 19	-0.151	300025	895619	-18.41
1995.17	BH3096	B 387	1.242	300023	895620	-18.50
1964.92	BJ0002	B 208	15.224	305922	914046	-2.57
1964.92	BJ0003	TORRAS BOLT	13.680	305921	914051	-1.82
1964.92	BJ0005	A 208	13.123	305835	914030	-3.63
1964.92	BJ0006	C 208	14.342	305741	914016	-3.32
1964.92	BJ0007	N 208	14.334	305719	914010	-3.85
1964.92	BJ0009	RED RIVER RM 2	12.687	305728	913954	-0.89
1964.92	BJ0012	Q 108	12.636	305633	913942	-3.47
1964.92	BJ0015	L 208	14.386	305557	913945	-3.99
1964.92	BJ0016	R 108	13.057	305603	913934	-2.06
1964.92	BJ0018	E 207	14.864	305458	913939	-4.12
1964.92	BJ0019	3 A BOLT	13.796	305434	913955	-2.97
1964.92	BJ0020	19 BOLT	12.823	305340	914004	-3.95
1964.92	BJ0021	F 207	14.260	305307	914013	-4.44
1964.92	BJ0022	4 A BOLT	13.491	305234	914024	-4.44
1964.92	BJ0024	G 207	13.368	305149	914016	-4.54
1964.92	BJ0025	XLIV	13.526	305137	914014	-4.52
1964.92	BJ0026	H 207	13.380	305104	913947	-4.61
1964.92	BJ0031	20 BOLT	12.972	304940	913633	-3.45
1964.92	BJ0033	M 207	12.481	304846	913444	-7.20
1964.92	BJ0038	P 207	11.192	304544	913616	0.42
1964.92	BJ0039	Q 207	16.130	304454	913601	-6.52
1964.92	BJ0042	PLAUCHE CAP	11.393	304418	913538	-2.87
1964.92	BJ0043	PLAUCHE BOLT	10.157	304418	913538	-2.79
1964.92	BJ0045	R 207	10.358	304334	913508	-2.65
1964.92	BJ0046	S 207	10.307	304305	913412	-2.57
1964.92	BJ0049	NEW ROADS WEST BASE RM 3	9.788	304256	913311	-3.70
1964.92	BJ0050	NEW ROADS WEST BASE RM 4	9.853	304256	913309	-2.91
1964.92	BJ0051	T 207	9.297	304253	913222	-2.00

1964.92	BJ0055	V 207	11.534	304351	913001	-3.77
1964.92	BJ0057	W 207	12.076	304347	912900	-2.81
1964.92	BJ0060	Z 207	9.856	304405	912555	-3.16
1964.92	BJ0062	SHAMROCK BOLT	9.276	304408	912522	-1.78
1964.92	BJ0063	D 207	10.565	304431	912440	-2.61
1964.92	BJ0065	C 207	13.278	304501	912355	-4.04
1964.92	BJ0067	B 207	12.451	304455	912304	-4.44
1964.92	BJ0068	161 C BOLT	10.534	304436	912234	-3.71
1964.92	BJ0069	23 BOLT	10.635	304421	912215	-4.08
1964.92	BJ0070	A 207	10.860	304334	912144	-4.51
1964.92	BJ0072	WALKER BOLT	9.065	304314	912141	-3.35
1964.92	BJ0073	GAGE 41 BOLT	10.215	304244	912126	-4.45
1964.92	BJ0074	Z 206	12.827	304149	912119	-4.95
1964.92	BJ0075	162 D CAP	11.271	304105	912122	-4.16
1964.92	BJ0076	Y 206	10.122	304028	912108	-4.32
1964.92	BJ0078	X 206	10.781	303937	912051	-4.83
1964.92	BJ0079	24 BOLT	9.825	303901	912008	-4.69
1964.92	BJ0081	W 206	9.863	303836	911922	-4.98
1964.92	BJ0082	DEFERN BOLT	9.572	303751	911844	-4.27
1964.92	BJ0083	V 206	10.027	303713	911854	-4.10
1964.92	BJ0084	U 206	9.361	303631	911906	-4.41
1964.92	BJ0085	T 206	10.306	303544	911919	-4.79
1964.92	BJ0087	S 206	8.763	303455	911926	-3.69
1964.92	BJ0088	R 206	9.201	303410	911900	-3.83
1964.92	BJ0092	25 BOLT	8.527	303352	911708	-3.26
1964.92	BJ0093	MCMURDO BOLT	9.293	303258	911726	-3.70
1964.92	BJ0094	SMITHFIELD BOLT	8.212	303244	911739	-4.09
1964.92	BJ0096	N 206	11.240	303207	911733	-4.54
1964.92	BJ0097	ORANGE GROVE BOLT	7.840	303136	911742	-3.79
1964.92	BJ0098	PAYNES BOLT	7.676	303114	911753	-2.94
1964.92	BJ0099	M 206	8.467	303108	911751	-3.47
1964.92	BJ0100	FOREST BOLT	7.217	303050	911748	-2.59
1964.92	BJ0104	J 206	8.041	302950	911540	-4.32
1964.92	BJ0107	G 206	8.775	303035	911345	-5.56
1964.92	BJ0108	F 206	8.395	303051	911253	-6.64
1964.92	BJ0109	E 206	9.396	303023	911214	-8.28
1964.92	BJ0110	POPLAR GROVE BOLT	8.125	302936	911209	-6.14
1964.92	BJ0111	D 206	8.601	302905	911209	-6.11
1986.40	BJ0112	P 287	8.157	302825	911206	-3.69
1976.50	BJ0154	J 208	13.503	305858	914646	-2.98
1976.50	BJ0155	K 208	14.081	305846	914741	-1.72
1977.33	BJ0163	L 250	14.406	305924	914856	-1.66
1977.33	BJ0164	M 250	14.229	305934	914918	-1.23
1977.33	BJ0165	N 250	13.688	305919	914943	-0.95
1977.33	BJ0166	P 250	11.750	305928	915028	-4.64
1977.33	BJ0171	GABRIEL CAP	14.220	305905	914821	-1.72
1986.40	BJ0259	Q 291	6.812	303326	913928	-9.32
1986.40	BJ0314	S 291	6.805	303327	913950	-8.45
1986.40	BJ0315	3680	6.929	303328	914030	-7.17

1986.40	BJ0316	3681	6.949	303329	914112	-9.36
1986.40	BJ0318	K 205	7.253	303331	914230	-11.22
1986.40	BJ0320	M 205	7.300	303313	914355	-12.61
1986.40	BJ0322	Z 234	8.245	303352	914510	-5.85
1986.40	BJ0323	P 205	12.614	303226	914433	-8.57
1986.40	BJ0324	U 201	7.773	303142	914352	-8.93
1986.40	BJ0325	V 201	8.253	303126	914329	-8.78
1986.40	BJ0333	X 205	12.771	303246	915145	-5.07
1986.40	BJ0334	Y 205	8.873	303250	915225	-5.05
1986.40	BJ0335	Z 205	5.891	303251	915322	-4.07
1986.40	BJ0336	X 295	5.540	303251	915420	-3.80
1986.40	BJ0337	B 206	6.563	303251	915524	-4.44
1982.38	BJ0365	A 218	7.840	301939	914719	-18.74
1982.38	BJ0373	Z 217	7.246	301837	914633	-14.78
1982.38	BJ0374	M 219	5.726	301820	914545	-12.70
1976.88	BJ0376	C 219	5.804	301737	914441	-12.10
1976.88	BJ0378	A 219	5.343	301646	914346	-14.14
1976.88	BJ0379	Q 218	5.930	301618	914258	-14.52
1976.88	BJ0383	C 241	2.409	301555	914413	-9.60
1976.88	BJ0384	Z 232	3.407	301508	914342	-10.19
1976.88	BJ0385	Y 232	3.193	301443	914302	-13.44
1976.88	BJ0386	MILE 64.8 USE	3.564	301408	914219	-5.44
1976.88	BJ0387	MILE 65.3 USE	4.076	301354	914149	-9.38
1976.88	BJ0388	B 241	3.781	301306	914137	-8.44
1976.88	BJ0390	A 241	1.476	301202	914131	-6.32
1976.88	BJ0392	M 231	1.299	301107	914122	-5.42
1976.88	BJ0393	L 231	1.522	301011	914115	-6.33
1976.88	BJ0394	Y 240	2.129	300932	914035	-7.02
1976.88	BJ0396	W 240	0.945	300801	914028	-5.62
1976.88	BJ0397	V 240	2.061	300731	913939	-6.66
1976.88	BJ0402	J 232	1.230	300705	913852	-6.30
1976.88	BJ0404	U 240	1.447	300637	913808	-6.72
1976.88	BJ0405	Q 240	1.412	300411	913713	-8.50
1976.88	BJ0407	N 240	0.597	300319	913531	-7.30
1976.88	BJ0410	H 231	1.566	300230	913500	-7.96
1976.88	BJ0411	R 240	1.539	300139	913426	-6.17
1976.88	BJ0413	G 231	0.929	300057	913350	-7.61
1982.46	BJ0629	J 228	13.377	300631	905925	-10.21
1982.46	BJ0630	DONALDSONVILLE	8.299	300627	905919	-13.96
1982.46	BJ0631	DONALDSONVILLE RM 1	7.158	300627	905918	-10.17
1982.46	BJ0632	1909 USE	7.555	300626	905921	-10.01
1982.46	BJ0633	B 228	2.599	300604	905936	-12.88
1986.50	BJ0701	D 147	4.403	300010	902729	-8.46
1986.50	BJ0702	T 188	4.389	300013	902741	-8.76
1986.50	BJ0706	U 188	4.229	300014	902711	-8.37
1986.50	BJ0707	J 95	8.488	300013	902711	-8.31
1986.50	BJ0708	H 95	7.762	300008	902629	-7.73
1986.50	BJ0710	G 95	8.311	300003	902544	-9.52
1986.40	BJ0718	D 204	5.336	302829	911253	-4.40

1986.40	BJ0720	F 204	6.484	302839	911439	-5.39
1986.40	BJ0721	G 204	7.945	302851	911501	-5.77
1986.40	BJ0724	M 294	6.777	302923	911646	-8.02
1986.40	BJ0725	J 204 RESET	6.763	302937	911722	-7.25
1986.40	BJ0726	K 204 RESET	7.413	302956	911818	-7.73
1986.40	BJ0728	L 294	6.250	303029	911958	-6.51
1986.40	BJ0729	M 204 RESET	6.129	303047	912049	-7.37
1986.40	BJ0733	K 294	6.964	303131	912302	-5.10
1986.40	BJ0734	3069	6.248	303149	912353	-5.82
1986.40	BJ0736	R 204 RESET	7.235	303202	912429	-6.15
1986.40	BJ0737	S 204 RESET	5.888	303212	912506	-6.35
1986.40	BJ0738	J 294	5.423	303227	912546	-4.85
1986.40	BJ0739	T 204 RESET	6.983	303232	912601	-5.52
1986.40	BJ0740	U 204 RESET	6.197	303249	912652	-5.99
1986.40	BJ0741	V 204 RESET	6.739	303305	912740	-6.82
1986.40	BJ0742	W 204	5.035	303311	912833	-5.74
1986.40	BJ0743	H 294	5.348	303309	912929	-6.69
1986.40	BJ0745	X 204 RESET	5.681	303312	913011	-6.73
1986.40	BJ0746	Y 204	7.076	303312	913111	-6.04
1986.40	BJ0747	Z 204 RESET	7.327	303314	913208	-6.61
1986.40	BJ0749	B 205	9.030	303317	913330	-7.04
1986.40	BJ0750	B 294	7.224	303320	913419	-6.75
1986.40	BJ0752	C 294	7.206	303321	913526	-7.90
1986.40	BJ0753	D 294	7.752	303320	913553	-7.67
1986.40	BJ0754	A 294	7.667	303321	913645	-8.62
1986.40	BJ0755	Z 293	7.414	303322	913722	-8.68
1986.40	BJ0756	Y 293	7.617	303325	913819	-9.16
1986.40	BJ0757	TT 16	7.205	303323	913830	-9.09
1986.40	BJ0759	R 291	6.674	303326	913855	-8.77
1976.88	BJ0807	Y 208	5.986	301659	911443	-9.34
1976.88	BJ0808	P 208	6.106	301626	911530	-12.66
1976.88	BJ0809	Q 208	5.504	301539	911558	-10.54
1976.88	BJ0810	36 RESET	4.808	301457	911617	-9.29
1976.88	BJ0811	X 208	4.061	301440	911659	-8.54
1976.88	BJ0812	R 208	3.946	301508	911753	-9.25
1976.88	BJ0814	PM 37 USE	3.881	301531	911853	-8.87
1976.88	BJ0815	IB 151 USGS	4.293	301533	911856	-8.01
1976.88	BJ0816	S 208	2.810	301453	911907	-8.79
1976.88	BJ0817	T 208	2.812	301355	911851	-10.64
1976.88	BJ0819	PM 51 USE	3.809	301311	911904	-11.72
1976.88	BJ0820	U 208	1.999	301221	911909	-10.06
1976.88	BJ0821	IB 148 USGS	2.179	301144	911827	-9.45
1976.88	BJ0822	V 208	2.235	301141	911827	-11.81
1976.88	BJ0823	W 208	1.916	301107	911859	-15.49
1976.88	BJ0824	A 209	2.397	301026	911927	-9.63
1976.88	BJ0825	B 209	1.723	301006	912014	-16.42
1976.88	BJ0826	39 BOLT	0.775	300937	912009	-14.48
1976.88	BJ0827	C 209	2.493	300855	911931	-10.97
1976.88	BJ0839	J 209	1.356	300413	911706	-15.06

1976.88	BJ0840	N 209	1.720	300338	911626	-9.66
1976.88	BJ0841	P 209	1.535	300301	911552	-10.10
1976.88	BJ0842	Q 209	0.867	300217	911521	-9.86
1993.25	BJ0933	P 19	14.402	303025	902744	-6.01
1993.25	BJ0935	TT 16 L RESET	13.983	303015	902742	-6.07
1993.25	BJ0937	HAMMOND RESET	12.819	303018	902728	-6.12
1986.50	BJ0958	J 22	15.380	302759	911121	-5.66
1977.00	BJ0960	L 22	19.805	302726	911112	-10.32
1986.50	BJ0961	17 B 013	15.960	302723	911124	-3.47
1986.50	BJ0962	C 204	13.061	302710	911127	-10.12
1977.00	BJ0963	B 197 WELL	10.392	302652	911123	-10.01
1977.00	BJ0965	XXXI	18.429	302649	911121	-10.07
1977.00	BJ0966	NORTH BOULEVARD CAP	16.585	302650	911113	-12.08
1977.00	BJ0967	POST OFFICE	17.509	302650	911113	-10.89
1977.00	BJ0968	K 22	11.893	302646	911125	-10.49
1977.00	BJ0969	M 197	11.110	302636	911055	-10.17
1977.00	BJ0970	N 197	14.942	302637	911042	-10.44
1977.00	BJ0971	P 197	16.952	302638	911023	-10.16
1977.00	BJ0972	Q 197	13.305	302642	910934	-10.16
1977.00	BJ0974	R 197 WELL	15.415	302642	910833	-9.36
1977.00	BJ0975	W 197	16.728	302651	910816	-9.39
1977.00	BJ0978	U 197	15.855	302645	910639	-9.03
1977.00	BJ0979	V 197	15.539	302649	910639	-9.49
1977.00	BJ0989	C 198	14.481	302556	911107	-9.10
1977.00	BJ0991	D 197	10.821	302531	911130	-11.14
1977.00	BJ0992	C 927 LAGS	7.463	302451	911141	-9.63
1977.00	BJ0993	C 929	7.481	302411	911202	-7.77
1977.00	BJ0994	C 930	7.341	302354	911213	-7.66
1977.00	BJ0995	ARLINGTON CAP RESET	7.403	302354	911211	-8.46
1977.00	BJ0996	B 198	7.352	302318	911242	-6.71
1977.00	BJ0997	W 94 RESET	8.305	302238	911324	-7.33
1977.00	BJ0998	C 936	9.111	302203	911352	-7.68
1977.00	BJ0999	XXV11	9.054	302122	911359	-9.01
1977.00	BJ1000	C 940	11.425	302102	911347	-8.92
1977.00	BJ1001	E 197	8.641	302104	911314	-9.07
1977.00	BJ1002	C 944	12.560	302107	911218	-9.79
1977.00	BJ1006	A 198	7.964	302035	910843	-7.77
1977.00	BJ1007	BURTVILLE RM 3	6.593	301956	910804	-39.45
1977.00	BJ1009	J 197	7.977	301900	910817	-7.74
1977.00	BJ1010	RIVER MISSISSIPPI MP 15	7.218	301847	910835	-7.41
1977.00	BJ1011	H 197	7.141	301835	910904	-7.38
1977.00	BJ1012	RIVER MISSISSIPPI MP 16	7.464	301832	910940	-7.87
1977.00	BJ1013	G 197	7.377	301833	910947	-7.56
1977.00	BJ1014	IB 44	6.977	301834	911034	-6.83
1977.00	BJ1015	PERTUIT	8.096	301841	911114	-34.00
1977.00	BJ1017	IB 40 USGS	8.009	301808	911309	-7.93
1977.00	BJ1018	RIVER MISSISSIPPI MP 20	8.449	301806	911320	-8.44
1986.50	BJ1019	F 197	8.374	301757	911323	-8.20
1986.50	BJ1020	Q 94 RESET	8.125	301724	911249	-9.16

1986.50	BJ1021	178 2 RESET	8.114	301708	911201	-8.44
1986.50	BJ1022	P 94 RESET	8.361	301717	911133	-8.33
1986.50	BJ1024	N 94 RESET	7.521	301723	911027	-8.19
1986.50	BJ1025	ANGER RESET	7.528	301724	911004	-8.98
1986.50	BJ1029	L 94	6.748	301617	910657	-11.26
1986.50	BJ1030	K 94	6.498	301534	910614	-10.28
1986.50	BJ1033	RIVER MISSISSIPPI MP 30	5.468	301451	910613	-7.94
1986.50	BJ1034	3004	6.004	301420	910641	-7.45
1986.50	BJ1038	X 192	6.826	301329	910758	-7.97
1986.50	BJ1039	RIVER MISSISSIPPI MP 33	7.207	301309	910819	-7.83
1986.50	BJ1041	RIVER MISSISSIPPI MP 34	6.952	301227	910851	-7.90
1986.50	BJ1042	W 192	7.185	301224	910852	-7.85
1986.50	BJ1043	RIVER MISSISSIPPI MP 35	7.347	301146	910910	-9.12
1986.50	BJ1045	V 192	7.446	301141	910911	-8.20
1986.50	BJ1046	RIVER MISSISSIPPI MP 36	7.519	301105	910852	-7.14
1986.50	BJ1048	F 94	7.249	301127	910800	-8.27
1986.50	BJ1050	RIVER MISSISSIPPI MP 38	7.347	301151	910724	-7.80
1986.50	BJ1051	U 192	7.224	301158	910714	-7.66
1986.50	BJ1052	E 94	6.704	301223	910637	-7.82
1986.50	BJ1053	RIVER MISSISSIPPI MP 40	6.406	301249	910550	-9.48
1986.50	BJ1055	CARVILLE CAP	6.090	301303	910548	-7.09
1986.50	BJ1056	3009	5.545	301307	910449	-7.58
1986.50	BJ1058	RIVER MISSISSIPPI MP 42	5.435	301309	910358	-8.59
1986.50	BJ1059	3011	5.361	301307	910349	-7.78
1986.50	BJ1060	RUSSELL CAP	6.060	301301	910300	-7.87
1986.50	BJ1066	NEW RIVER CAP	7.141	301214	910122	-7.95
1986.50	BJ1069	C 94 RESET	6.986	301040	910012	-10.17
1986.50	BJ1071	P 192	7.631	300959	905945	-11.43
1986.50	BJ1072	A 94 RESET	5.560	300914	905934	-14.52
1986.50	BJ1075	Z 197	5.977	300711	905954	-9.72
1986.50	BJ1076	TT 3 P RESET	5.896	300710	905924	-10.63
1986.50	BJ1082	N 192	4.692	300843	905619	-7.46
1986.50	BJ1084	M 192	4.995	300856	905555	-7.59
1986.50	BJ1085	L 192	5.780	300857	905520	-7.73
1986.50	BJ1092	H 192	6.704	300556	905426	-8.18
1986.50	BJ1109	X 197	6.382	300524	905422	-7.66
1986.50	BJ1112	RIVER MISSISSIPPI MP 65	6.181	300455	905410	-9.17
1986.50	BJ1114	V 191	6.090	300414	905327	-9.15
1986.50	BJ1115	RIVER MISSISSIPPI MP 67	5.998	300404	905253	-13.04
1986.50	BJ1117	R 191	5.440	300016	904936	-9.73
1986.50	BJ1119	RIVER MISSISSIPPI MP 73	5.149	300052	904941	-10.40
1986.50	BJ1122	S 191	5.928	300210	904956	-8.02
1986.50	BJ1124	HYMEL RM 4	5.755	300408	905147	-7.91
1994.92	BJ1184	D 3123	-0.195	300008	900322	-8.01
1994.92	BJ1185	D 3124	-0.116	300010	900312	-8.52
1994.92	BJ1186	B 3105	-0.235	300012	900301	-8.89
1994.92	BJ1187	S 152	-1.030	300009	900242	-7.88
1994.92	BJ1188	G 278	0.878	300021	900212	-8.82
1994.92	BJ1191	225 RESET	-0.013	300038	900112	-12.01

1994.92	BJ1192	B 276	1.153	300039	900046	-10.77
1994.92	BJ1193	LAFON	-0.805	300042	900019	-12.93
1994.92	BJ1194	A 3128 RESET	-0.402	300042	900021	-20.71
1977.33	BJ1199	H 250	13.568	305937	915138	-0.73
1977.33	BJ1200	K 250	14.100	305940	915210	-0.58
1977.33	BJ1201	J 250	15.154	305943	915314	-0.35
1977.33	BJ1202	F 250	14.770	305943	915314	-0.48
1977.33	BJ1203	G 250	15.732	305949	915324	-1.15
1993.25	BJ1216	HAMMOND RM 1	12.841	303039	902759	-5.41
1993.25	BJ1217	HAMMOND	12.992	303038	902800	-6.07
1993.25	BJ1218	HAMMOND RM 3	13.200	303039	902800	-6.03
1993.25	BJ1223	F 179	15.934	303258	902829	-6.18
1993.25	BJ1224	G 179	16.998	303347	902844	-5.81
1993.25	BJ1225	S 19	19.164	303438	902859	-6.53
1993.25	BJ1226	TA 265	18.779	303439	902904	-6.01
1993.25	BJ1227	H 179	19.582	303524	902912	-4.32
1993.25	BJ1228	T 19	20.366	303556	902923	-7.10
1993.25	BJ1229	53 DO 13	21.831	303624	902931	-6.25
1993.25	BJ1231	U 19	22.028	303638	902936	-5.78
1993.25	BJ1232	J 179	23.687	303716	902946	-7.34
1993.25	BJ1234	A 180	65.206	305747	902933	-5.42
1993.25	BJ1236	B 180	73.568	305857	902853	-5.35
1993.25	BJ1237	P 20	75.739	305937	902832	-5.36
1986.50	BJ1459	C 95	2.898	300137	902803	-9.50
1986.50	BJ1462	F 95	3.622	300349	902903	-9.02
1993.25	BJ1465	K 276	0.572	300003	901737	-9.02
1993.25	BJ1467	L 276	1.191	300107	901909	-9.47
1993.25	BJ1468	D 178	1.289	300145	902005	-11.22
1993.25	BJ1469	M 276	0.305	300214	902051	-8.13
1993.25	BJ1474	G 178	0.635	300308	902210	-10.27
1993.25	BJ1478	Z 274	2.033	300313	902220	-7.45
1993.25	BJ1480	H 178	5.369	300350	902312	-6.92
1993.25	BJ1481	J 178	5.215	300423	902401	-7.09
1993.25	BJ1484	A 275	3.231	300435	902414	-7.44
1993.25	BJ1507	R 178	0.712	301305	902451	-7.18
1993.25	BJ1522	GALVA 2	1.381	301646	902358	-10.78
1993.25	BJ1523	GALVA 2 RM 3	1.419	301647	902358	-8.89
1993.25	BJ1524	C 275	1.578	301700	902358	-6.91
1993.25	BJ1527	G 275	1.476	301721	902406	-6.76
1993.25	BJ1531	E 19	1.633	301827	902416	-7.36
1993.25	BJ1532	H 275	1.450	301832	902418	-7.08
1993.25	BJ1533	J 275	1.437	301847	902419	-6.91
1993.25	BJ1535	F 19	2.122	301935	902430	-6.76
1993.25	BJ1537	K 275	1.354	302028	902443	-6.73
1993.25	BJ1538	G 19	1.978	302055	902449	-6.75
1993.25	BJ1540	1038	1.087	302204	902510	-7.88
1993.25	BJ1541	H 19	1.946	302212	902513	-6.73
1993.25	BJ1542	1039	0.978	302252	902526	-8.71
1993.25	BJ1549	J 19	2.000	302329	902538	-7.58

1993.25	BJ1552	K 19	2.010	302446	902600	-7.23
1993.25	BJ1553	L 275	3.911	302453	902603	-7.40
1993.25	BJ1555	M 275	3.306	302533	902614	-5.68
1993.25	BJ1556	PONCHATOULA AZ MK	4.386	302552	902626	-5.24
1993.25	BJ1557	PONCHATOULA RM 1	6.325	302608	902631	-5.84
1993.25	BJ1560	PONCHATOULA	6.824	302608	902632	-5.84
1993.25	BJ1561	PONCHATOULA RM 2	6.879	302608	902631	-5.36
1993.25	BJ1567	765	9.084	302816	902726	-6.02
1993.25	BJ1568	V 178	9.591	302816	902723	-5.51
1986.50	BJ1607	Z 190	4.533	300333	903034	-8.49
1986.50	BJ1613	P 95	4.234	300316	903317	-8.29
1986.50	BJ1618	Q 95	4.684	300322	903401	-8.00
1986.50	BJ1627	MILE 90	4.605	300216	903718	-5.97
1986.50	BJ1628	A 191	3.693	300227	903729	-7.80
1986.50	BJ1632	H 191	2.546	300255	903804	-9.75
1986.50	BJ1639	RIVER MISSISSIPPI MP 86	4.290	300258	904035	-6.91
1986.50	BJ1647	J 191	4.744	300222	904132	-7.98
1986.50	BJ1655	E 191	4.450	300102	904348	-10.52
1986.50	BJ1656	RIVER MISSISSIPPI MP 81	3.940	300113	904421	-11.90
1986.50	BJ1659	L 191	3.535	300115	904443	-11.61
1986.50	BJ1669	N 191	5.391	300050	904716	-9.54
1986.50	BJ1671	P 191	5.922	300023	904751	-14.20
1993.25	BJ1740	W 19	27.995	303804	903001	-5.79
1993.25	BJ1743	TA 271	26.622	303806	902959	-5.90
1993.25	BJ1744	K 179	27.017	303850	903015	-5.80
1993.25	BJ1746	L 179	28.219	303946	903027	-6.01
1993.25	BJ1748	U 179	28.682	304028	903030	-6.22
1993.25	BJ1749	M 179	28.589	304106	903028	-6.30
1993.25	BJ1750	Z 19	32.071	304152	903029	-6.42
1993.25	BJ1751	A 197	33.337	304241	903030	-7.01
1993.25	BJ1752	AMITE AZ MK	32.922	304316	903010	-6.08
1993.25	BJ1756	AMITE RESET	34.224	304341	903013	-6.78
1993.25	BJ1757	AMITE RM 3	33.833	304337	903013	-6.60
1993.25	BJ1758	AMITE	33.528	304336	903014	-6.69
1993.25	BJ1759	AMITE RM 2	33.622	304337	903013	-6.62
1993.25	BJ1760	B 711	35.455	304346	903031	-6.69
1993.25	BJ1761	P 179	34.687	304406	903030	-6.71
1993.25	BJ1763	Q 275	37.492	304512	903028	-6.62
1993.25	BJ1765	Q 179	39.554	304545	903033	-7.14
1993.25	BJ1767	TA 260	40.349	304552	903041	-6.82
1993.25	BJ1768	R 179	40.327	304652	903034	-6.67
1993.25	BJ1769	E 20	41.896	304759	903036	-6.74
1993.25	BJ1771	S 179	44.942	304841	903037	-6.27
1993.25	BJ1772	F 20	45.853	304916	903037	-6.44
1993.25	BJ1774	G 20	50.510	305101	903039	-6.32
1993.25	BJ1775	V 179	52.304	305153	903040	-6.93
1993.25	BJ1776	H 20	54.143	305230	903040	-6.18
1993.25	BJ1777	W 179	54.921	305257	903041	-6.13
1993.25	BJ1778	X 179	54.681	305338	903042	-5.91

1993.25	BJ1781	Y 179	60.730	305519	903043	-6.23
1993.25	BJ1782	S 275	60.475	305552	903036	-6.63
1982.46	BJ2046	E 228	6.859	300447	910135	-9.23
1982.46	BJ2047	F 228	6.438	300349	910138	-9.77
1982.46	BJ2048	G 228	6.949	300259	910224	-8.84
1982.46	BJ2049	ES 17 USGS RESET 1961	6.089	300259	910225	-9.67
1982.46	BJ2050	H 228	5.786	300215	910259	-9.66
1982.46	BJ2051	ES 19 USGS	5.918	300124	910251	-10.51
1982.46	BJ2052	K 228	5.510	300026	910242	-11.06
1982.25	BJ2124	28 A 013	11.561	301146	915951	-8.40
1982.25	BJ2126	A 268	10.944	301131	915939	-7.63
1982.25	BJ2128	J 171	10.316	301049	915918	-7.56
1982.25	BJ2129	OVERLAP USE	9.522	301037	915908	-7.51
1982.25	BJ2130	28 A 011 LADH	9.921	301032	915904	-7.94
1982.25	BJ2131	B 4076 LAGS	9.826	301021	915852	-7.36
1982.25	BJ2132	28 A 010 LADH	10.183	301004	915836	-7.55
1982.25	BJ2133	B 4075 LAGS	10.574	300955	915834	-7.55
1982.25	BJ2134	B 4074 LAGS	10.079	300936	915816	-7.51
1982.25	BJ2135	28 A 009 LADH	10.247	300924	915805	-8.80
1982.25	BJ2139	V 3 RESET 1947	10.070	300857	915745	-7.44
1982.25	BJ2142	B 4072 LAGS	10.679	300841	915724	-7.54
1982.25	BJ2146	G 171	9.012	300751	915642	-9.42
1982.25	BJ2147	D 171	10.304	300713	915605	-15.71
1982.25	BJ2148	C 171	10.794	300625	915522	-7.82
1982.25	BJ2150	G 268	9.256	300547	915452	-6.50
1982.25	BJ2152	A 4	9.259	300503	915407	-6.30
1982.25	BJ2153	A 171	7.368	300421	915334	-8.12
1982.25	BJ2155	BURKE AZ MK	9.315	300316	915233	-6.98
1982.25	BJ2157	X 170	7.659	300307	915246	-6.30
1982.25	BJ2158	BURKE RM 2	7.755	300308	915241	-6.44
1982.25	BJ2159	BURKE	7.749	300308	915241	-6.72
1982.25	BJ2160	BURKE RM 1	7.768	300309	915242	-6.22
1982.25	BJ2161	Y 170	7.898	300303	915244	-6.11
1982.25	BJ2162	Z 266	8.509	300243	915157	-6.14
1982.25	BJ2167	Y 266	8.319	300214	915121	-6.06
1982.25	BJ2168	C 3879 LAGS	6.491	300148	915054	-8.85
1982.25	BJ2169	S 277	5.895	300111	915008	-7.50
1982.25	BJ2171	L 201	6.019	300100	914958	-6.87
1982.25	BJ2178	H 4	7.353	300031	914928	-8.04
1969.33	BJ2182	J4=23.520 USGS	6.985	300013	914859	-7.92
1969.33	BJ2183	P 170	5.935	300006	914904	-7.51
1982.38	BJ2223	D 203	9.046	301639	915425	-12.67
1965.21	BJ2248	P 164	13.150	301441	915933	-10.12
1965.21	BJ2251	R 164	5.825	301517	915805	-13.89
1965.21	BJ2252	L 17	6.204	301545	915649	-10.94
1965.21	BJ2253	S 164	5.371	301607	915553	-11.15
1982.38	BJ2254	M 17	5.544	301619	915525	-14.19
1982.38	BJ2263	S 17	5.858	301818	915026	-11.48
1964.92	BJ2630	11 A CAP	12.415	304758	913419	-2.55

1986.40	BJ3232	3678	7.356	303326	913921	-8.83
1993.25	BJ3867	IC 2 CAP RESET	1.503	300313	902216	-10.06
1986.17	BK0154	N 267	5.431	301049	923000	-20.91
1986.17	BK0158	455	3.906	301049	922914	-17.72
1986.17	BK0159	X 267	4.384	301049	922836	-17.31
1986.17	BK0160	453	5.227	301049	922800	-16.21
1986.17	BK0161	B 2250	6.007	301043	922750	-15.98
1986.17	BK0163	B 2239	4.033	301049	922630	-14.52
1986.17	BK0164	Y 267	4.176	301103	922554	-14.62
1986.17	BK0166	B 2242	4.457	301109	922534	-15.85
1986.17	BK0167	E 163	4.467	301123	922502	-15.84
1986.17	BK0168	P 267	2.783	301131	922452	-15.48
1986.17	BK0169	D 163	5.259	301147	922408	-14.01
1986.17	BK0170	Z 267	5.591	301209	922316	-13.22
1986.17	BK0173	S 266	6.225	301223	922228	-12.95
1986.17	BK0175	X 2	7.022	301245	922222	-13.87
1986.17	BK0176	Z 2	6.805	301247	922218	-12.65
1986.17	BK0178	G 163	6.130	301249	922044	-13.43
1986.17	BK0179	418	6.344	301249	922000	-10.14
1986.17	BK0180	V 267	5.977	301249	921944	-12.36
1986.17	BK0182	416	6.186	301249	921850	-10.65
1986.17	BK0183	415	7.079	301249	921830	-8.76
1986.17	BK0184	414	7.752	301249	921740	-9.35
1986.17	BK0185	K 163	8.050	301249	921712	-10.47
1986.17	BK0186	J 163	9.092	301248	921606	-10.49
1986.17	BK0187	A 410	8.827	301315	921608	-10.49
1986.17	BK0188	B 3	10.434	301407	921608	-10.95
1986.17	BK0189	S 267	9.540	301409	921609	-10.73
1986.17	BK0196	N 163	9.701	301407	921524	-10.50
1986.17	BK0197	F 3	9.992	301407	921454	-12.19
1986.17	BK0198	T 266	9.013	301406	921448	-11.29
1986.17	BK0200	B 3827	8.861	301407	921404	-11.20
1986.17	BK0201	B 3826	8.751	301405	921318	-10.42
1986.17	BK0204	Q 163	9.025	301405	921210	-12.52
1986.17	BK0205	Z 163	9.767	301405	921110	-21.64
1986.17	BK0206	T 267	10.677	301407	921054	-12.66
1986.17	BK0207	A 164	9.814	301405	921046	-12.45
1986.17	BK0208	Q 164	10.452	301405	920940	-12.83
1986.17	BK0211	J 3 RESET	10.583	301405	920814	-13.22
1986.17	BK0212	A 3863	9.336	301406	920726	-13.02
1986.17	BK0213	N 164	9.904	301406	920657	-12.34
1986.17	BK0214	A 3864	9.702	301406	920635	-11.75
1986.17	BK0217	A 3865	9.366	301401	920559	-10.91
1986.17	BK0218	U 267	10.302	301404	920540	-10.22
1986.17	BK0221	V 266	10.334	301405	920450	-9.06
1986.17	BK0222	X 163	10.833	301405	920400	-9.66
1986.17	BK0223	U 266	11.336	301406	920321	-8.32
1986.17	BK0224	U 164	10.876	301335	920303	-8.04
1986.17	BK0226	X 266	11.965	301406	920221	-8.30

1986.17	BK0227	S 163	12.733	301405	920205	-8.30
1965.21	BK0227	S 163	13.015	301405	920205	-10.25
1965.21	BK0232	R 163	11.886	301401	920103	-15.67
1986.17	BK0233	28 A 019	11.829	301351	920058	-8.46
1986.17	BK0234	E 268	11.690	301340	920052	-8.13
1986.17	BK0239	P 3	13.034	301338	920053	-8.16
1982.25	BK0241	28 A 015	10.790	301245	920023	-8.14
1982.25	BK0242	E 3815 A LAGS	8.991	301224	920012	-9.23
1965.21	BK0308	J 17	13.054	301420	920025	-6.65
1986.17	BK0354	1 V 10	6.167	301244	922145	-13.10
1986.17	BK0398	28 A 017	11.773	301329	920047	-8.49
1986.17	BK0607	F 267	6.856	301354	925955	-10.85
1986.17	BK0610	H 162	9.174	301351	925859	-10.30
1986.17	BK0612	A 4178	7.335	301353	925749	-10.46
1986.17	BK0614	A 267	6.899	301353	925727	-9.61
1986.17	BK0619	H 267	5.843	301353	925523	-9.27
1986.17	BK0629	LACAS AZ MK	6.042	301353	925500	-8.75
1986.17	BK0630	2124	5.468	301353	925407	-12.02
1986.17	BK0631	G 162	5.354	301353	925329	-11.43
1986.17	BK0632	TT 3 B	5.902	301354	925242	-30.34
1986.17	BK0636	2121	6.869	301353	925131	-8.53
1986.17	BK0637	2120	5.127	301353	925049	-8.09
1986.17	BK0638	27 V 156	5.103	301353	925027	-9.01
1986.17	BK0639	2119	6.408	301354	925009	-13.98
1986.17	BK0640	2118	5.146	301353	924953	-0.94
1986.17	BK0641	C 267	4.109	301353	924941	-8.89
1986.17	BK0643	V 1	7.319	301412	924918	-9.11
1986.17	BK0645	T 1	7.384	301419	924923	-9.29
1986.17	BK0646	J 267	6.511	301426	924919	-9.01
1986.17	BK0647	J 162	5.504	301428	924934	-10.40
1986.17	BK0649	M 162	5.926	301355	924833	-9.88
1986.17	BK0652	WELSH RM 1	5.726	301355	924744	-7.96
1986.17	BK0654	2113	6.760	301355	924701	-7.89
1986.17	BK0657	2112	6.903	301357	924603	-8.80
1986.17	BK0658	2111	6.175	301355	924529	-8.57
1986.17	BK0662	K 267	5.568	301353	924329	-9.38
1986.17	BK0663	Y 1	6.185	301414	924327	-9.51
1986.17	BK0664	TT 9 B	5.709	301353	924327	-7.50
1986.17	BK0668	Q 267	4.356	301353	924127	-12.33
1986.17	BK0670	2105	3.734	301353	924103	-13.24
1986.17	BK0671	Y 162	8.140	301355	924023	-13.41
1986.17	BK0683	B 2	9.567	301323	923932	-11.75
1986.17	BK0686	S 162 RESET	8.436	301434	923951	-11.98
1986.17	BK0687	T 162	7.400	301446	923950	-11.67
1986.17	BK0689	L 267	7.338	301313	923919	-14.44
1986.17	BK0690	A 406	6.850	301255	923905	-15.93
1986.17	BK0692	V 162	3.891	301225	923825	-15.73
1986.17	BK0694	W 162	4.417	301149	923735	-14.77
1986.17	BK0695	B 2208	4.457	301135	923711	-17.43

1986.17	BK0696	P 163	3.602	301135	923638	-14.93
1986.17	BK0697	M 267	4.685	301132	923600	-15.48
1986.17	BK0698	B 2224	4.596	301129	923550	-14.98
1986.17	BK0699	G 2	4.315	301121	923524	-15.83
1986.17	BK0700	B 2226	4.534	301119	923518	-16.21
1986.17	BK0704	B 2230	2.961	301101	923420	-18.49
1986.17	BK0707	W 266	4.149	301049	923336	-18.97
1986.17	BK0710	462	3.203	301047	923230	-22.54
1986.17	BK0711	TT 17 B	3.177	301047	923234	-23.48
1986.17	BK0713	W 267	3.779	301045	923120	-24.06
1986.17	BK0716	X 162	4.782	301047	923054	-24.87
1970.00	BK0718	W 16	14.578	302922	925049	-1.36
1986.33	BK0718	W 16	14.551	302922	925049	-1.65
1970.00	BK0719	X 16	15.629	302915	925055	-1.58
1986.33	BK0802	2 V 12	13.787	302932	925159	-3.19
1986.33	BK0803	E 3950	14.439	302930	925150	-3.04
1986.33	BK0804	E 3951	13.794	302928	925132	-4.06
1986.17	BK0838	27 V 37	6.976	301417	924917	-9.68
1986.17	BK0839	27 V 36	5.531	301351	924902	-8.85
1986.33	BK0860	INDIAN	10.892	302610	925958	-0.18
1986.33	BK0862	2 V 1	9.098	302641	925910	0.60
1986.33	BK0863	2 V 2	10.248	302649	925814	-0.36
1986.33	BK0864	2 V 3	9.201	302732	925742	-1.19
1986.33	BK0865	2 V 4	13.523	302805	925647	-1.18
1986.33	BK0867	2 V 5	11.676	302840	925545	-0.97
1986.33	BK0868	2 V 6	14.003	302858	925445	-1.16
1986.33	BK0869	2 V 7	12.407	302943	925419	-1.68
1986.33	BK0870	2 V 8	12.438	302954	925359	-1.67
1986.17	BK0951	27 V 115	8.295	301357	923935	-10.48
1970.00	BK1035	S 15	36.487	305906	923440	0.27
1970.00	BK1037	T 15	41.133	305833	923504	0.19
1970.00	BK1041	4 MPRR	45.828	305737	923533	-0.51
1970.00	BK1043	U 15	45.693	305642	923601	-0.03
1970.00	BK1045	V 15	46.522	305512	923645	0.11
1970.00	BK1047	W 15	39.891	305408	923717	-0.31
1970.00	BK1048	5 MPRR	41.164	305337	923731	-0.29
1970.00	BK1060	A 16	35.520	304858	923946	-0.64
1970.00	BK1061	B 16	36.892	304857	923926	-0.40
1970.00	BK1063	C 16	32.498	304751	924021	-1.18
1970.00	BK1074	F 16	28.803	304406	924217	-0.28
1970.00	BK1076	G 16	27.567	304307	924248	-0.16
1970.00	BK1082	H 16	29.042	304200	924323	-0.02
1970.00	BK1090	L 16	26.524	303948	924427	-0.02
1970.00	BK1097	N 16	21.447	303713	924546	-5.14
1970.00	BK1099	P 16	22.717	303714	924607	-1.45
1986.25	BK1360	A 4130	4.733	301340	932949	-9.98
1981.92	BK1360	A 4130	4.776	301340	932949	-9.99
1986.25	BK1361	A 4131	5.355	301339	932851	-9.62
1981.92	BK1361	A 4131	5.397	301339	932851	-9.62

1986.25	BK1362	A 4132	5.601	301339	932752	-4.57
1981.92	BK1362	A 4132	5.621	301339	932752	-4.57
1986.25	BK1363	A 4133	5.075	301338	932709	-5.52
1981.92	BK1363	A 4133	5.099	301338	932709	-5.52
1986.25	BK1364	M 161	5.204	301338	932622	-11.99
1981.92	BK1364	M 161	5.256	301338	932622	-11.99
1986.25	BK1366	N 161 RESET	4.412	301338	932538	-12.12
1981.92	BK1366	N 161 RESET	4.465	301338	932538	-12.12
1986.25	BK1369	A 4135	5.269	301348	932454	-11.62
1981.92	BK1369	A 4135	5.319	301348	932454	-11.62
1986.25	BK1374	C 269	3.228	301407	932337	-11.37
1981.92	BK1374	C 269	3.278	301407	932337	-11.37
1981.92	BK1375	X	5.935	301416	932239	-11.37
1986.25	BK1379	P 161	5.080	301415	932151	-10.68
1986.25	BK1380	L 210	3.270	301416	932100	-11.29
1986.25	BK1382	B 269	4.601	301415	932003	-9.25
1986.25	BK1383	U 161	4.139	301415	931904	-9.59
1986.25	BK1386	R 161	4.053	301416	931759	-9.66
1986.25	BK1389	N 210	5.197	301414	931701	-11.42
1986.25	BK1396	D 1	2.758	301417	931453	-11.73
1986.25	BK1398	P 210	1.477	301417	931352	-12.78
1986.25	BK1400	G 1	5.474	301345	931251	-12.06
1981.92	BK1405	Q 210	3.970	301339	931151	-11.79
1981.92	BK1406	R 210	3.853	301339	931113	-13.27
1981.92	BK1407	X 108	2.244	301339	931024	-14.87
1986.25	BK1407	X 108	2.208	301339	931024	-10.14
1981.92	BK1408	Y 108	2.798	301327	930949	-13.86
1986.25	BK1408	Y 108	2.734	301327	930949	-12.26
1981.92	BK1417	X 161	3.336	301339	930919	-13.11
1981.92	BK1421	Y 161	4.377	301357	930733	-11.95
1986.17	BK1422	A 4142 X	4.399	301357	930636	-12.45
1986.17	BK1423	Z 161	4.146	301357	930538	-11.22
1981.92	BK1423	Z 161	4.194	301357	930538	-11.22
1986.17	BK1425	D 267	5.176	301357	930451	-11.48
1986.17	BK1430	A 4140	5.321	301358	930410	-14.68
1986.17	BK1432	B 162	5.384	301358	930343	-12.30
1986.17	BK1434	A 4171	5.702	301359	930155	-10.64
1986.17	BK1435	A 4172	5.872	301353	930115	-10.95
1986.33	BK1438	O 1 RESET	7.417	301407	930042	-7.00
1986.17	BK1439	E 267	7.004	301353	930031	-11.30
1982.17	BK1467	S 210	3.246	301332	932236	-14.78
1982.17	BK1468	4164 LAGS RESET 1959	3.397	301303	932234	-14.46
1982.17	BK1469	T 210	3.780	301211	932235	-15.14
1982.17	BK1471	TT 171 LS USGS	3.179	301100	932235	-13.94
1982.17	BK1473	W 210	3.306	300935	932227	-12.60
1982.17	BK1474	X 210	2.424	300851	932205	-10.98
1982.17	BK1475	WRIGHT RM 1	3.343	300823	932152	-15.57
1982.17	BK1477	WRIGHT	3.465	300816	932201	-14.39
1982.17	BK1479	Z 210	1.287	300639	932133	-14.31

1982.17	BK1481	B 211	1.247	300447	932134	-12.78
1982.17	BK1484	D 211	1.244	300301	932029	-11.18
1982.17	BK1485	E 211	1.268	300205	932021	-11.81
1982.17	BK1486	F 211	0.442	300108	932020	-12.36
1982.17	BK1487	G 211	1.758	300015	932031	-10.47
1986.25	BK1552	TT 159 LS RESET	2.288	300035	930517	-10.29
1986.25	BK1601	12 V 19	1.906	300152	930742	-11.89
1986.25	BK1602	10 V 18	1.572	300244	930742	-10.21
1986.25	BK1603	10 V 19	2.430	300336	930744	-10.89
1986.25	BK1605	10 V 21	1.760	300548	930845	-12.46
1986.25	BK1606	10 V 22	2.852	300639	930845	-13.42
1986.25	BK1607	10 V 23	2.639	300732	930846	-12.09
1986.25	BK1608	10 V 24	3.443	300824	930843	-14.86
1986.25	BK1609	10 V 25	5.550	300929	930844	-18.49
1986.25	BK1610	10 V 26	5.432	300928	930950	-17.24
1986.25	BK1611	10 V 27	5.026	300930	931047	-15.28
1986.25	BK1612	10 V 28	4.861	301021	931046	-17.29
1986.25	BK1613	10 V 115	6.277	301116	931047	-19.48
1986.25	BK1614	10 V 116	3.483	301201	931047	-17.59
1986.25	BK1615	10 V 117	3.217	301250	931049	-12.90
1986.25	BK1616	10 V 118	2.974	301336	931048	-11.30
1986.25	BK1618	12 V 4	1.890	300032	930649	-10.40
1986.25	BK1619	12 V 5	2.640	300033	930732	-10.56
1986.25	BK1620	12 V 6	2.423	300059	930750	-10.94
1986.25	BK1655	10 V 14	1.852	300448	930845	-11.09
1986.33	BK1679	10 A 006	14.069	301456	930049	-5.15
1986.33	BK1680	C 4125	6.897	301538	930051	-6.31
1986.33	BK1682	C 4142	6.996	301614	930051	-7.65
1986.33	BK1683	C 4126	7.107	301629	930051	-7.35
1986.33	BK1684	27 V 83	6.805	301638	930049	-7.81
1986.33	BK1685	27 V 84	6.978	301723	930050	-6.74
1986.33	BK1686	27 V 85	7.028	301823	930050	-6.06
1986.33	BK1687	27 V 86	5.925	301911	930050	-4.57
1986.33	BK1688	27 V 87	6.600	302009	930050	-2.98
1986.33	BK1689	TT 105 RESET	6.292	302009	930051	-5.50
1986.33	BK1690	27 V 88	6.092	302102	930052	-3.66
1986.33	BK1691	27 V 89	6.912	302154	930101	-2.19
1986.33	BK1692	27 V 90	7.609	302245	930106	-1.59
1986.33	BK1693	27 V 91	7.946	302329	930048	-2.37
1986.33	BK1694	27 V 92	8.393	302415	930022	-1.33
1986.33	BK1695	27 V 93	7.845	302522	925959	-3.76
1986.25	BK1696	E 269	6.592	301358	933023	-9.33
1986.25	BK1702	T	5.635	301353	933031	-9.09
1986.25	BK1703	A 4127	4.578	301339	933055	-9.00
1986.25	BK1705	K 161	5.119	301326	933120	-9.49
1986.25	BK1707	A 4125	5.686	301254	933217	-3.65
1986.25	BK1709	J 161	5.659	301237	933249	-9.18
1986.25	BK1711	A 4123	3.700	301205	933343	-6.73
1986.25	BK1712	C 161	5.153	301144	933424	-9.71

1986.25	BK1713	F 269	4.754	301128	933450	-9.14
1986.25	BK1720	D 161	4.414	301111	933521	-9.33
1986.25	BK1722	G 269	4.741	301042	933614	-8.03
1986.25	BK1723	TTS 37 B	3.777	301008	933715	-6.36
1986.25	BK1724	E 161	3.623	301002	933730	-9.69
1986.25	BK1725	H 269	4.133	300932	933820	-4.82
1986.25	BK1727	J 269	4.771	300906	933913	-10.40
1986.25	BK1729	L 161	3.113	300854	934006	-10.98
1986.25	BK1731	K 269	2.878	300907	934103	-10.56
1986.25	BK1732	B 161	3.041	300910	934122	-11.72
1986.25	BK1733	U 58	4.027	300910	934226	-11.78
1986.25	BK1736	7 JLP	5.003	300912	934342	-12.63
1986.25	BK1737	N 1199	3.769	300911	934416	-12.65
1986.25	BK1739	P 1199	4.265	300905	934503	-10.09
1986.25	BK1742	S 1199	4.064	300801	934458	-10.60
1986.25	BK1743	Q 1199	2.953	300704	934444	-9.83
1986.25	BK1746	R 1199	2.557	300625	934437	-10.68
1986.25	BK1748	N 58	4.031	300536	934430	-11.07
1986.25	BK1750	P 58	3.338	300536	934417	-10.84
1986.25	BK1753	T 1199	1.855	300532	934456	-11.39
1986.25	BK2249	E 356	3.763	301414	931600	-11.01
1986.25	BK2251	H 356	5.095	301351	933017	-9.62
1981.92	BK2251	H 356	5.137	301351	933017	-9.62
1986.25	BK2260	D 1413	2.084	300639	934434	-11.38
1986.25	BK2261	C 1413	2.043	300558	934420	-11.10
1986.25	BK2262	B 1413	2.167	300539	934422	-11.11
1986.25	BK2263	A 1413	2.105	300536	934434	-11.21
1986.17	BK2337	Q 3 RESET	11.636	301329	920107	-49.28
1980.33	BV0141	M 119	94.757	310331	881354	2.04
1980.33	BV0142	448 ALGS	97.539	310417	881412	2.01
1980.33	BV0202	45 V A	79.816	312610	882704	2.22
1980.33	BV0203	45 V B	92.691	312702	882742	2.09
1980.33	BV0209	45 V C	73.813	312743	882815	2.01
1980.33	BV0211	45 V E	58.511	312902	882911	3.77
1980.33	BV0339	X 82	45.122	313219	883142	2.76
1980.33	BV0353	H 36	60.070	315145	884139	3.61
1980.33	BV0371	V 14	57.764	314038	883852	1.85
1980.33	BV0372	W 14	59.291	314029	883843	1.55
1980.33	BV0385	45 V 1	53.916	313046	883021	2.05
1980.33	BV0387	45 V 2	42.427	313131	883100	0.27
1980.33	BV0388	45 V 3	45.763	313308	883154	1.89
1980.33	BV0389	45 V 4	47.318	313359	883211	1.54
1980.33	BV0395	45 V 6	52.087	313537	883306	-0.32
1980.33	BV0396	45 V 7	53.382	313625	883352	2.20
1980.33	BV0399	SHAW RM 1	64.573	313739	883523	2.15
1980.33	BV0401	SHAW AZ MK	60.548	313757	883542	2.06
1980.33	BV0402	45 V 9	59.380	313837	883628	1.66
1980.33	BV0403	45 V 10	54.330	313912	883706	1.68
1980.33	BV0404	45 V 11	60.692	313958	883751	1.50

1980.33	BV0410	45 V 12	77.969	314210	883838	2.02
1980.33	BV0411	45 V 13	79.929	314258	883841	2.16
1980.33	BV0412	45 V 14	68.704	314356	883855	3.19
1980.33	BV0413	45 V 15	60.829	314452	883921	2.34
1980.33	BV0418	45 V 16	55.970	314523	884009	2.08
1980.33	BV0419	45 V 17	78.902	314620	884028	2.44
1980.33	BV0421	45 V 19	64.563	314905	884128	3.41
1980.33	BV0426	45 V 20	69.152	314958	884122	3.74
1980.33	BV0427	45 V 21	60.888	315054	884122	3.23
1980.33	BV0432	45 V 22	60.729	315242	884242	3.76
1980.33	BV0433	45 V 23	61.153	315337	884242	3.18
1980.33	BV0434	45 V 24	61.212	315425	884242	4.31
1980.33	BV0435	45 V 25	63.783	315607	884258	4.45
1980.33	BV0436	45 V 26	74.259	315701	884325	4.35
1980.33	BV0441	45 V 27	66.795	315749	884317	4.77
1980.33	BV1133	45 8 AZ MK	53.833	313024	883005	1.88
1976.50	BW0049	CHAPEL BOLT	13.956	310012	914144	-1.79
1976.50	BW0051	E 208	14.707	310013	914259	-3.24
1976.50	BW0052	F 208	15.051	310032	914350	-3.19
1976.50	BW0053	1945	14.390	310037	914421	-2.94
1977.33	BW0058	E 250	14.914	310008	915402	0.21
1977.33	BW0059	C 250	14.711	310047	915457	0.14
1977.33	BW0060	D 250	14.827	310132	915552	0.35
1977.33	BW0061	B 250	13.790	310153	915632	-0.08
1977.33	BW0062	Z 239	14.456	310205	915704	-0.53
1977.33	BW0063	Y 239	15.571	310237	915752	-0.58
1977.33	BW0064	CHAUSON RM 3	16.142	310235	915756	-0.39
1977.33	BW0065	CHAUSON RESET	15.509	310238	915753	-0.53
1977.33	BW0066	X 239	16.688	310246	915846	-1.41
1977.33	BW0067	RECTORY USE	17.203	310217	915838	-1.32
1977.33	BW0068	A 250	16.827	310204	915840	-1.34
1977.33	BW0069	Q 250	16.438	310155	915834	-1.81
1977.33	BW0070	W 239	16.809	310251	915914	-1.63
1977.33	BW0071	K 14	18.551	310253	915912	-1.31
1977.33	BW0072	RUE RM 1	15.701	310251	915922	-1.44
1993.25	BW0086	BROOK RESET	139.628	313256	902724	-5.94
1993.25	BW0087	BROOK RM 3	139.731	313257	902723	-5.87
1993.25	BW0088	BROOK RM 4	139.993	313257	902723	-5.08
1993.25	BW0090	E 8	137.057	313345	902656	-6.24
1993.25	BW0092	BROOKHAVEN	148.078	313439	902639	-6.00
1993.25	BW0093	F 8	149.228	313445	902635	-6.01
1993.25	BW0117	BROOKHAVEN N BASE RM 2	146.218	314133	902402	-5.66
1993.25	BW0118	BROOKHAVEN N BASE	147.250	314133	902402	-5.54
1993.25	BW0119	BROOKHAVEN N BASE RM 1	147.421	314133	902402	-5.58
1993.25	BW0121	N 8	138.899	314213	902321	-5.20
1993.25	BW0123	P 8	144.738	314316	902308	-5.18
1993.25	BW0124	H 209	141.815	314346	902329	-5.24
1993.25	BW0133	J 209	135.712	314657	902414	-5.41
1993.25	BW0134	T 8	132.608	314727	902426	-5.33

1993.25	BW0135	S 235	133.802	314736	902430	-5.23
1993.25	BW0140	G 209	125.719	314913	902355	-5.39
1993.25	BW0141	V 8	130.196	314959	902349	-5.15
1993.25	BW0142	K 209	132.346	315030	902347	-4.82
1993.25	BW0149	Z 8 RESET	139.612	315133	902331	-5.13
1993.25	BW0150	HAZELHURST	145.896	315136	902347	-4.81
1993.25	BW0151	HAZELHURST AZ MK	146.093	315138	902347	-4.85
1993.25	BW0152	HAZELHURST RM 3	146.994	315137	902351	-4.81
1993.25	BW0159	A 9	136.452	315259	902343	-5.15
1993.25	BW0160	Z 235	133.033	315335	902354	-5.59
1993.25	BW0166	B 9	127.516	315413	902356	-5.46
1993.25	BW0167	L 209	130.153	315446	902346	-5.65
1993.25	BW0168	C 9	135.878	315529	902332	-5.65
1993.25	BW0170	E 9	148.092	315640	902254	-5.91
1993.25	BW0177	R 209	142.408	315718	902235	-6.20
1993.25	BW0178	F 9	139.088	315810	902205	-6.22
1993.25	BW0179	T 235	140.458	315837	902151	-6.43
1993.25	BW0180	G 9	141.027	315911	902132	-6.74
1993.25	BW0181	H 9	143.696	315902	902108	-6.71
1993.25	BW0205	A 7	75.734	310006	902818	-5.26
1993.25	BW0207	A 208	72.766	310058	902757	-6.83
1993.25	BW0208	C 7	73.981	310148	902808	-5.41
1993.25	BW0209	B 208	76.125	310238	902818	-6.13
1993.25	BW0210	D 7	78.853	310334	902818	-5.29
1993.25	BW0211	M 235	78.971	310339	902818	-5.38
1993.25	BW0213	D 208	80.268	310447	902819	-6.09
1993.25	BW0214	E 7	81.652	310535	902819	-5.54
1993.25	BW0215	F 7	87.368	310707	902813	-5.90
1993.25	BW0217	MAGNOLIA	97.199	310837	902735	-5.92
1993.25	BW0218	C 235	97.683	310838	902734	-5.97
1993.25	BW0220	MAGNOLIA RM 2	98.574	310837	902735	-6.06
1993.25	BW0222	H 7	92.885	310841	902728	-6.01
1993.25	BW0225	D 235	103.870	311048	902642	-6.30
1993.25	BW0229	E 235	110.078	311215	902652	-6.47
1993.25	BW0230	J 208	111.827	311255	902656	-6.78
1993.25	BW0231	K 208	114.843	311352	902658	-7.34
1993.25	BW0232	MCCOMB AZ MK	126.278	311352	902658	-7.28
1993.25	BW0234	MCCOMB	127.163	311345	902712	-7.60
1993.25	BW0239	N 7	122.140	311437	902703	-7.00
1993.25	BW0240	P 7	126.927	311443	902707	-6.83
1993.25	BW0241	F 235	119.300	311446	902700	-6.91
1993.25	BW0252	G 235	128.566	311558	902747	-6.66
1993.25	BW0254	H 235	131.219	311656	902800	-6.95
1993.25	BW0255	R 7	131.132	311701	902800	-6.63
1993.25	BW0256	SUMMIT	139.592	311716	902804	-6.55
1993.25	BW0257	SUMMIT RM 1	139.399	311716	902804	-6.16
1993.25	BW0259	SUMMIT RM 3	140.115	311716	902804	-6.54
1993.25	BW0262	Q 208	124.461	311757	902741	-6.42
1993.25	BW0263	S 7	115.692	311841	902721	-6.66

1993.25	BW0264	R 208	112.367	311931	902701	-6.40
1993.25	BW0265	T 7	110.139	312014	902703	-6.57
1993.25	BW0266	N 235	110.004	312026	902707	-6.33
1993.25	BW0267	U 7	106.768	312042	902711	-6.52
1993.25	BW0268	V 7	105.267	312134	902727	-7.11
1993.25	BW0269	S 208	106.902	312217	902739	-6.70
1993.25	BW0270	W 7	108.978	312318	902744	-6.50
1993.25	BW0271	J 235	109.090	312348	902736	-6.56
1993.25	BW0273	T 208	110.597	312433	902725	-6.19
1993.25	BW0274	K 235	110.235	312503	902716	-6.30
1993.25	BW0282	Z 7	114.875	312630	902652	-6.29
1993.25	BW0283	V 208	115.488	312729	902637	-6.24
1993.25	BW0284	A 8	116.680	312806	902633	-5.96
1993.25	BW0285	P 235	116.850	312826	902637	-5.89
1993.25	BW0286	W 208	116.849	312831	902638	-6.13
1993.25	BW0287	B 8	118.838	312927	902654	-5.93
1993.25	BW1307	F 208	88.337	310725	902806	-5.80
1993.25	BW1795	E 208	83.382	310607	902819	-6.26
1993.25	BW1796	G 208	90.322	310819	902739	-6.44
1970.00	BX0622	E 237	23.937	311842	922637	-0.83
1977.33	BX0622	E 237	23.927	311842	922637	-1.14
1977.33	BX0722	Q 14	23.343	310321	920254	2.43
1977.33	BX0739	F 98	18.861	310749	921554	-2.05
1977.33	BX0743	L 99 RESET 1959	20.256	311108	921841	-1.47
1977.33	BX0745	K 99 RESET 1959	20.824	311133	921931	-1.37
1977.33	BX0748	WILSON RM 1	21.597	311246	922204	-2.11
1977.33	BX0751	J 98	21.348	311311	922215	-2.09
1970.00	BX0757	P 13	24.731	311843	922639	-1.49
1977.33	BX0757	P 13	24.720	311843	922639	-1.49
1920.50	BX0758	O 13	25.625	311843	922640	-0.92
1938.67	BX0764	HH 96	25.472	311919	922758	-1.88
1920.50	BX0765	VARGES RESET	25.331	311918	922757	-12.59
1977.33	BX0778	P 239	25.060	310307	920129	-1.32
1977.33	BX0779	B 239	24.157	310252	920224	-1.47
1977.33	BX0780	C 239	24.521	310322	920242	-1.38
1977.33	BX0782	BANK	22.644	310321	920254	1.04
1977.33	BX0785	N 239	21.886	310403	920306	-1.15
1977.33	BX0786	VICTOR AZ MK	22.636	310459	920248	-1.42
1977.33	BX0790	VICTOR RM 1	23.751	310543	920324	-2.63
1977.33	BX0795	ROSIE CAP	22.620	310546	920336	-2.15
1977.33	BX0797	L 239	24.179	310554	920351	-1.97
1977.33	BX0798	M 239	23.636	310553	920354	-2.04
1977.33	BX0799	806 LAGS	22.694	310647	920354	-2.24
1977.33	BX0800	J 239	21.301	310649	920355	-2.27
1977.33	BX0804	Q 238	24.850	310739	920354	1.92
1977.33	BX0806	R 238	20.670	310811	920344	-1.68
1977.33	BX0809	LOUETTA CAP	25.223	310829	920348	-0.17
1977.33	BX0810	Z 238	24.307	310927	920401	-1.96
1977.33	BX0819	S 238	23.924	310905	920425	-1.87

1977.33	BX0820	T 238	24.105	310918	920450	-1.22
1977.33	BX0822	U 238	21.818	311025	920552	-1.53
1977.33	BX0826	V 238	22.753	311043	920604	0.75
1977.33	BX0827	B 238	22.630	311135	920644	-1.08
1977.33	BX0830	MONCLA STORE CAP	19.857	311213	920722	-0.75
1977.33	BX0837	T 237	24.306	311203	920826	-1.83
1977.33	BX0842	P 238	19.606	311047	920950	-1.63
1977.33	BX0846	X 238	18.782	310959	920958	-1.74
1977.33	BX0849	RRC CAP USE	19.432	310945	921020	-1.60
1977.33	BX0850	N 238	18.631	310942	921040	-1.90
1977.33	BX0853	STORE CAP	18.747	310919	921118	-1.67
1977.33	BX0854	M 238	19.624	310845	921126	-1.81
1977.33	BX0857	KATIE CAP	18.947	310737	921120	-1.41
1977.33	BX0858	L 238	18.630	310739	921116	-1.43
1977.33	BX0859	K 238	18.872	310726	921146	-1.60
1977.33	BX0860	J 238	19.331	310645	921220	-1.54
1977.33	BX0862	H 238	19.383	310635	921349	-2.10
1977.33	BX0863	Z 237	19.072	310637	921426	-1.82
1977.33	BX0866	BIJOU CAP	19.816	310647	921422	-1.70
1977.33	BX0868	F 238	18.608	310727	921556	-1.62
1977.33	BX0871	OURSIDE CAP	19.535	310843	921623	-1.74
1977.33	BX0874	RRB CAP USE	20.959	310920	921628	-1.41
1977.33	BX0877	RRA CAP USE	21.459	310942	921628	-1.55
1977.33	BX0882	3 CAP	20.699	311005	921629	-1.55
1977.33	BX0883	Y 237	20.041	311024	921722	-2.55
1977.33	BX0884	R 237	21.144	311033	921816	-1.29
1977.33	BX0891	HONDURAS RESET	20.221	311158	922031	-1.71
1977.33	BX0892	N 237	20.767	311210	922121	-3.17
1977.33	BX0896	M 237	20.208	311337	922242	0.11
1977.33	BX0898	LOULETTE BOLT	21.280	311406	922206	-3.00
1977.33	BX0900	K 237	22.093	311447	922225	-2.35
1977.33	BX0901	J 237	20.686	311514	922316	-2.12
1977.33	BX0902	H 237	22.944	311556	922329	-2.17
1977.33	BX0906	G 237	22.675	311620	922403	-2.88
1977.33	BX0912	N 232	22.967	311828	922630	-1.68
1970.00	BX0916	Q 239	23.749	311810	922650	-2.18
1970.00	BX0917	R 239	23.695	311732	922708	-2.84
1970.00	BX0918	1123 LAGS	23.089	311721	922707	-4.75
1970.00	BX0920	V 239	22.414	311645	922651	-6.00
1970.00	BX0921	S 239	22.573	311623	922643	-2.40
1970.00	BX0922	T 239	24.146	311546	922655	-3.27
1970.00	BX0923	A 3795 LAGS	24.380	311529	922707	-2.33
1970.00	BX0924	F 15	24.380	311531	922717	-2.45
1970.00	BX0939	G 15	21.222	311141	922840	-1.21
1970.00	BX0940	H 15	23.050	311047	922900	0.02
1970.00	BX0942	2 MPRR	24.102	310923	922927	-1.90
1920.50	BX0998	FLINT=I 13 RESET	25.492	312042	923125	-4.84
1938.67	BX1000	L 96	24.821	312119	923256	-2.72
1938.67	BX1001	PECAN=B 67	24.467	312130	923328	-2.49

1938.67	BX1002	PECAN RM 2	24.502	312131	923328	-1.86
1938.67	BX1003	M 96	24.969	312144	923441	-0.82
1920.50	BX1004	RAPIDES=H 13	26.956	312151	923513	-10.60
1938.67	BX1005	HAWTHORN	25.672	312151	923514	-0.66
1920.50	BX1008	JOYNER=G 13	25.489	312221	923744	0.51
1938.67	BX1009	JOYNER RM 1	25.185	312223	923755	0.05
1938.67	BX1010	JOYNER RM 2	25.567	312225	923754	-0.03
1920.50	BX1011	BOYCE=F 13	26.665	312253	923910	-2.05
1920.50	BX1022	ZIMMERMAN=D 13	27.932	312456	924208	-0.77
1970.00	BX1121	L 15	41.623	310643	923024	0.37
1970.00	BX1124	M 15	54.442	310449	923106	0.51
1970.00	BX1132	Q 15	44.491	310153	923210	-0.05
1970.00	BX1134	3 MPRR	38.286	310109	923254	0.28
1920.50	BX1275	HALES=Z 12	30.296	313119	925518	0.33
1920.50	BX1282	MONTROSE=V 12	30.880	313416	925939	-4.72
1920.50	BX1683	CYPRESS=S 12 RESET	30.590	313628	930239	-2.23
1920.50	BX1689	FLORA=Q 12	32.147	313700	930708	-1.57
1920.50	BX1692	RUM=P 12 RESET	39.142	313742	930947	-1.55
1920.50	BX1700	SIGN	71.344	314016	931516	-3.91
1920.50	BX1703	WHITE=M 12	72.156	314043	931617	-2.63
1920.50	BX1705	ROBELINE=L 12	59.704	314106	931728	-4.80
1920.50	BX1713	CABIN=J 12	64.274	314359	932218	-1.47
1920.50	BX1721	BOLYNE=H 12	101.575	314500	932624	-1.31
1920.50	BX1724	PALM=G 12	96.615	314538	932729	-2.00
1920.50	BX1728	MILES=D 12	110.284	314737	932935	-0.56
1920.50	BX2171	PELICAN=Z 10	96.387	315256	933510	-2.72
1920.50	BX2174	OXFORD=Y 10	77.875	315533	933747	-17.43
1977.33	BX2225	R 250	14.027	310259	920020	-1.35
1977.33	BX2226	D 239	14.032	310305	920054	-1.29
1938.67	BX2273	HAWTHORN RM 1	25.683	312154	923514	-1.47
1968.25	CN2592	PBM 5	38.311	323103	875012	3.84
1968.25	CN2593	BOLT 4	38.830	323103	875012	3.83
1968.25	CN2594	Z 112	37.766	323102	875015	3.93
1968.25	CN2599	W 158	29.664	323042	875123	3.85
1968.25	CN2604	U 158	24.413	323050	875309	3.72
1968.25	CN2608	S 158	29.422	323115	875444	3.99
1968.25	CN2609	P B M 2	28.962	323123	875522	3.98
1968.25	CN2612	Q 158	26.548	323106	875626	3.80
1968.25	CN2614	P 158	24.637	323056	875711	4.15
1968.25	CN2615	N 158	25.380	323040	875822	4.15
1968.25	CN2616	TTS 63 T	26.818	323030	875907	3.77
1968.25	CO0285	D 158	49.685	322906	880305	4.36
1968.25	CO0288	H 158	38.741	322903	880409	4.49
1968.25	CO0289	TTS 61 T USGS	37.022	322906	880424	4.25
1968.25	CO0292	J 158	43.832	322913	880511	5.96
1968.25	CO0296	LT 3 108 USE	39.425	322903	880706	4.00
1968.25	CO0299	L 158	29.813	322859	880840	4.88
1968.25	CO0300	M 158	30.555	322909	880945	4.64
1968.25	CO0307	A 158	49.183	322923	881310	3.72

1968.25	CO0308	Z 156	52.811	322917	881413	5.80
1968.25	CO0309	Y 156	42.142	322914	881516	5.16
1968.25	CO0316	TTS 54 T USGS	50.828	322906	881751	4.68
1968.25	CO0320	W 156	49.193	322811	881926	4.32
1968.25	CO0321	V 156	52.062	322727	881951	4.60
1968.25	CO0322	U 156	52.914	322643	882030	4.46
1968.25	CO0323	T 156	60.271	322624	882110	4.67
1968.25	CO0324	S 156	63.768	322558	882204	5.06
1968.25	CO0326	K 103	65.310	322540	882242	5.42
1968.25	CO0327	M 318	71.105	322545	882300	5.51
1968.25	CO0328	L 318	71.359	322539	882329	5.65
1968.25	CO0329	KEWANEE RM 1	94.874	322529	882442	5.97
1968.25	CO0330	KEWANEE	95.290	322528	882442	6.08
1968.25	CO0331	KEWANEE RM 2	94.396	322529	882442	5.98
1968.25	CO0332	M 73	81.817	322459	882437	5.84
1968.25	CO0333	A 211	93.822	322527	882446	5.89
1968.25	CO0334	KEWANEE AZ MK	90.401	322527	882501	6.00
1968.25	CO0335	B 211	83.304	322526	882547	6.18
1968.25	CO0336	L 73	84.995	322526	882618	4.99
1968.25	CO0337	C 211	74.486	322536	882732	5.62
1968.25	CO0339	TOOMSUBA RM 2	89.280	322527	882829	5.46
1968.25	CO0340	TOOMSUBA RM 1	90.140	322527	882829	5.48
1968.25	CO0341	TOOMSUBA	89.359	322527	882829	5.47
1968.25	CO0342	TOOMSUBA AZ MK	89.435	322520	882853	5.35
1968.25	CO0343	Z 185	87.951	322501	882943	5.47
1968.25	CO0344	D 211	82.930	322509	882940	4.96
1980.33	CO0428	Q 36	71.131	320225	884338	5.06
1980.33	CO0431	S 35	68.796	320243	884348	4.73
1980.33	CO0443	C 73	101.439	322139	884206	5.50
1968.25	CO0449	PBM NEW POST OFFICE USE	104.953	322159	884200	5.76
1968.25	CO0452	B 73	101.167	322152	884145	5.29
1968.25	CO0460	H 11642	89.719	322503	883023	4.37
1968.25	CO0462	G 211	95.871	322507	883015	5.18
1968.25	CO0463	H 211	89.760	322511	883125	5.16
1968.25	CO0464	J 211	106.640	322503	883219	4.90
1968.25	CO0465	H 73	113.703	322448	883305	5.11
1968.25	CO0466	RUSSELL RM 2	172.590	322435	883408	4.91
1968.25	CO0467	RUSSELL	174.739	322435	883408	4.91
1968.25	CO0468	RUSSELL RM 1	173.645	322435	883408	5.05
1968.25	CO0469	RUSSELL AZ MK	146.223	322440	883403	5.01
1968.25	CO0470	F 211	137.539	322432	883447	5.97
1968.25	CO0472	E 211	127.873	322412	883541	5.28
1968.25	CO0473	N 211	115.366	322353	883629	5.19
1968.25	CO0475	G 73	109.184	322340	883815	5.95
1968.25	CO0476	W 211	104.043	322330	883923	5.91
1968.25	CO0477	BONITA RM 1	129.710	322256	883929	7.44
1968.25	CO0478	BONITA	130.453	322255	883929	6.21
1968.25	CO0479	BONITA RM 2	129.417	322256	883929	5.81
1968.25	CO0480	U 211	100.830	322214	884022	5.81

1968.25	CO0482	L 211	102.014	322255	884001	5.75
1968.25	CO0485	BONITA AZ MK	99.476	322234	884024	5.57
1968.25	CO0486	J 168	101.760	322222	884037	5.78
1968.25	CO0487	K 211	106.165	322215	884047	5.90
1968.25	CO0488	N 213	93.912	321924	885910	5.80
1968.25	CO0489	317	96.333	321907	885857	5.46
1968.25	CO0491	P 213	94.210	321932	885809	6.16
1968.25	CO0492	M 213	95.745	321934	885655	6.67
1968.25	CO0493	D 124	92.013	321920	885654	6.34
1968.25	CO0494	50 S	96.334	321931	885541	5.25
1968.25	CO0495	Z 211	95.503	321931	885541	6.07
1968.25	CO0497	L 213	92.031	321939	885505	6.21
1968.25	CO0498	GAGING STA USGS	92.067	321935	885433	6.53
1968.25	CO0501	K 213	112.695	321946	885326	6.48
1968.25	CO0502	J 213	91.331	321938	885225	6.43
1968.25	CO0503	G 213	100.456	321940	885202	6.58
1968.25	CO0506	Z 212	102.988	321949	885146	6.58
1968.25	CO0507	Y 211	95.110	322021	885104	7.07
1968.25	CO0509	Y 212	132.775	322039	884905	6.65
1968.25	CO0510	X 212	106.154	322030	884820	5.82
1968.25	CO0516	X 211	91.928	322042	884606	5.39
1968.25	CO0521	T 211	100.069	322059	884406	5.72
1968.25	CO0522	D 168	90.361	322038	884418	5.80
1968.25	CO0524	F 168	90.914	322041	884433	5.77
1968.25	CO0525	G 168	91.888	322035	884433	5.73
1968.25	CO0526	H 168	90.235	322015	884434	5.28
1968.25	CO0527	KEY	89.001	322015	884432	5.17
1968.25	CO0528	KEY RM 2	89.186	322015	884432	5.14
1968.25	CO0529	KEY RM 1	88.615	322015	884432	4.99
1968.25	CO0531	S 211	102.860	322056	884306	5.91
1968.25	CO0537	Q 211	98.293	322113	884129	5.53
1980.33	CO0537	Q 211	98.354	322113	884129	5.23
1968.25	CO0538	P 211	103.611	322146	884157	5.68
1968.25	CO0539	H 213	101.468	321848	885154	6.64
1968.25	CO0540	Y 123	86.813	321830	885228	6.55
1980.33	CO0541	45 V 29	69.812	320045	884348	4.80
1980.33	CO0546	45 V 30	74.714	320125	884344	5.09
1980.33	CO0548	QUITMAN AZ MK	87.306	320402	884349	5.22
1980.33	CO0549	QUITMAN	93.031	320416	884349	4.96
1980.33	CO0550	QUITMAN RM 1	91.960	320417	884349	5.05
1980.33	CO0553	45 V 32	87.256	320451	884346	5.16
1980.33	CO0554	37 FJH	75.605	320539	884302	5.27
1980.33	CO0556	45 V 34	80.567	320613	884208	4.73
1980.33	CO0558	45 V 35	119.585	320755	884139	5.03
1980.33	CO0562	RILEY AZ MK	125.368	320835	884112	5.75
1980.33	CO0564	45 V 36	138.014	320915	884056	5.14
1980.33	CO0565	45 V 37	139.437	321010	884044	5.00
1980.33	CO0568	SABLE	163.441	321226	884132	4.35
1980.33	CO0572	45 V 40	166.766	321333	884203	4.38

1980.33	CO0573	45 V 41	173.813	321429	884148	4.41
1980.33	CO0580	45 V 44	185.097	321645	884152	4.21
1980.33	CO0582	WOLF RESET	196.023	321720	884128	6.11
1980.33	CO0587	ZERO	203.420	321939	884129	4.85
1968.83	CO0740	C 25	152.447	322147	892928	3.00
1968.83	CO0741	FOREST W BASE RM 2	155.307	322147	892929	-21.54
1968.83	CO0742	FOREST W BASE RM 1	155.760	322147	892929	-2.67
1968.83	CO0743	FOREST WEST BASE	155.547	322146	892928	-0.29
1968.83	CO0744	PTS 25 S USGS	147.684	322146	892828	6.79
1968.83	CO0745	D 25	145.433	322137	892826	3.90
1968.83	CO0746	V 107	139.861	322137	892750	1.83
1968.83	CO0751	F 213	143.588	322145	892726	2.82
1968.83	CO0752	MUSKEGON AZ MK	134.245	322145	892644	2.91
1968.83	CO0753	MUSKEGON RM 3	140.522	322141	892619	4.30
1968.83	CO0754	MUSKEGON	140.459	322141	892620	3.30
1968.83	CO0755	MUSKEGON RM 1	140.241	322141	892619	-2.58
1968.83	CO0756	N 214	134.719	322137	892540	-1.27
1968.83	CO0757	U 107	137.377	322125	892538	2.97
1968.83	CO0758	L 214	135.995	322129	892444	-0.22
1968.83	CO0759	K 214	129.463	322125	892332	2.93
1968.83	CO0760	J 214	138.747	322117	892224	3.06
1968.83	CO0762	G 214	128.846	322109	892112	-4.79
1968.83	CO0763	FOREST E BASE RM 1	135.550	322053	892036	0.14
1968.83	CO0764	FOREST E BASE RM 3	136.406	322053	892036	1.14
1968.83	CO0765	FOREST EAST BASE	136.354	322052	892036	-0.10
1968.83	CO0766	PTS 23 S USGS	134.068	322035	891940	1.91
1968.83	CO0767	H 214	143.353	322043	891932	2.19
1968.83	CO0768	C 214	141.550	322023	891827	2.29
1968.83	CO0769	S 107	143.642	322009	891850	3.49
1968.83	CO0770	D 214	139.653	322015	891736	4.49
1968.83	CO0771	E 214	135.856	321952	891618	3.49
1968.83	CO0772	R 107	139.979	321939	891640	3.81
1968.83	CO0773	F 214	133.425	321951	891543	4.60
1968.83	CO0775	B 214	140.826	321940	891504	1.92
1968.83	CO0776	24 S	139.276	321930	891403	-0.48
1968.83	CO0777	Q 107	138.642	321931	891356	4.33
1968.83	CO0778	A 214	130.094	321926	891249	4.48
1968.83	CO0779	Z 213	124.756	321931	891147	3.98
1968.83	CO0780	P 107	122.580	321922	891148	4.15
1968.83	CO0781	P 212	116.998	321932	891108	4.23
1968.25	CO0782	Y 213	119.406	321930	891035	3.65
1968.25	CO0783	W 102	126.905	321917	890957	3.56
1968.25	CO0784	PTS 47S	126.503	321914	890947	3.48
1968.25	CO0786	V 102	133.259	321953	890937	3.08
1968.25	CO0788	W 213	142.006	321953	890932	4.37
1968.25	CO0789	NEWTON RM 2	146.374	321956	890921	4.33
1968.25	CO0790	NEWTON	147.192	321955	890921	4.32
1968.25	CO0791	NEWTON RM 1	147.343	321956	890921	4.36
1968.25	CO0792	NEWTON AZ MK	134.565	321959	890851	4.27

1968.25	CO0793	T 213	114.588	321957	890803	4.99
1968.25	CO0799	U 213	112.293	321958	890737	5.04
1968.25	CO0800	Q 212	104.460	322011	890644	4.74
1968.25	CO0801	V 213	106.417	322024	890600	5.19
1968.25	CO0802	X 213	109.821	322017	890452	4.18
1968.25	CO0803	TREES AZ MK	113.418	322004	890411	5.89
1968.25	CO0804	TREES RM 2	119.546	322000	890403	5.60
1968.25	CO0805	TREES	120.416	322000	890403	5.62
1968.25	CO0806	TREES RM 1	120.421	322000	890403	5.44
1968.25	CO0807	S 213	108.727	321952	890321	5.77
1968.25	CO0808	R 213	113.694	321929	890220	6.14
1968.25	CO0809	R 212	99.298	321905	890129	6.01
1968.25	CO0810	Q 213	99.250	321914	890014	5.55
1968.83	CO0830	P 214	140.417	322217	892838	3.70
1968.83	CO0837	W 107	144.153	322139	892828	2.58
1968.83	CO0860	BRANDON RESET	158.627	321635	895926	-2.44
1968.83	CO0861	BRANDON RM 1	156.655	321635	895926	-2.45
1968.83	CO0862	BRANDON RM 2	156.339	321635	895926	-2.66
1968.83	CO0865	Q 24	121.438	321717	895936	-3.42
1968.83	CO0866	W 210	152.836	321625	895924	-2.31
1968.83	CO0867	X 210	124.040	321621	895832	-4.37
1968.83	CO0868	Y 210	122.161	321629	895722	-3.95
1968.83	CO0869	B 212	121.693	321641	895627	-2.90
1968.83	CO0870	C 212	130.575	321655	895526	-3.80
1968.83	CO0871	COX AZ MK	133.719	321707	895446	-3.49
1968.83	CO0872	S 24	129.283	321717	895444	-1.79
1968.83	CO0873	J 212	121.074	321723	895338	-1.82
1968.83	CO0874	D 212	119.867	321739	895256	-2.64
1968.83	CO0875	T 24	119.290	321741	895236	-2.78
1968.83	CO0876	GULDE AZ MK	115.791	321807	895203	-9.56
1968.83	CO0877	GULDE RM 2	121.157	321818	895141	-4.40
1968.83	CO0878	GULDE	121.875	321817	895142	-6.49
1968.83	CO0881	GULDE RM 1	121.128	321818	895141	-1.94
1968.83	CO0883	F 212	118.725	321829	894942	-3.62
1968.83	CO0887	V 24	106.239	321837	894858	-2.12
1968.83	CO0888	L 212	104.798	321843	894832	-1.99
1968.83	CO0889	W 24	106.633	321841	894828	-2.34
1968.83	CO0890	W	109.403	321847	894758	-1.71
1968.83	CO0891	A 212	108.507	321845	894752	-2.78
1968.83	CO0892	HATCH AZ MK	112.200	321851	894734	-11.79
1968.83	CO0893	HATCH RM 3	118.568	321858	894719	3.99
1968.83	CO0896	G 212	118.520	321905	894644	0.20
1968.83	CO0897	S 212	131.905	321919	894536	-3.07
1968.83	CO0898	RANSCO AZ MK	112.868	321915	894445	-3.30
1968.83	CO0899	RANSCO RM 2	116.185	321933	894351	-0.86
1968.83	CO0900	RANSCO	116.234	321932	894351	-1.32
1968.83	CO0901	RANSCO RM 1	116.437	321933	894351	-1.51
1968.83	CO0902	T 212	125.131	321952	894240	-11.20
1968.83	CO0904	W 212	120.433	322001	894214	-2.77

1968.83	CO0905	V 212	138.396	322027	894115	-3.50
1968.83	CO0906	U 212	127.411	322051	894024	-3.52
1968.83	CO0910	X 24	144.981	322113	893910	3.10
1968.83	CO0911	Y 24	141.401	322114	893830	1.02
1968.83	CO0912	A 213	135.403	322117	893719	13.56
1968.83	CO0913	M 212	133.606	322115	893700	1.01
1968.83	CO0914	JOHNS	141.488	322117	893636	-2.86
1968.83	CO0915	JOHNS RM 1	141.315	322118	893635	-4.52
1968.83	CO0916	JOHNS RM 2	140.987	322118	893635	-0.87
1968.83	CO0918	B 213	138.108	322119	893536	2.39
1968.83	CO0919	A 25	144.146	322143	893424	3.60
1968.83	CO0920	CURVE AZ MK	145.403	322145	893412	-12.78
1968.83	CO0921	CURVE RM 1	154.672	322144	893352	-3.16
1968.83	CO0922	CURVE	155.348	322144	893352	-14.24
1968.83	CO0923	CURVE RM 2	155.512	322144	893352	-5.62
1968.83	CO0925	D 213	158.751	322127	893250	5.29
1968.83	CO0926	C 213	161.661	322125	893156	0.69
1968.83	CO0927	N 212	142.957	322145	893105	2.88
1968.83	CO0928	E 213	150.405	322143	893000	15.23
1968.25	CO0997	KEY AZ MK	90.185	322035	884420	5.09
1993.08	CP0001	61 V 130	30.067	324222	905605	-4.85
1993.08	CP0003	61 V 131	29.354	324306	905625	-6.14
1993.25	CP0205	A 236	132.777	320029	902050	-6.05
1993.25	CP0206	J 9	127.951	320051	902036	-5.76
1993.25	CP0209	U 209	114.619	320245	902007	-6.68
1993.25	CP0210	L 9	110.047	320323	901945	-6.32
1993.25	CP0215	V 209	102.745	320406	901906	-6.25
1993.25	CP0216	M 9	96.832	320444	901826	-6.24
1993.25	CP0218	BM	88.601	320543	901734	-6.58
1993.25	CP0219	N 9	89.618	320551	901744	-6.48
1993.25	CP0222	TERRY RM 1	97.030	320601	901800	-5.96
1993.25	CP0225	C 236	85.430	320641	901640	-6.63
1993.25	CP0226	Y 209	91.786	320718	901614	-5.94
1993.25	CP0227	G 210	84.578	320751	901602	-6.99
1993.25	CP0228	270	82.217	320837	901546	-6.30
1993.25	CP0229	Q 9	79.986	320919	901528	-6.90
1993.25	CP0232	R 9	80.564	321039	901442	-6.20
1993.25	CP0233	S 9	80.215	321056	901432	-5.66
1993.25	CP0241	W 9	89.558	321618	901225	-6.09
1993.25	CP0242	B 210	89.991	321645	901205	-5.94
1993.25	CP0243	B 236	90.023	321703	901145	-5.70
1993.25	CP0264	X 224	94.100	321812	901055	-3.82
1968.83	CP0269	CITY HALL	88.969	321751	901056	-5.61
1993.25	CP0283	CLINTON RM 4	116.411	322012	901912	-5.48
1993.25	CP0284	CLINTON RESET	115.786	322012	901912	-13.11
1993.25	CP0285	CLINTON RM 3	115.603	322012	901912	1.76
1993.25	CP0286	D 1	107.262	322015	901948	-6.47
1993.25	CP0287	Y 224	93.553	322000	901957	-6.88
1993.25	CP0298	Z 224	96.214	322025	902050	-5.03

1993.25	CP0309	P RESET	89.227	321749	901058	-5.73
1968.83	CP0310	CITY RM 1	88.748	321750	901059	-6.67
1993.25	CP0311	CITY AZ MK	88.844	321802	901058	-5.58
1968.83	CP0311	CITY AZ MK	88.981	321802	901058	-5.66
1968.83	CP0312	G 24	84.428	321715	901048	-6.29
1993.25	CP0313	Q 224	85.419	321732	901055	-5.70
1993.25	CP0314	H 210	82.769	321704	901100	-5.99
1968.83	CP0314	H 210	82.916	321704	901100	-6.22
1993.25	CP0315	P 224	84.334	321658	901103	-6.91
1968.83	CP0316	E 5	83.958	321657	901104	-8.27
1993.25	CP0317	J 210	92.139	321646	900959	-6.66
1968.83	CP0317	J 210	92.302	321646	900959	-6.17
1968.83	CP0326	K 210	82.806	321631	900812	-5.24
1968.83	CP0328	M 210	90.472	321457	900752	-6.67
1968.83	CP0329	J 24	83.749	321515	900836	-4.88
1968.83	CP0333	N 210	91.469	321445	900701	-6.05
1968.83	CP0334	P 210	88.588	321425	900556	-3.69
1968.83	CP0335	Q 210	93.248	321411	900505	-2.84
1968.83	CP0336	L 24	92.379	321406	900442	-3.55
1968.83	CP0337	R 210	93.469	321413	900422	-3.06
1968.83	CP0339	ST FARM	100.289	321417	900414	-4.73
1968.83	CP0342	S 210	93.360	321437	900334	-2.97
1968.83	CP0343	M 24	95.236	321455	900311	-2.73
1968.83	CP0345	N 24	98.146	321547	900237	-2.73
1968.83	CP0346	T 210	105.894	321624	900210	-2.64
1968.83	CP0347	V 210	110.777	321701	900209	-6.06
1968.83	CP0354	K 212	105.896	321703	900123	-2.52
1968.83	CP0355	U 210	124.068	321652	900014	-6.13
1993.25	CP0391	20 V 49	90.799	322035	902138	-6.59
1993.25	CP0393	TOM RM 1	108.802	322046	902220	-6.48
1993.25	CP0394	TOM RM 2	110.402	322046	902220	-6.02
1993.25	CP0398	20 V 46	81.928	322120	902435	-8.23
1993.25	CP0401	BOLTON AZ MK	83.982	322123	902604	-6.47
1993.25	CP0402	BOLTON 2	82.309	322122	902632	-6.11
1993.25	CP0403	BOLTON 2 RM 3	81.342	322123	902632	-5.86
1993.25	CP0404	BOLTON 2 RM 4	82.369	322122	902631	-5.23
1993.25	CP0409	REVIS 2	63.681	322140	902942	-5.85
1993.25	CP0410	REVIS 2 RM 3	63.177	322140	902941	-6.11
1993.25	CP0511	55 V 1	83.642	321650	901021	-6.73
1993.25	CP0546	X 59	79.474	322027	905052	-5.94
1993.08	CP0551	N 225	67.570	322035	905248	-5.71
1993.08	CP0552	P 225	70.475	322056	905250	-5.43
1993.08	CP0553	Z 59	58.646	322040	905302	-5.42
1993.08	CP0554	M 225	54.387	322046	905303	-5.45
1974.00	CP0558	J 225	44.018	321903	905337	-5.94
1974.00	CP0559	H225	49.252	321847	905405	-5.77
1993.08	CP0563	K 236	31.454	322123	905249	-5.40
1993.08	CP0564	J 236	33.871	322149	905234	-5.30
1993.08	CP0567	H 236	31.332	322220	905218	-5.30

1993.08	CP0569	L 236	48.358	322304	905144	-5.10
1993.08	CP0571	M 236	38.802	322333	905122	-5.08
1993.08	CP0572	N 236	33.433	322423	905048	-5.05
1993.08	CP0575	T 236	32.047	322503	905001	-4.89
1993.08	CP0582	61 V 111	58.612	322802	904838	-4.56
1993.08	CP0583	P 236	46.952	322809	904834	-4.69
1993.08	CP0586	61 V 112	31.807	322851	904819	-6.26
1993.08	CP0587	R 236	37.139	322859	904812	-4.46
1993.08	CP0588	61 V 113	33.092	322944	904834	-4.64
1993.25	CP0754	20 V 41 RESET	59.031	322135	903104	-5.88
1993.25	CP0756	20 V 40	59.867	322138	903208	-5.91
1993.25	CP0761	20 V 37	68.239	322038	903455	-4.70
1993.25	CP0762	ED	80.568	322031	903515	-5.42
1993.25	CP0763	ED RM 3	79.594	322032	903514	-5.43
1993.25	CP0764	ED RM 4	80.773	322032	903514	-5.36
1993.25	CP0765	E 225	82.230	322024	903546	-5.58
1993.25	CP0766	F 225	71.078	322031	903614	-5.72
1993.25	CP0767	EDWARDS 2 AZ MK	80.384	322027	903530	-5.46
1993.25	CP0771	20 V 36	68.925	322037	903626	-5.82
1993.25	CP0772	20 V 35	48.292	322107	903717	-7.18
1993.25	CP0776	20 V 33	44.404	322122	903916	-5.51
1993.25	CP0777	20 V 32	49.494	322139	904013	-5.49
1993.25	CP0778	G 225	52.774	322149	904047	-5.45
1993.25	CP0779	20 V 31	55.979	322151	904116	-5.62
1993.25	CP0780	20 V 30	57.012	322143	904208	-6.40
1993.25	CP0781	20 V 29	49.674	322133	904304	-5.29
1993.25	CP0785	20 V 28	78.017	322117	904401	-5.69
1993.08	CP0915	L 55	32.355	325250	905318	-5.22
1993.08	CP0925	V 55	29.862	323808	905153	-4.37
1993.08	CP0927	W 55	29.335	323515	905110	-4.25
1993.08	CP0931	61 V 114	31.016	323043	904841	-4.88
1993.08	CP0932	61 V 115	28.033	323127	904855	-5.05
1993.08	CP0934	61 V 117	28.320	323254	904927	-4.09
1993.08	CP0936	61 V 118	29.401	323335	904957	-4.92
1993.08	CP0939	HARDEE RM 3	29.639	323533	905114	-4.23
1993.08	CP0940	HARDEE	34.267	323533	905114	-4.02
1993.08	CP0942	HARDEE AZ MK	29.343	323552	905104	-4.09
1993.08	CP0943	61 V 121	29.527	323642	905133	-5.88
1993.08	CP0944	X 236	29.201	323642	905132	-4.22
1993.08	CP0948	VALLEY RM 1	30.177	323800	905152	-4.31
1993.08	CP0950	61 V 124	29.677	323914	905207	-3.94
1993.08	CP0951	61 V 125	28.802	324010	905244	-3.34
1993.08	CP0952	61 V 126	38.151	324016	905346	-4.24
1993.08	CP0960	61 V 129	29.519	324140	905538	-3.98
1993.08	CP0961	61 V 132	29.972	324354	905611	-4.16
1993.08	CP0963	BLANTON RM 2	30.266	324450	905552	-4.24
1993.08	CP0964	BLANTON RESET	30.177	324451	905552	-4.34
1993.08	CP0965	BLANTON RM 1	30.164	324450	905552	-4.77
1993.08	CP0966	61 V 133	30.568	324542	905552	-4.25

1993.08	CP0967	61 V 134	30.510	324642	905603	-4.22
1993.08	CP0969	61 V 136	31.369	324824	905541	-5.32
1993.08	CP0970	G 237	31.711	324831	905528	-4.46
1993.08	CP0971	CARY AZ MK	31.523	324902	905516	-4.96
1993.08	CP0972	CARY RM 2	30.350	324912	905507	-5.39
1993.08	CP0974	CARY	31.379	324913	905507	-10.33
1993.08	CP0975	61 V 137	32.442	325007	905447	-5.36
1993.08	CP0977	B 237	31.542	325135	905412	-4.73
1993.08	CP0982	FORK RESET	33.113	325346	905240	-5.23
1993.08	CP0998	Y 236	31.164	325419	905344	-5.17
1993.08	CP0999	Z 236	32.581	325422	905417	-4.83
1993.08	CP1000	J 237	32.562	325427	905540	-4.84
1993.08	CP1002	H 237	30.774	325438	905716	-4.58
1993.08	CP1004	M 237	31.200	325542	905759	-4.59
1993.08	CP1005	N 237	30.841	325639	905757	-4.94
1993.08	CP1006	P 237	31.231	325727	905757	-5.31
1993.08	CP1011	F 237	33.003	325932	905752	-4.91
1969.08	CP1336	U 254	25.613	322223	910638	-8.73
1982.75	CP1338	BARNES	25.297	322245	910725	-8.92
1982.75	CP1339	BARNES RM 2	25.700	322245	910725	-8.97
1982.75	CP1345	W 254	26.632	322334	910920	-9.03
1982.75	CP1348	TALLULAH 2 AZ MK	25.111	322441	910849	-10.14
1982.75	CP1352	L 255	25.510	322445	910900	-9.58
1982.75	CP1353	M 255	25.251	322446	910859	-9.64
1982.75	CP1361	Z 254	24.183	322503	911224	-8.24
1982.75	CP1372	E 255	23.919	322535	911811	-8.75
1982.75	CP1387	G 255	24.476	322553	912200	-8.12
1982.75	CP1393	WAVERLY RM 3	24.245	322646	912442	-8.66
1982.75	CP1394	WAVERLY	24.943	322647	912444	-8.78
1982.75	CP1395	WAVERLY RM 4	24.279	322646	912446	-8.34
1969.08	CP1399	S 245	23.091	322714	912725	-12.85
1969.08	CP1400	R 245	27.385	322719	912832	-10.96
1969.08	CP1401	Y 244	28.911	322715	912937	-10.13
1969.08	CP1410	Z 244	29.656	322727	912956	-9.71
1969.08	CP1722	Q 245	29.137	322729	913024	-10.31
1969.08	CP1723	P 245	26.733	322734	913125	-10.14
1969.08	CP1725	N 245	27.478	322737	913210	-9.94
1969.08	CP1726	M 245	27.147	322743	913314	-7.97
1969.08	CP1730	L 245	26.331	322747	913418	-9.06
1969.08	CP1733	K 245	24.700	322751	913517	-8.92
1969.08	CP1734	J 245	24.803	322757	913618	-8.49
1969.08	CP1735	J 23 4 CAP	26.866	322805	913725	-6.29
1969.08	CP1736	HOLLY RM 3	26.770	322807	913724	-6.88
1969.08	CP1737	HOLLY RM 4	26.767	322807	913724	-7.05
1969.08	CP1738	HOLLY	26.792	322807	913724	-7.04
1969.08	CP1743	H 245	24.600	322809	913828	-6.41
1969.08	CP1744	G 245	24.419	322811	913933	-5.99
1969.08	CP1745	F 245	24.892	322816	914038	-6.52
1969.08	CP1746	J 23 1 CAP	25.595	322820	914146	-7.03

1969.08	CP1747	J 23 1 BOLT	24.376	322820	914145	-7.13
1969.08	CP1749	E 245	23.159	322826	914236	-6.36
1969.08	CP1750	D 245	24.616	322830	914337	-6.09
1969.08	CP1751	C 245	23.952	322834	914437	-6.13
1969.08	CP1752	4756	24.380	322833	914524	-6.37
1969.08	CP1756	RAYVILLE RM 2	24.085	322835	914533	-6.29
1969.08	CP1759	B 245	23.642	322837	914547	-5.68
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1969.08	CP1761	GAGING STATION	25.980	322851	914748	-5.71
1969.08	CP1766	Z 242	24.533	322855	914846	-5.88
1969.08	CP1767	Y 242	23.528	322859	914950	-5.62
1969.08	CP1768	X 242	23.163	322905	915056	-5.45
1969.08	CP1769	W 242	21.913	322907	915135	-5.13
1969.08	CP1770	CREW AZ MK	21.514	322914	915222	-5.58
1969.08	CP1778	V 242	20.200	322917	915334	-5.31
1969.08	CP1779	R 242	19.641	322923	915442	-4.94
1969.08	CP1780	I 23 3 CAP	19.658	322926	915534	-1.71
1969.08	CP1781	I 23 3 BOLT	18.432	322926	915534	-5.02
1969.08	CP1783	Q 242	20.232	322928	915612	-21.02
1969.08	CP1784	P 242	18.591	322934	915704	-4.77
1969.08	CP1785	N 242	19.460	322937	915825	-6.18
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1996.25	CP2317	N 254	33.865	321927	905528	-9.11
1969.08	CP2351	P 254	26.206	321937	905811	-6.32
1969.08	CQ0001	Y 110	21.287	323002	920325	-5.52
1969.08	CQ0002	U 242	22.042	323043	920317	-6.63
1969.08	CQ0003	T 242	23.272	323049	920237	-5.96
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1969.08	CQ0008	A 111	23.886	323037	920236	-6.36
1969.08	CQ0009	AP STA B 2	22.310	323012	920243	-5.91
1969.08	CQ0013	J 242	20.587	323008	920431	-5.75
1969.08	CQ0014	MONROE WEST BASE RM 2	21.333	323010	920509	-5.62
1969.08	CQ0015	MONROE W BASE RM 3	21.182	323010	920509	-4.69
1969.08	CQ0016	MONROE W BASE RESET	21.157	323010	920509	-4.57
1969.08	CQ0017	H 242	19.867	323011	920542	-5.49
1969.08	CQ0020	G 242	21.867	323014	920611	-6.29
1969.08	CQ0021	IP 14 LAGS	23.549	323018	920643	-5.60
1969.08	CQ0022	F 242	25.828	323008	920708	-5.71
1969.08	CQ0023	T 1	23.874	323007	920708	-5.50
1969.08	CQ0033	3 C OF WM	23.442	323020	920747	-5.16
1969.08	CQ0045	A 673 LAGS	37.518	323104	921012	-9.37
1969.08	CQ0049	A 678 LAGS	39.005	323058	921157	-2.34
1969.08	CQ0054	A 683 LAGS	48.129	323059	921357	-3.27
1969.08	CQ0081	K 49	35.132	323111	922711	-3.92
1969.08	CQ0964	F 49	59.248	323201	923404	-2.64
1969.08	CQ0968	E 49	74.586	323209	923613	-2.12
1969.08	CQ0970	1734 LAGS	86.030	323200	923709	-2.23
1969.08	CQ0974	33 CAP	96.360	323137	923818	-21.68
1969.08	CQ0975	33 BOLT	95.736	323137	923818	-1.23

1969.08	CQ0979	X 57	68.193	323143	924032	-2.09
1969.08	CQ0980	H 104	99.004	323111	924045	0.84
1969.08	CQ0991	A 1324 LAGS	101.340	323047	924348	-1.49
1969.08	CQ1001	1748 LAGS	105.311	323155	924646	-1.30
1969.08	CQ1002	35 CAP	98.769	323159	924706	-1.02
1969.08	CQ1003	35 BOLT	97.527	323159	924706	-1.08
1969.08	CQ1008	1751 LAGS	101.789	323204	924839	-1.21
1969.08	CQ1011	1753 LAGS	101.007	323225	924940	-1.18
1969.08	CQ1012	K 104	105.773	323227	925014	-2.00
1969.08	CQ1013	Q 47	100.878	323232	925120	-1.07
1969.08	CQ1018	P 47	95.800	323237	925343	-1.00
1969.08	CQ1022	N 47	109.679	323256	925529	-0.36
1969.08	CQ1026	F 104	114.181	323319	925607	-0.87
1969.08	CQ1233	F 103	69.571	323200	932931	3.45
1969.08	CQ1237	H 103	59.239	323203	932711	-0.17
1969.08	CQ1254	Q 103	44.427	323213	931915	-0.59
1969.08	CQ1261	49 A	57.457	323220	931726	-0.21
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1969.08	CQ1267	39 BOLT	77.939	323217	931434	-0.07
1969.08	CQ1273	T 103	67.835	323239	931206	-0.23
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1969.08	CQ1280	W 103	72.877	323246	930816	-0.48
1969.08	CQ1290	PTS 63 Y	75.040	323249	930305	-0.26
1969.08	CQ1291	K 47	89.293	323235	930316	-0.29
1969.08	CQ1295	L 47	77.726	323246	930056	-0.43
1969.08	CQ1296	DD 104	82.311	323246	930041	-0.52
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1969.08	CQ2012	43 CAP	73.319	323201	933017	-0.35
1969.08	CQ2013	43 BOLT	72.086	323201	933017	-0.14
1969.08	CQ2015	E 103	71.908	323158	933033	-0.51
1969.08	CQ2021	B 103	68.541	323203	933330	-1.66
1969.08	CQ2030	Y 101	53.615	323153	933634	-1.32
1969.08	CQ2031	X 101	50.069	323148	933742	-1.48
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1969.08	CQ2402	M 242	20.036	322948	920029	-4.36
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1969.08	CQ2404	K 242	22.068	322957	920225	-6.69
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1993.08	DK0435	S 237	33.941	330122	905924	-4.73
1993.08	DK0532	3 DWB	41.995	334027	905904	-4.57
1993.08	DK0533	Z 240	41.991	334134	905859	-5.00
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1993.08	DK0571	F 242	46.091	335557	905724	-4.45
1993.08	DK0572	G 242	46.384	335629	905636	-4.75
1993.08	DK0573	H 242	46.771	335720	905550	-4.46
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1993.08	DK0575	J 242	46.613	335841	905438	-4.38
1993.08	DK0576	K 242	45.926	335916	905404	-4.82
1993.08	DK0799	Q 240	44.999	335036	910139	-3.92
1993.08	DK0801	ROSEDALE	45.351	335114	910139	-4.14
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1993.08	DK1004	N 241	40.679	333119	910435	-5.81
1993.08	DK1005	P 241	39.973	333215	910447	-5.07
1993.08	DK1011	G 241	43.164	333555	910446	-5.15
1993.08	DK1016	C 241	41.239	333746	910200	-5.68
1993.08	DK1017	K 240	42.054	333812	910132	-4.86
1993.08	DK1018	A 241	41.907	333900	910039	-4.97
1993.08	DK1266	V 237	34.990	330449	910136	-4.59
1993.08	DK1267	C 240	35.309	330529	910159	-4.50
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1993.08	DK1291	82 V 17 W	37.974	332358	910305	-3.06
1993.08	DK1292	82 V 18 W	37.049	332359	910214	-3.56
1993.08	DK1297	S 132	39.865	332427	910310	-3.18
1993.08	DK1300	CITY HALL	39.835	332436	910342	-3.05
1993.08	DK1301	A 167	38.894	332503	910309	-3.89
1993.08	DK1302	B 239	37.239	332520	910258	-2.96
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1993.08	DK1320	S 239	33.507	331036	910352	-11.01
1993.08	DK1323	P 239	33.274	331300	910310	-6.32
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1993.08	DK1330	J 239	34.658	331751	910225	-4.20
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1993.08	DK1337	A 239	37.636	332615	910230	-3.45
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1993.08	DK1341	H 240	39.506	332911	910352	-4.07
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1993.08	EH0012	H 193	62.722	345417	901250	-2.50
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1993.08	EH0017	CORMORANT	63.771	345415	901144	-1.96

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1993.08	EH0026	L 193	59.810	344935	901345	-2.57
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1993.08	EH0072	D 245	54.860	343222	902513	-2.47
1993.08	EH0073	F 245	56.516	343313	902454	-1.92
1993.08	EH0074	G 245	54.943	343413	902432	-1.83
1993.08	EH0075	J 245	56.153	343459	902415	-1.51
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1993.08	EH0085	M 238	57.971	343909	902250	-1.13
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1993.08	EH0089	X 237	58.791	344118	902253	-1.35
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1993.08	EH0091	C 238	57.890	344217	902232	-1.29
1993.08	EH0092	D 238	59.083	344259	902219	-1.30
1993.08	EH0093	E 238	57.917	344337	902157	-1.82
1993.08	EH0094	F 238	58.993	344438	902125	-1.49
1993.08	EH0097	H 238	59.592	344547	902051	-1.67
1993.08	EH0098	J 238	59.059	344643	902027	-2.78
1993.08	EH0099	N 238	59.635	344705	902016	-1.86
1993.08	EH0100	P 238	59.968	344736	901951	-1.53
1993.08	EH0101	Q 238	59.316	344818	901858	-1.54
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1993.08	EH0112	H 243	95.218	344927	901013	-1.81
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1993.08	EH0123	P 13 3	89.527	344646	900701	-1.45
1993.08	EH0125	ARKABUTLA	89.581	344647	900700	-1.53

1993.08	EH0126	T 243	88.864	344647	900700	-1.64
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1993.08	EH0133	V 238	61.986	345048	901750	-1.47
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1993.08	EH0135	W 238	60.178	345101	901536	-1.79
1993.08	EH0136	X 238	60.475	345136	901500	-2.21
1993.08	EH0137	Y 238	60.633	345207	901417	-3.27
1993.08	EH0140	V 243	61.455	345518	901047	-1.30
1993.08	EH0141	W 243	64.505	345551	900959	-1.31
1993.08	EH0142	X 243	64.257	345559	900957	-1.28
1993.08	EH0143	Y 243	64.226	345642	900927	-1.46
1993.08	EH0144	S 238	62.667	345742	900850	-1.26
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1993.08	EH0161	R 196	58.647	343845	902420	-3.57
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1993.08	EH0297	Z 244	53.897	342810	902645	-2.71
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1993.08	EH0388	G 244	53.445	342010	903824	-3.79
1993.08	EH0389	S 201	52.224	341915	903826	-4.43
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1993.08	EH0401	D 244	51.570	341645	903931	-3.61
1993.08	EH0405	C 244	49.944	341556	904008	-3.63
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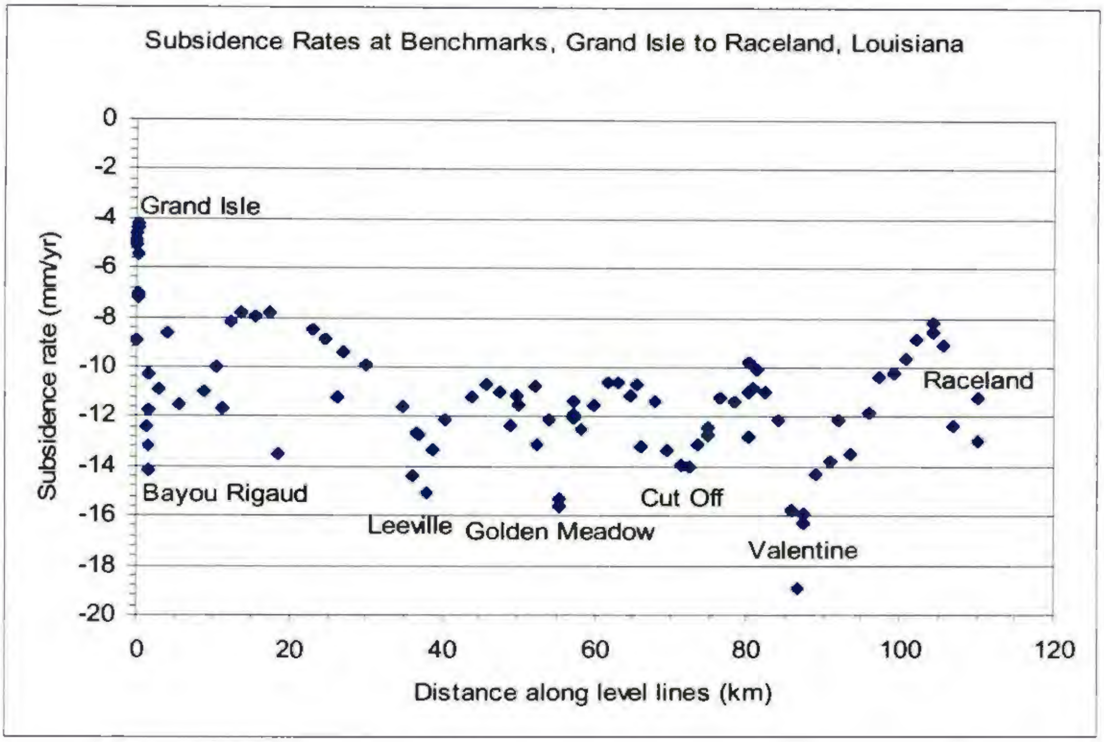
1993.08	EH0408	Z 199	51.065	341421	904118	-3.92
1993.08	EH0413	STOVALL SW BASE 2	49.861	341243	904231	-4.76
1993.08	EH0416	R 200	49.791	341244	904235	-4.43
1993.08	EH0417	V 199	49.912	341238	904236	-5.31
1993.08	EH0432	A 197	48.776	340859	904648	-5.19
1993.08	EH0435	RENA 2	58.329	340907	904713	-7.32
1993.08	EH0455	LAKE RM 3	58.067	340749	905218	-5.25
1993.08	EH0456	LAKE	58.149	340749	905219	-5.10
1993.08	EH0457	LAKE RM 2	56.955	340750	905219	-4.27
1993.08	EH0460	L 200	48.529	340702	905246	-3.34
1993.08	EH0461	1 B	48.782	340700	905242	-4.12
1993.08	EH0481	64/65 RM	54.009	342430	903418	-3.30
1993.08	EH0491	68/69 RESET	53.456	342238	903719	-4.39
1993.08	EH0492	68/69 RM	53.483	342236	903726	-4.10
1993.08	EH0494	ADEHO RESET	58.279	342242	903800	-3.90
1993.08	EH0498	ADEHO 2 AZ MK	55.149	342228	903744	-4.40

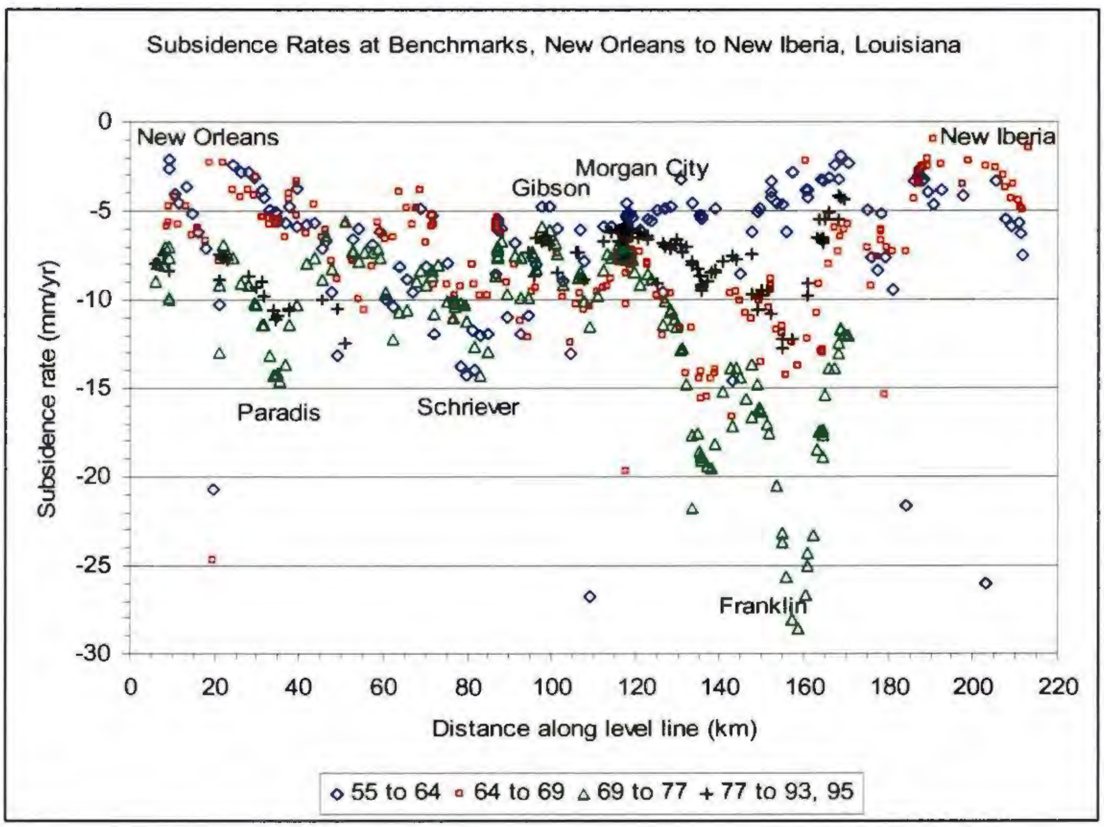
1993.08	EH0499	ADEHO 2	58.538	342240	903803	-4.47
1993.08	EH0500	ADEHO 2 RM 4	58.805	342239	903804	-4.27
1993.08	EH0501	ADEHO 2 RM 5	58.483	342241	903801	-4.07
1993.08	EH0506	C 196	54.139	342215	903823	-3.52
1993.08	EH0513	B	53.743	342153	903808	-3.41
1993.08	EH0644	M 242	47.502	340002	905311	-4.24
1993.08	EH0645	DEESON 2 AZ MK	46.053	340052	905210	-5.09
1993.08	EH0647	DEESON 2	46.639	340106	905152	-6.16
1993.08	EH0650	Q 242	48.326	340311	905110	-4.26
1993.08	EH0651	R 242	46.972	340355	905108	-4.08
1993.08	EH0652	S 242	47.173	340432	905105	-4.17
1993.08	EH0653	T 242	47.184	340522	905101	-3.92
1993.08	EH0654	U 242	47.474	340557	905059	-4.04
1993.08	EH0685	J 244	53.964	342244	903635	-4.13
1993.08	EH0687	Q 244	54.015	342400	903450	-2.48
1993.08	EH0688	L 244	53.854	342505	903335	-2.84
1993.08	EH0689	M 244	54.016	342554	903259	-2.88
1993.08	EH0690	N 244	53.196	342624	903240	-2.33
1993.08	EH0691	P 244	53.619	342736	903224	-2.66
1993.08	EH0692	R 244	52.926	342823	903218	-2.44
1993.08	EH0693	T 244	55.628	342912	903244	-1.57
1993.08	EH0694	S 244	53.270	342850	903146	-1.67
1993.08	EH0695	U 244	55.505	342807	903046	-2.28
1993.08	EH0696	V 244	53.953	342744	903015	-2.20
1993.08	EH2077	T 260	74.647	345940	900732	-1.74
1993.08	FF0391	W 260	90.696	350049	900538	-1.72
1993.08	FF0392	X 260	84.818	350114	900514	-1.60
1993.08	FF0393	Y 260	86.109	350145	900442	-1.68
1993.08	FF0395	B 261	80.867	350340	900334	-1.74
1993.08	FF0396	C 261	72.432	350407	900331	-1.77
1993.08	FF0400	U 260	69.627	350001	900700	-1.89
1993.08	FF0401	V 260	75.998	350024	900610	-1.76
1993.08	FF0431	CONNAH	73.401	350436	900329	-2.32
1993.08	FF0456	G 75	90.556	350650	900343	-1.46
1993.08	FF0457	H 75	88.120	350614	900342	-1.43
1993.08	FF0458	J 75	76.836	350552	900348	-1.80
1993.08	FF0461	26	72.996	350512	900347	-1.61
1993.08	FF0462	79 26 1	79.491	350510	900330	-1.52
1993.08	FF0464	D 261	72.445	350448	900326	-1.76
1993.08	FF0465	N 75	69.613	350511	900314	-1.45

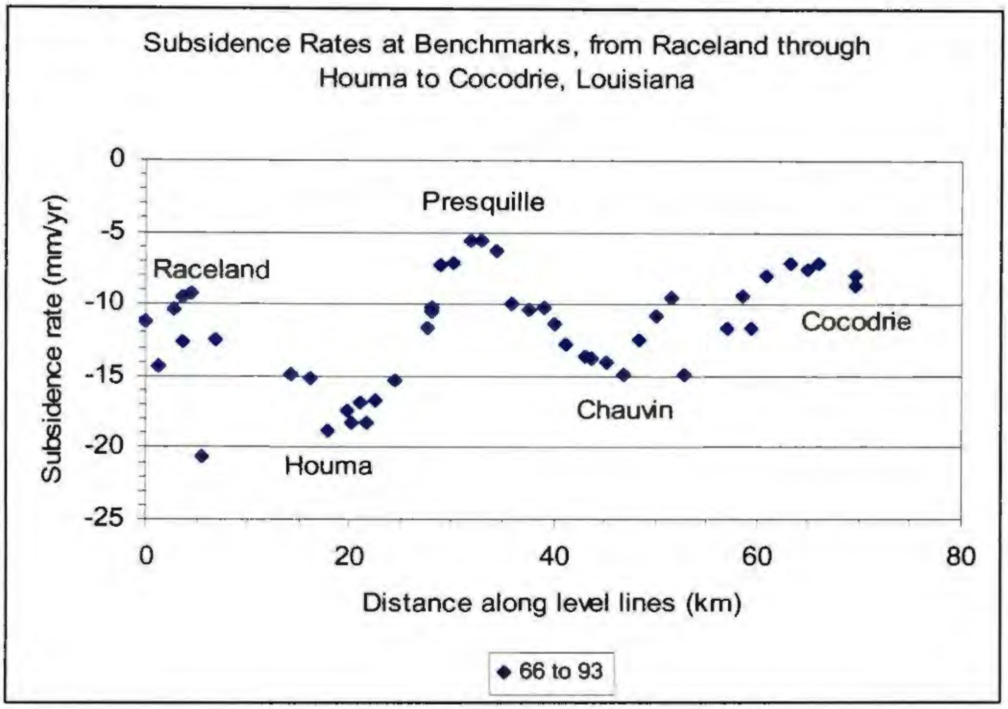
APPENDIX 4

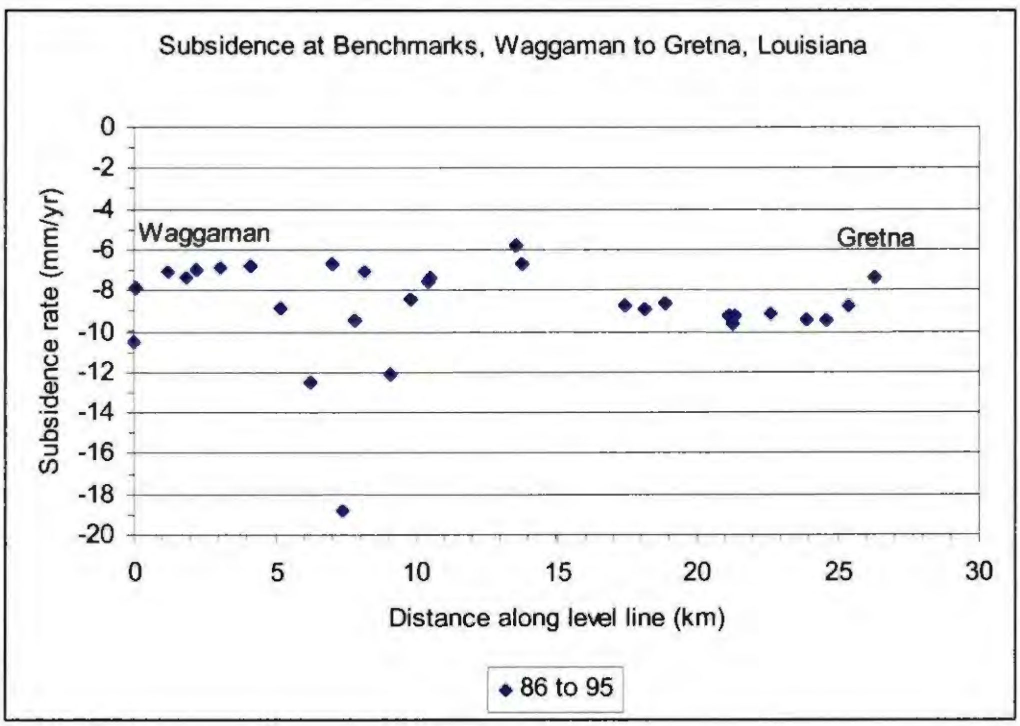
PLOTS OF SUBSIDENCE RATES AT BENCHMARKS OVER SELECTED LARGE SEGMENTS OF THE NETWORK

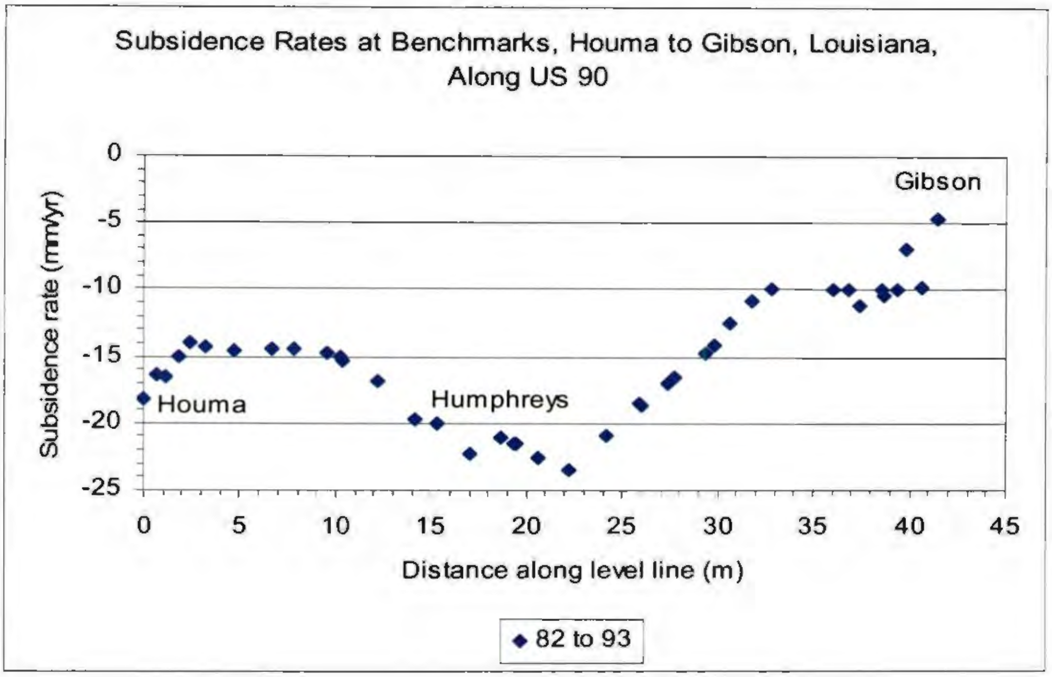
In these charts, we plotted the subsidence rate for each benchmark against its cumulative distance along the leveling line from a common initial point for that pair, or set, of lines. Distance along the leveling line is the actual distance run, as extracted from the leveling notes. These charts also clearly show the regional trends and local spatial patterns present in the data.

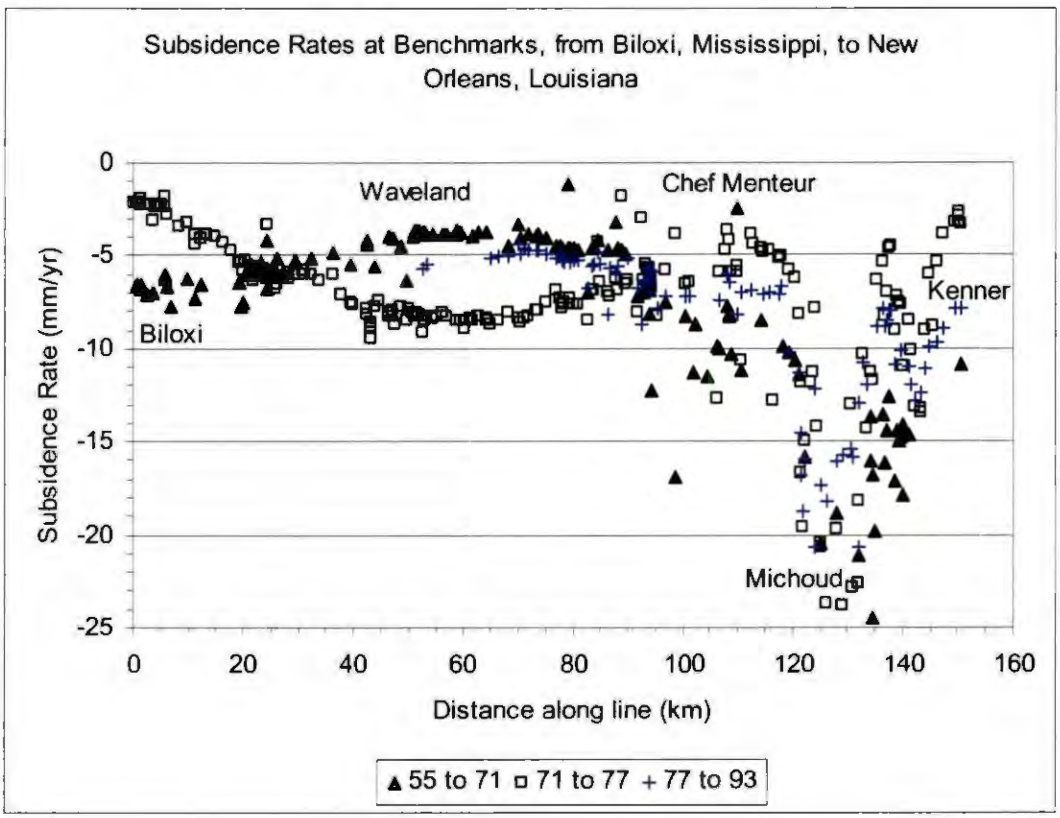

Subsidence Rates at Benchmarks, Grand Isle to Raceland, Louisiana
Subsidence rate (mm/yr)
Distance along level lines (km)
Grand Isle
Bayou Rigaud
Leeville
Golden Meadow
Cut Off
Valentine
Raceland

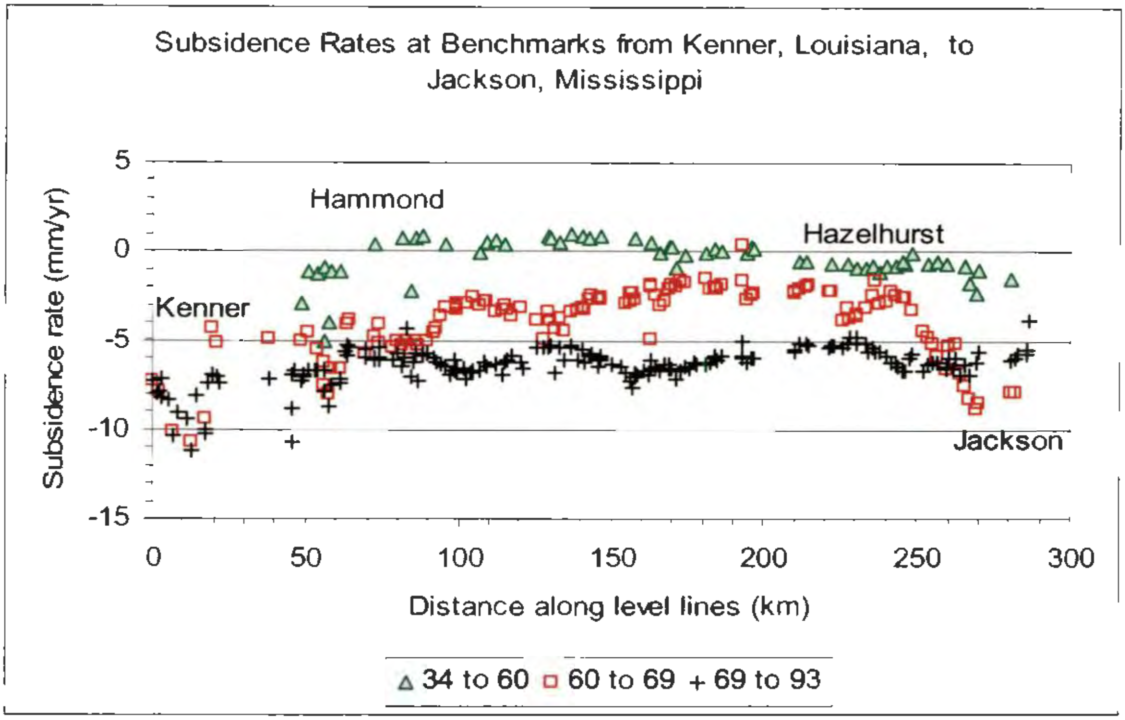

Subsidence Rates at Benchmarks, New Orleans to New Iberia, Louisiana
Subsidence rate (mm/yr)
Distance along level line (km)
New Orleans
Paradis
Schriever
Gibson
Morgan City
Franklin
New Iberia
55 to 64
64 to 69
69 to 77
77 to 93, 95

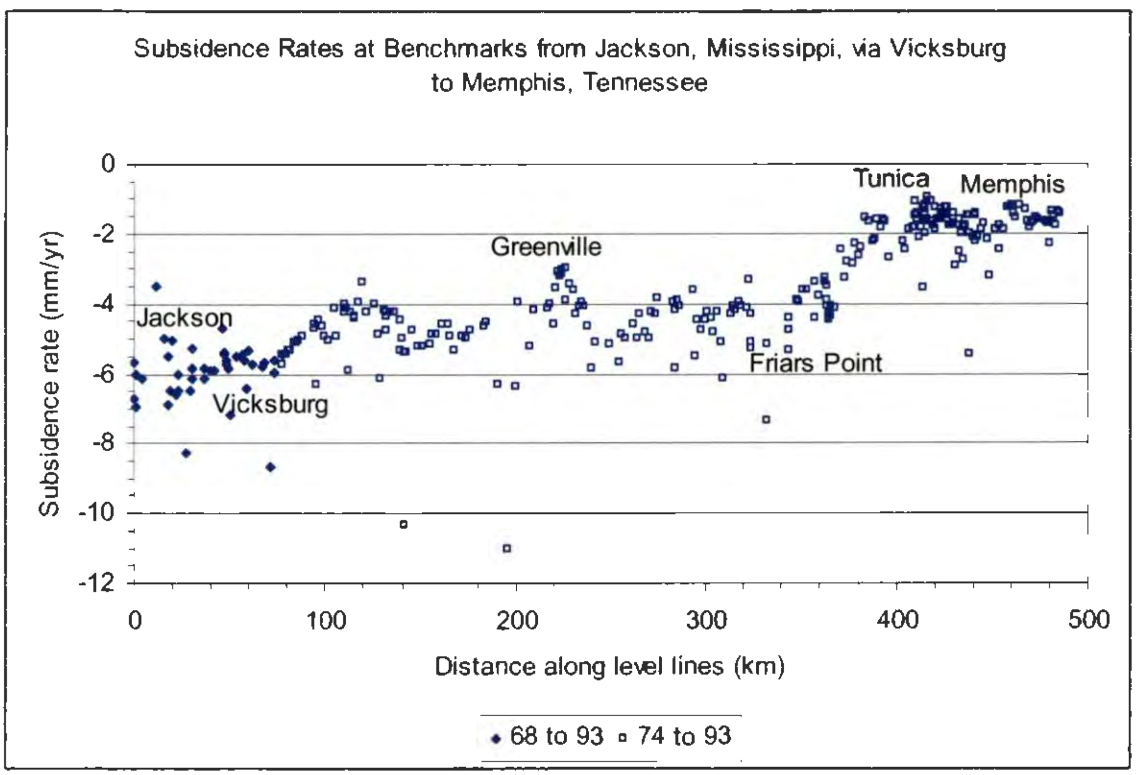

Subsidence Rates at Benchmarks, from Raceland through Houma to Cocodrie, Louisiana
Subsidence rate (mm/yr)
Distance along level lines (km)
Raceland
Presquille
Cocodrie
Chauvin
Houma
66 to 93
0
-5
-10
-15
-20
-25
0
20
40
60
80

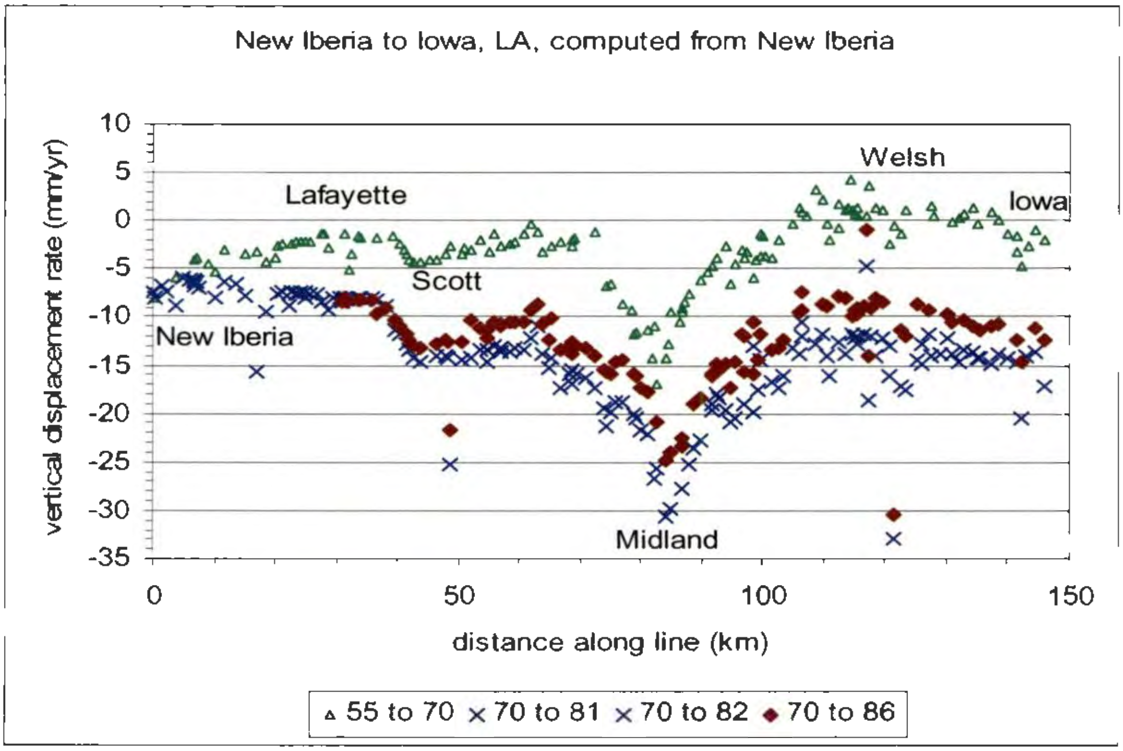

Subsidence at Benchmarks, Waggaman to Gretna, Louisiana
Subsidence rate (mm/yr)
Distance along level line (km)
Waggaman
Gretna
86 to 95
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
0
5
10
15
20
25
30

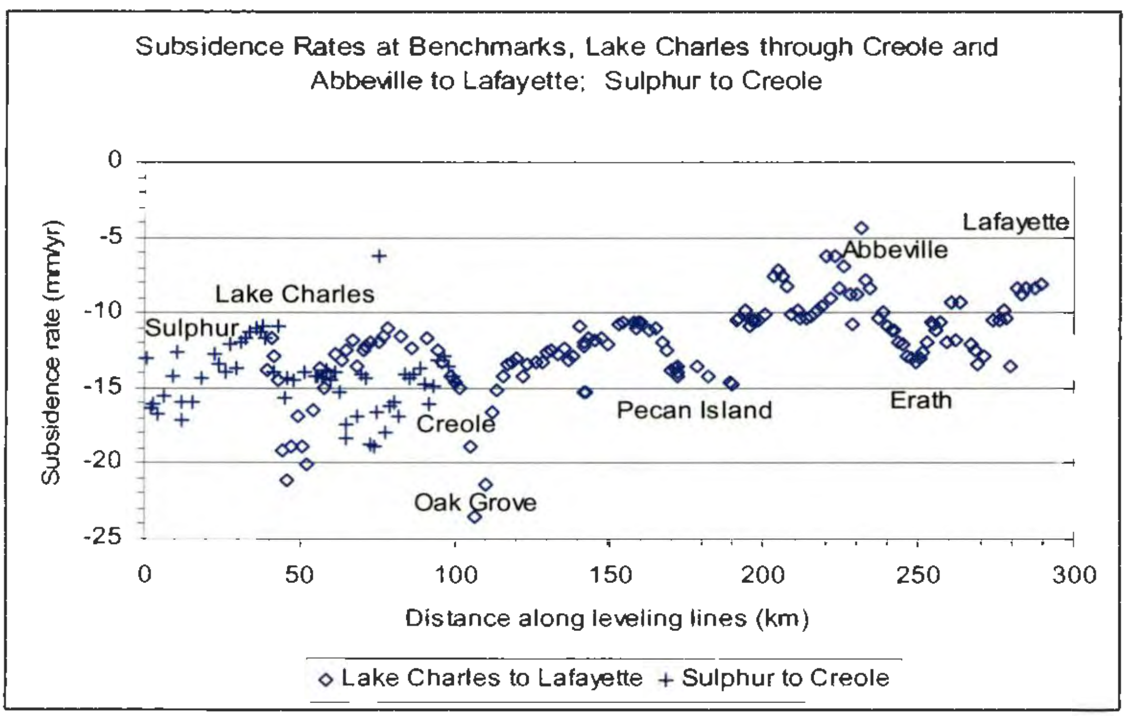

Subsidence Rates at Benchmarks, Houma to Gibson, Louisiana, Along US 90
Subsidence rate (mm/yr)
Distance along level line (m)
Houma
Humphreys
Gibson
82 to 93


Subsidence Rates at Benchmarks, from Biloxi, Mississippi, to New Orleans, Louisiana
Subsidence Rate (mm/yr)
Distance along line (km)
Biloxi
Waveland
Chef Menteur
Michoud
Kenner
55 to 71
71 to 77
77 to 93

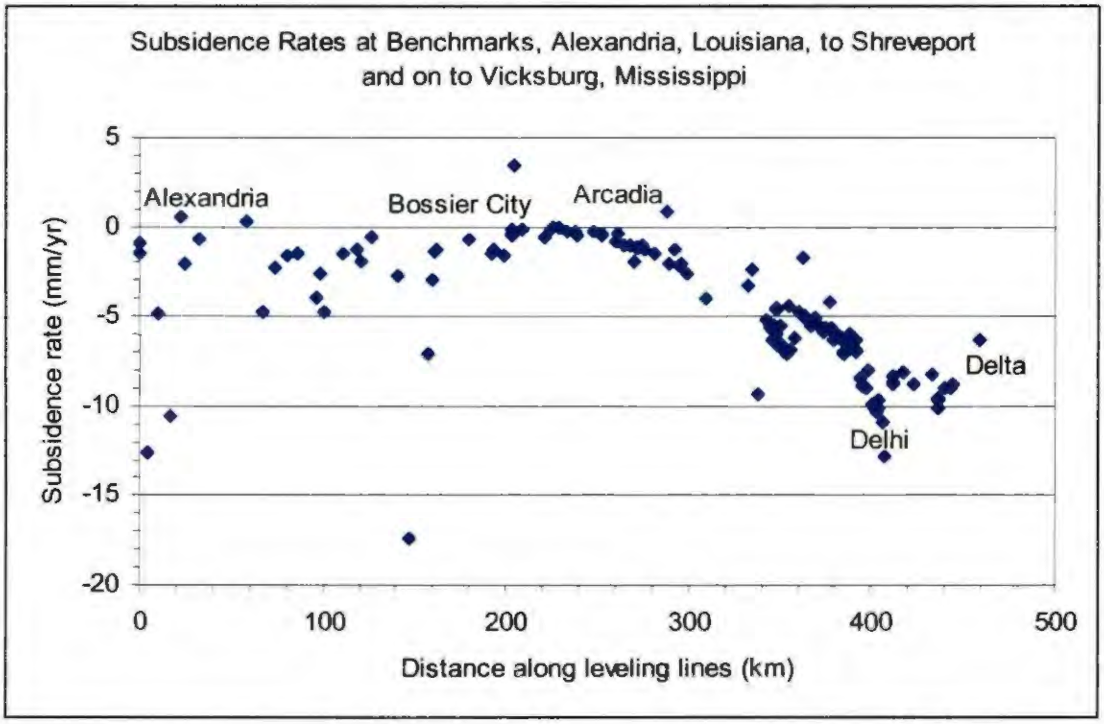

Subsidence Rates at Benchmarks from Kenner, Louisiana, to Jackson, Mississippi
Hammond
Hazelhurst
Kenner
Jackson
Subsidence rate (mm/yr)
5
0
-5
-10
-15
0
50
100
150
200
250
300
Distance along level lines (km)
34 to 60
60 to 69
+ 69 to 93

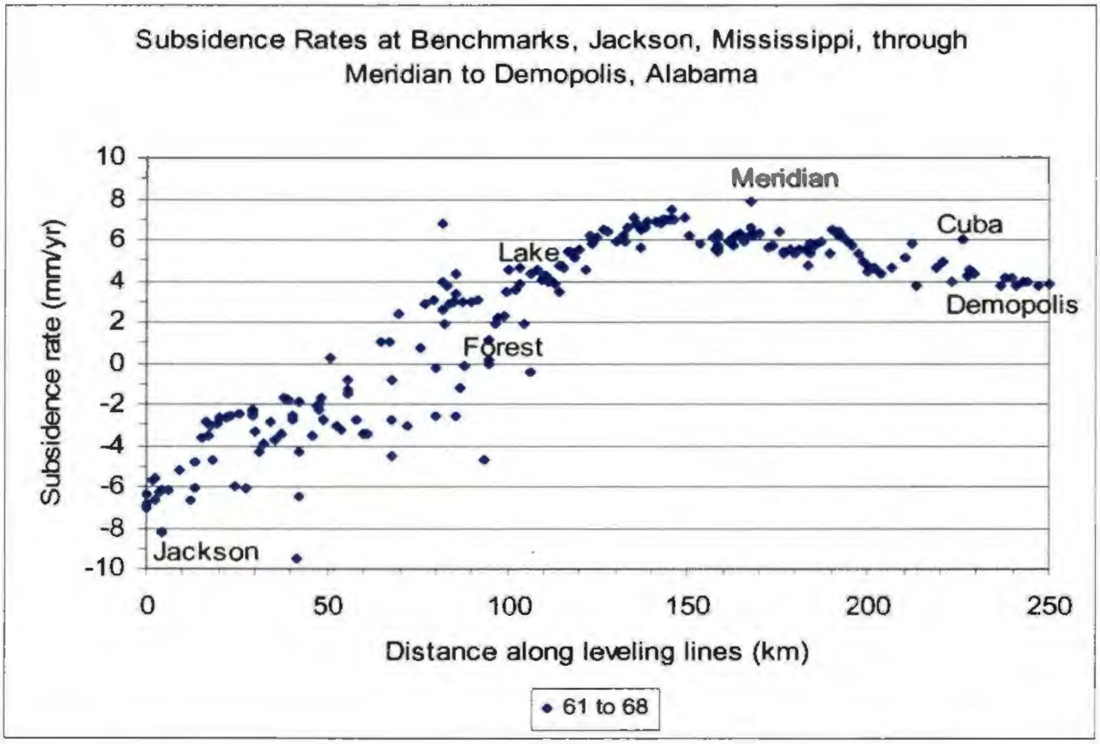

Subsidence Rates at Benchmarks from Jackson, Mississippi, via Vicksburg to Memphis, Tennessee
Tunica
Memphis
Greenville
Jackson
Vicksburg
Friars Point
Subsidence rate (mm/yr)
0
-2
-4
-6
-8
-10
-12
0
100
200
300
400
500
Distance along level lines (km)
68 to 93
74 to 93

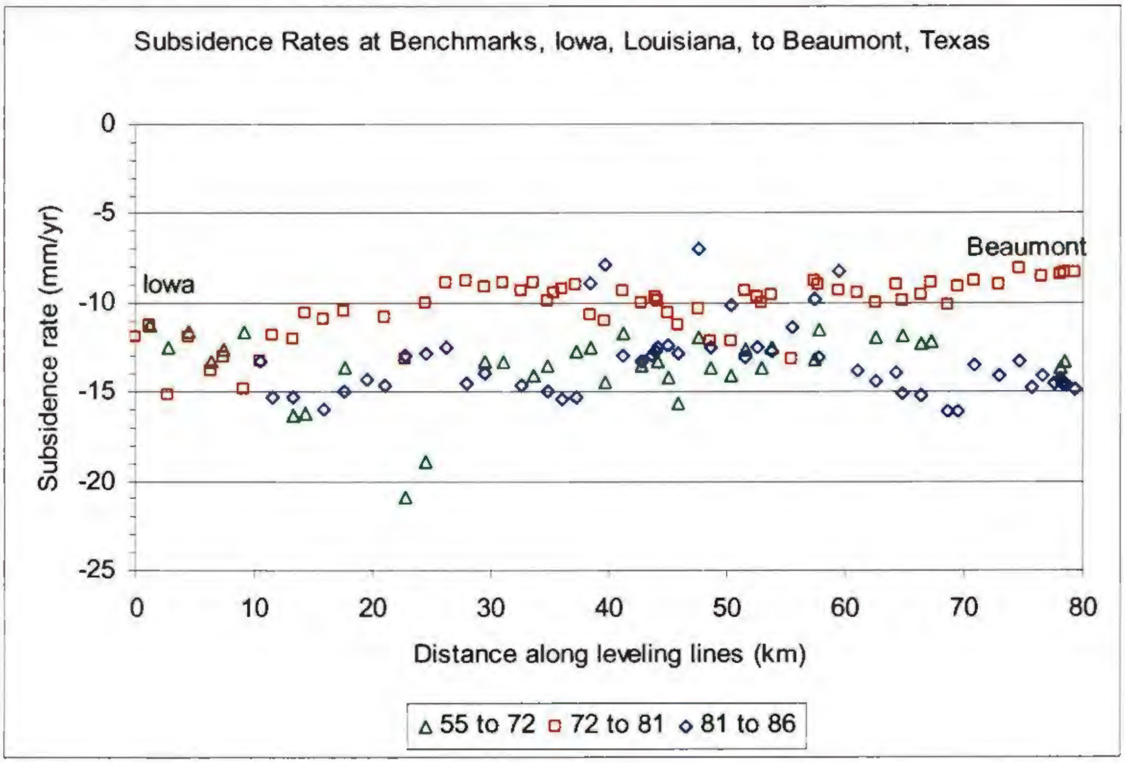




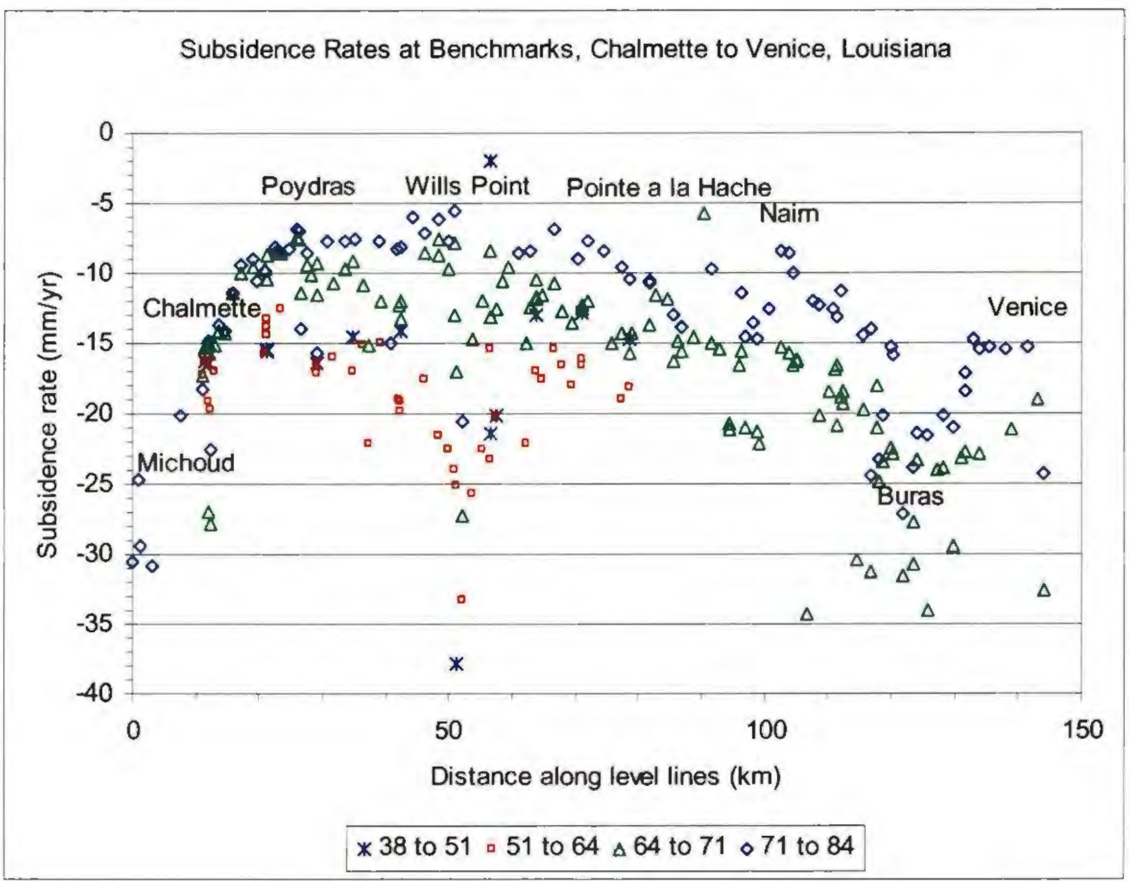
Lines beginning in Sulphur and in Lake Charles follow different routes to common point D 213 at Creole, and continue on as one segment.


Subsidence Rates at Benchmarks, Alexandria, Louisiana, to Shreveport and on to Vicksburg, Mississippi
Alexandria
Bossier City
Arcadia
Delta
Delhi
Subsidence rate (mm/yr)
5
0
-5
-10
-15
-20
0
100
200
300
400
500
Distance along leveling lines (km)


Subsidence Rates at Benchmarks, Jackson, Mississippi, through Meridian to Demopolis, Alabama
Meridian
Cuba
Lake
Demopolis
Forest
Jackson
Subsidence rate (mm/yr)
10
8
6
4
2
0
-2
-4
-6
-8
-10
0
50
100
150
200
250
Distance along leveling lines (km)
61 to 68



Subsidence Rates at Benchmarks, Iowa, Louisiana, to Beaumont, Texas
Subsidence rate (mm/yr)
Distance along leveling lines (km)
Iowa
Beaumont
55 to 72
72 to 81
81 to 86



Subsidence Rates at Benchmarks, Chalmette to Venice, Louisiana
Subsidence rate (mm/yr)
Distance along level lines (km)
Poydras
Wills Point
Pointe a la Hache
Naim
Chalmette
Venice
Michoud
Buras
38 to 51
51 to 64
64 to 71
71 to 84

APPENDIX 5

STATISTICS AND INDIVIDUAL POINT PLOTS SHOWING TEMPORAL VARIATIONS

Each individual point plot shows the network computed elevation, in meters, as the ordinate and its temporal distance from the first available epoch as the abscissa. We used Minitab version 13 to compute the quadratic regression curve and the 95% confidence intervals.

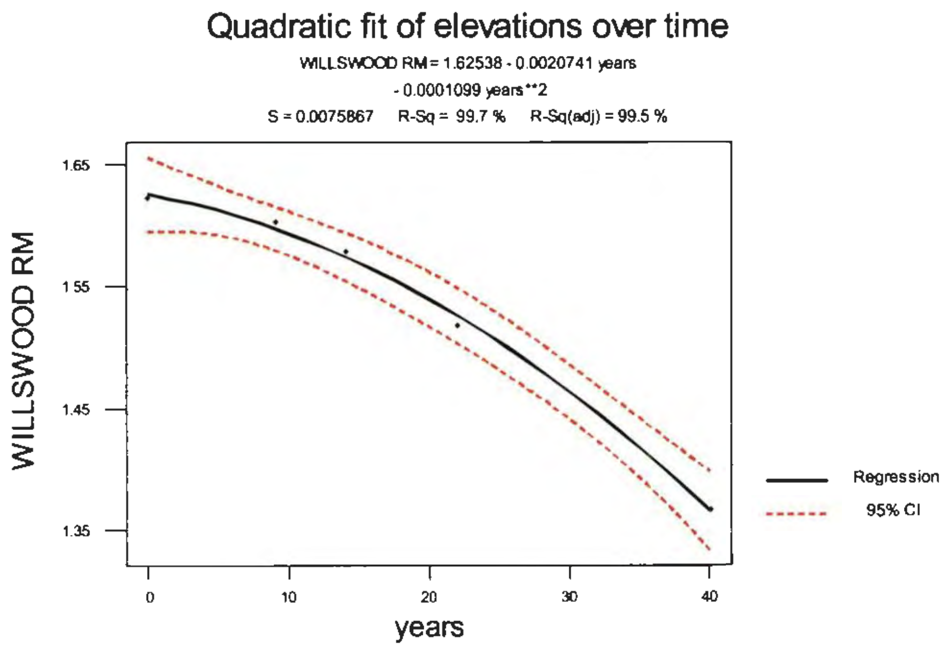
Minitab Project Report

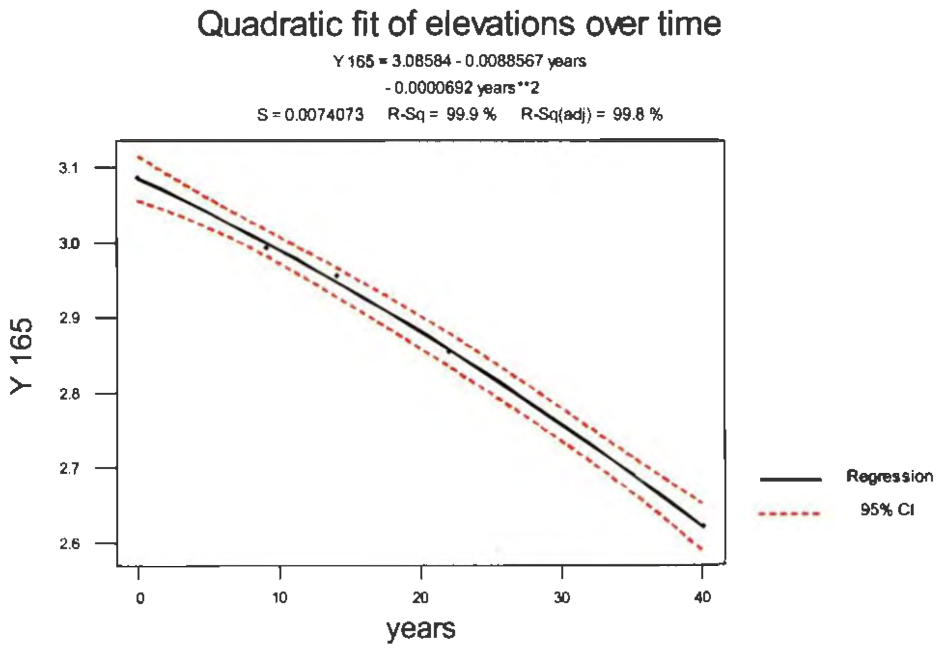
Temporal variation in the subsidence rates at benchmarks along the line from New Orleans to New Iberia

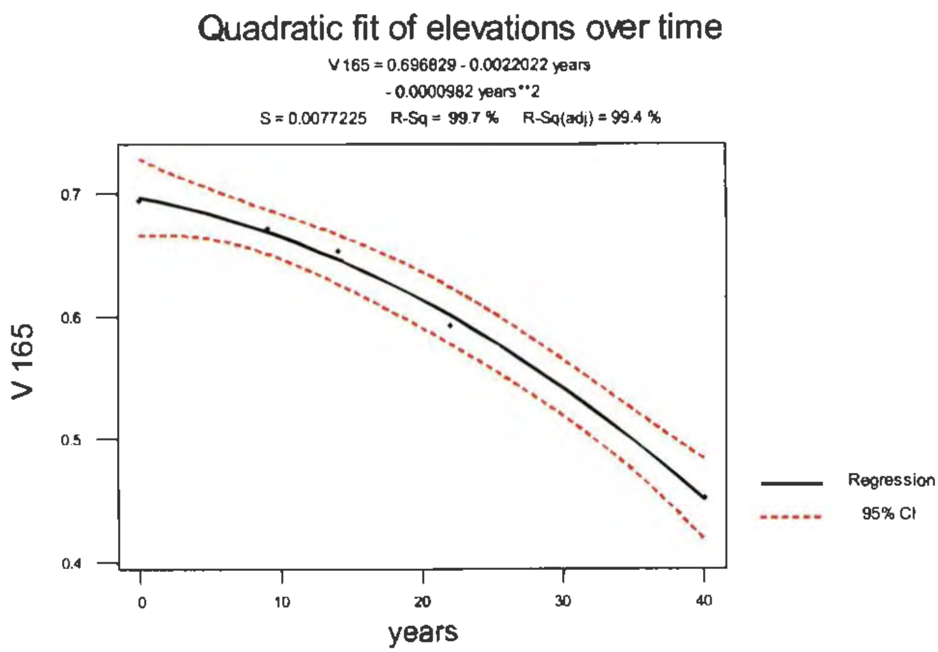
Data Display
row 1 = intercept
row 2 = linear term coefficient
row 3 = squared term coefficient

Row	ave coef	stdev	median	max	min	range
1	2.64564	1.23696	2.86924	4.84208	0.696829	4.14525
2	-0.00748	0.00431	-0.00691	-0.00207	-0.023852	0.02178
3	-0.00003	0.00008	-0.00002	0.00028	-0.000125	0.00040

Sample of 22 randomly selected points along the line from New Orleans to New Iberia. Points selected from among those that have five computed elevations.
Negative value in row 2 indicates downward tilt, i.e., subsidence.
Negative value in row 3 indicates downward "bend" in fitted curve, i.e., subsidence increasing with time. Rate is increasing at coefficient amount in mm/yr/yr. On average, for this line, subsidence rates are increasing by 0.03 mm per year for each year, from a base rate of 7.5 mm/yr. The sample appears to show a spatial distribution of increasing rates of subsidence in the eastern part to relatively constant subsidence rates in the western portion.



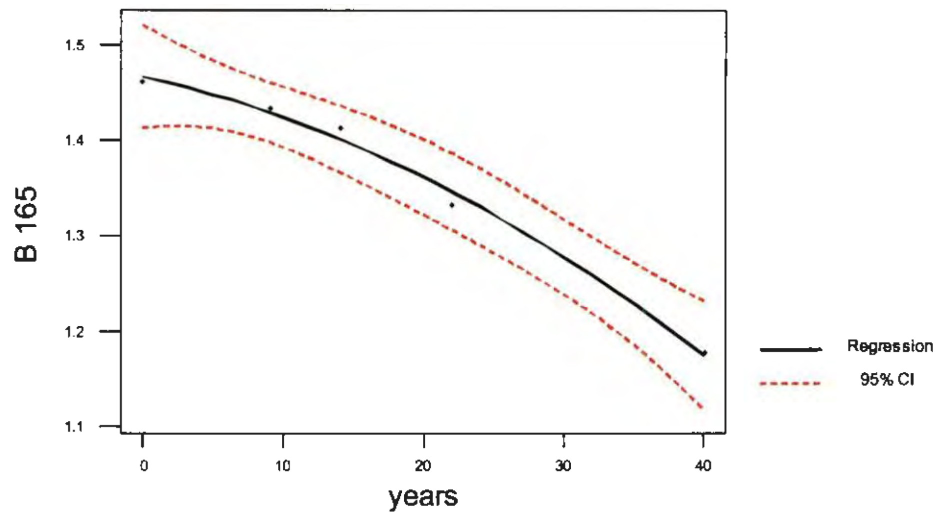

Quadratic fit of elevations over time
Y 165 = 3.08584 - 0.0088567 years
- 0.0000692 years**2
S = 0.0074073 R-Sq = 99.9 % R-Sq(adj) = 99.8 %
Y 165
3.1
3.0
2.9
2.8
2.7
2.6
0
10
20
30
40
years
Regression
95% CI


Quadratic fit of elevations over time
V 165 = 0.696829 - 0.0022022 years
- 0.0000982 years**2
S = 0.0077225 R-Sq = 99.7 % R-Sq(adj) = 99.4 %
V 165
0.7
0.6
0.5
0.4
0
10
20
30
40
years
Regression
95% CI

Quadratic fit of elevations over time

B 165 = 1.46672 - 0.0032112 years
- 0.0001023 years**2

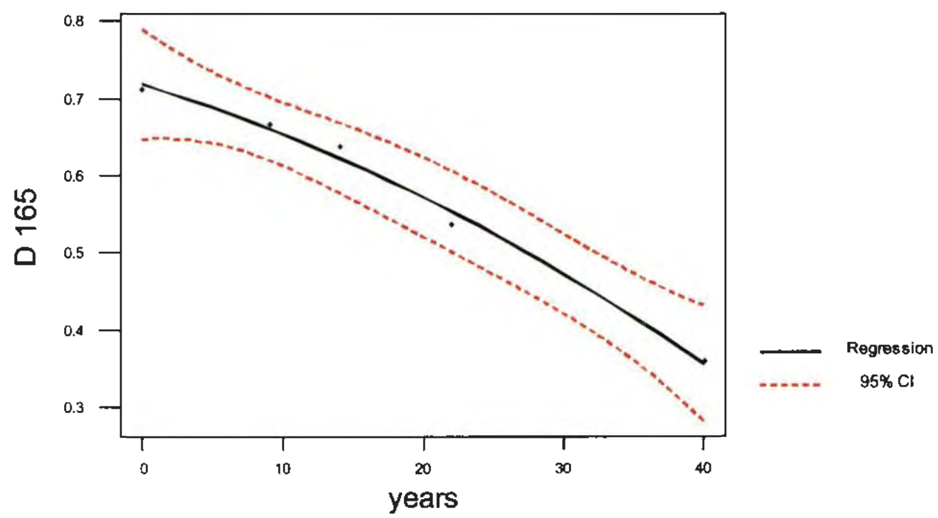
S = 0.0134037   R-Sq = 99.3 %   R-Sq(adj) = 98.6 %

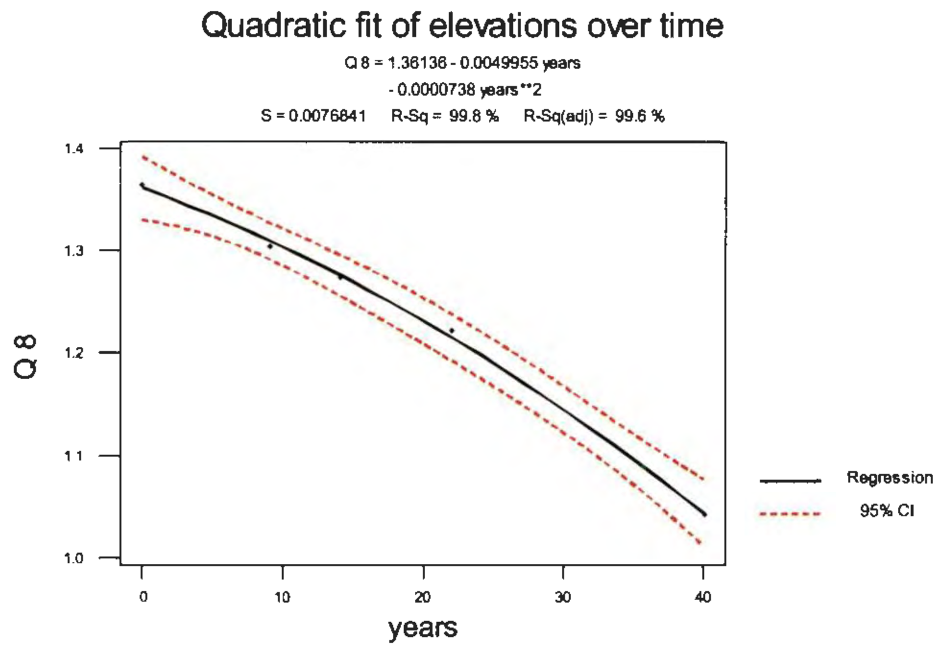


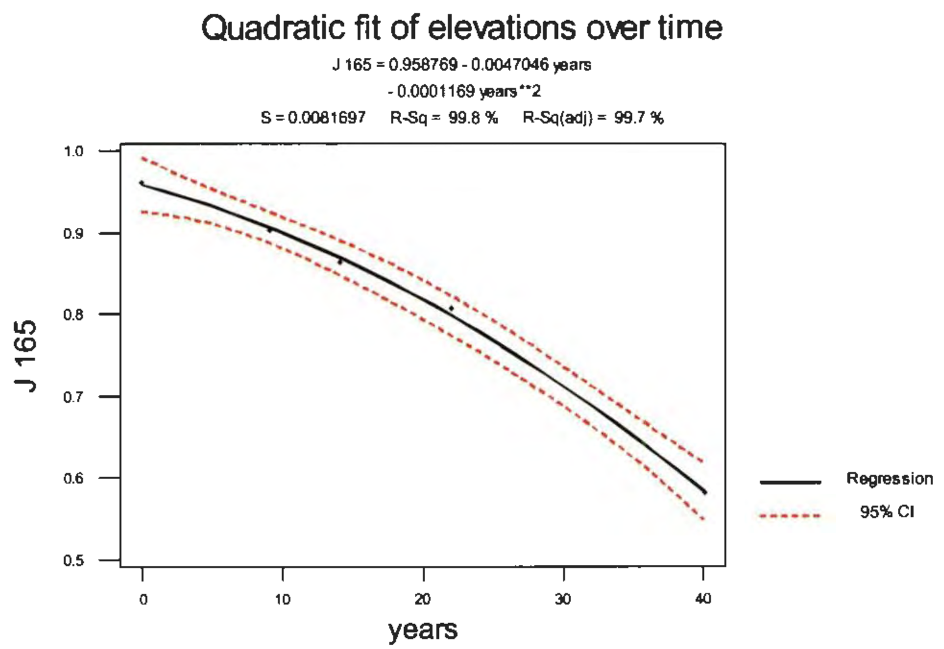
Quadratic fit of elevations over time

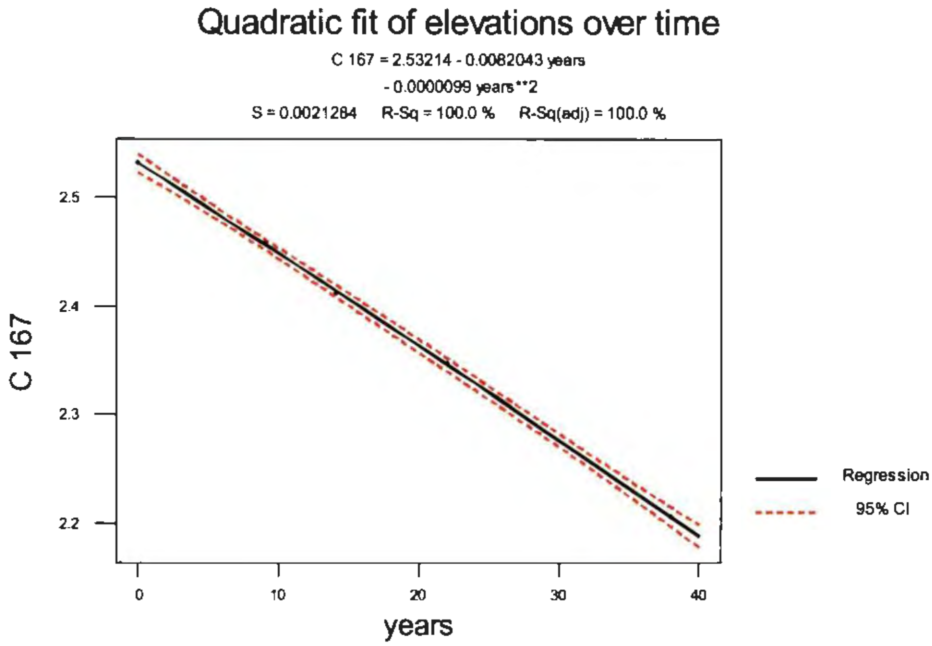
D 165 = 0.718203 - 0.0055682 years
- 0.0000867 years**2

S = 0.0175546   R-Sq = 99.2 %   R-Sq(adj) = 98.4 %

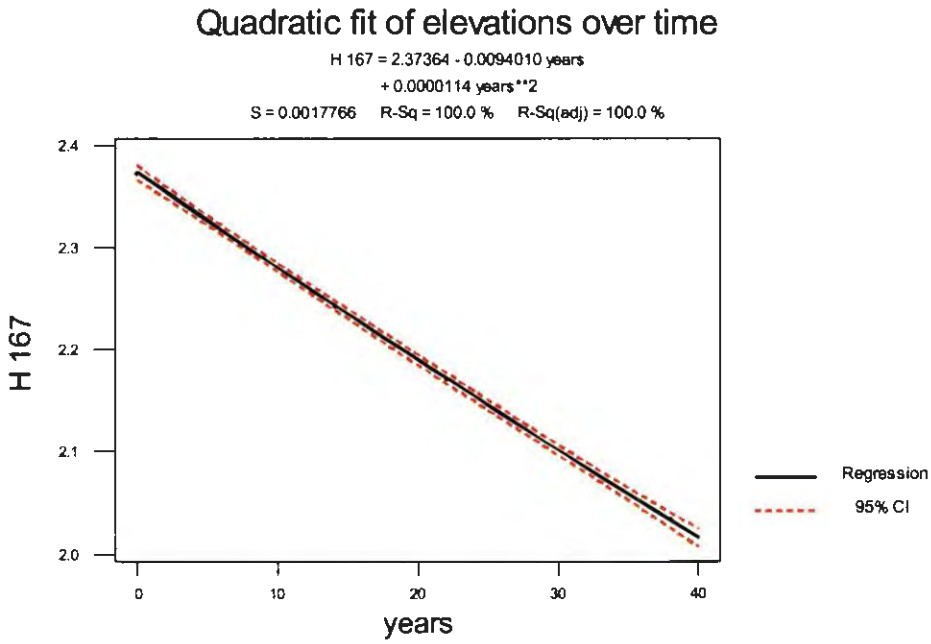



Quadratic fit of elevations over time
Q 8 = 1.36136 - 0.0049955 years
- 0.0000738 years**2
S = 0.0076841 R-Sq = 99.8 % R-Sq(adj) = 99.6 %
Q 8
years
Regression
95% CI

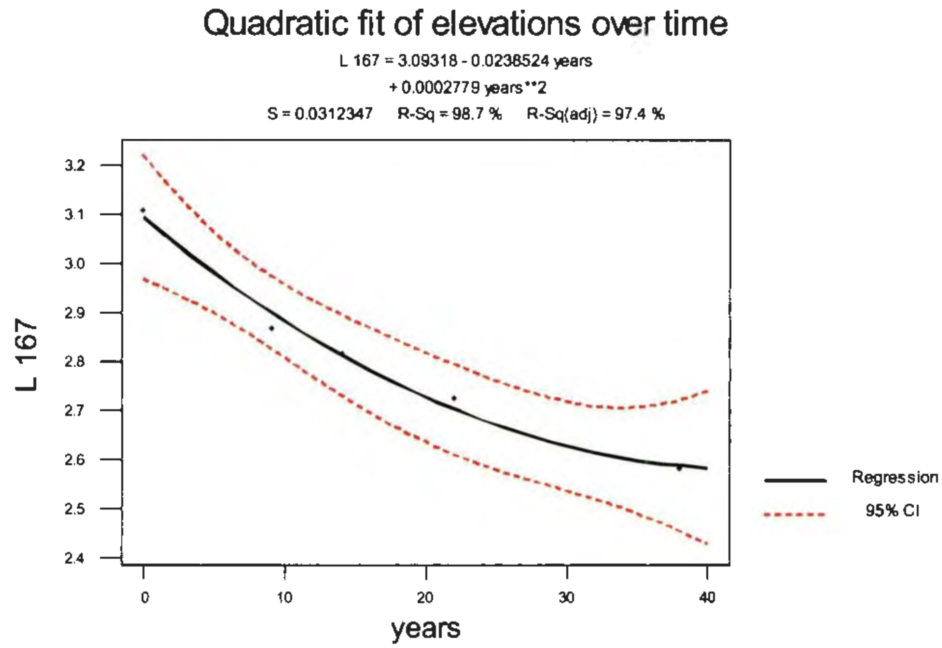

Quadratic fit of elevations over time
J 165 = 0.958769 - 0.0047046 years
- 0.0001169 years**2
S = 0.0081697 R-Sq = 99.8 % R-Sq(adj) = 99.7 %
J 165
years
Regression
95% CI

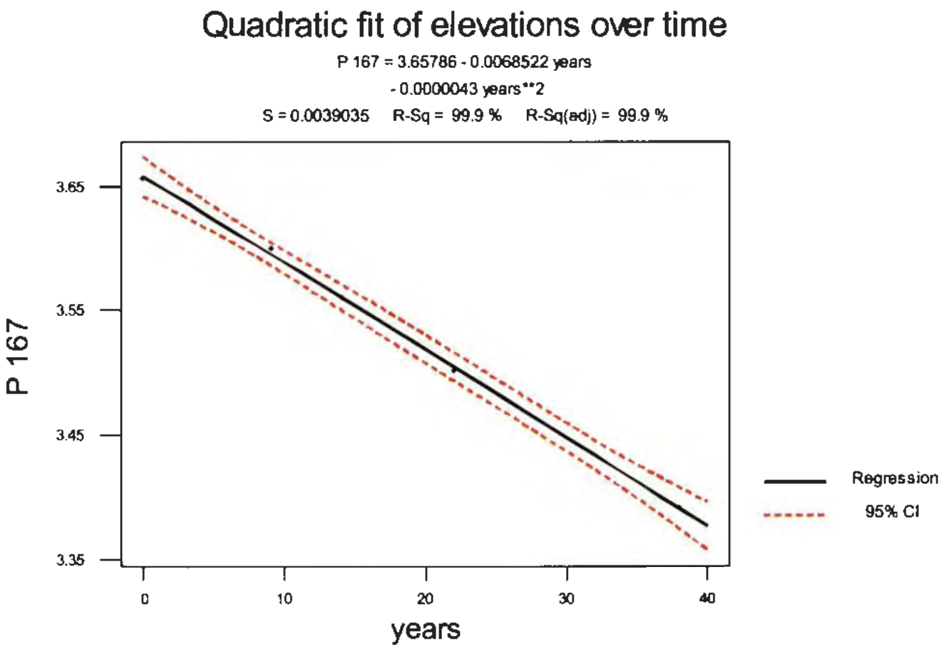


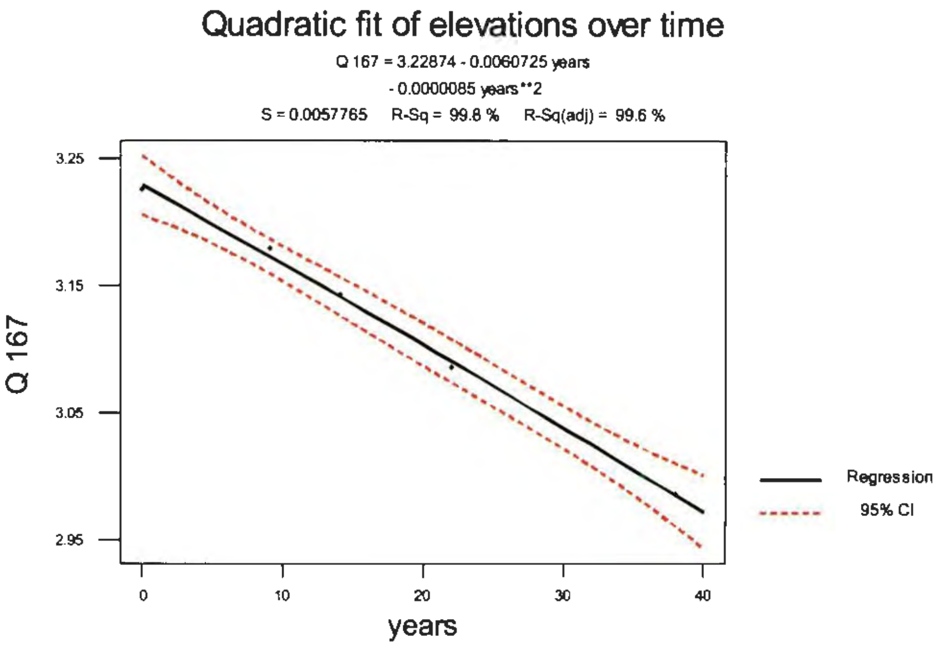
Quadratic fit of elevations over time
C 167 = 2.53214 - 0.0082043 years
- 0.0000099 years**2
S = 0.0021284 R-Sq = 100.0 % R-Sq(adj) = 100.0 %
C 167
2.5
2.4
2.3
2.2
0
10
20
30
40
years
Regression
95% CI

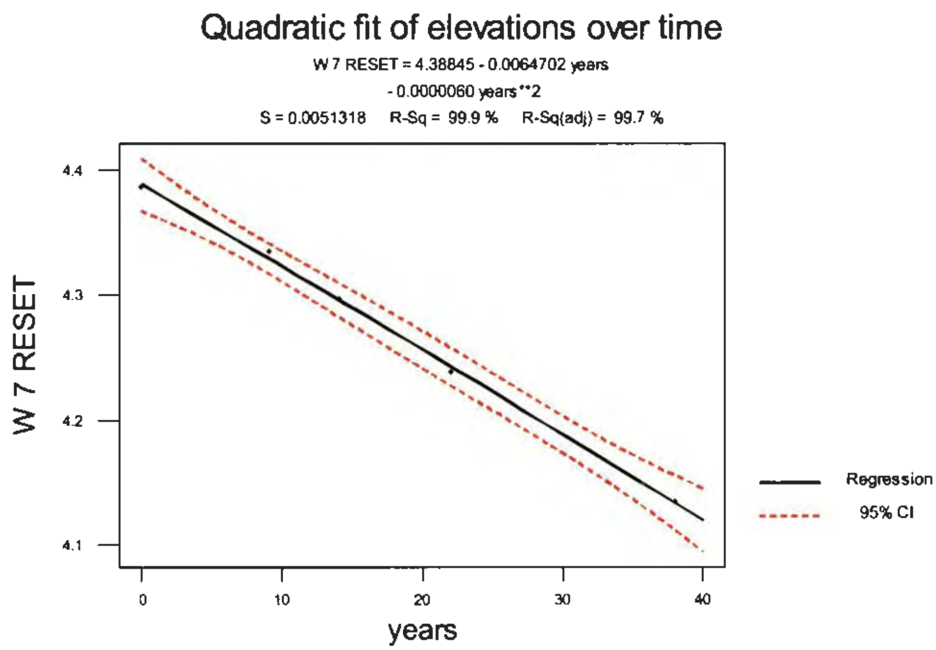


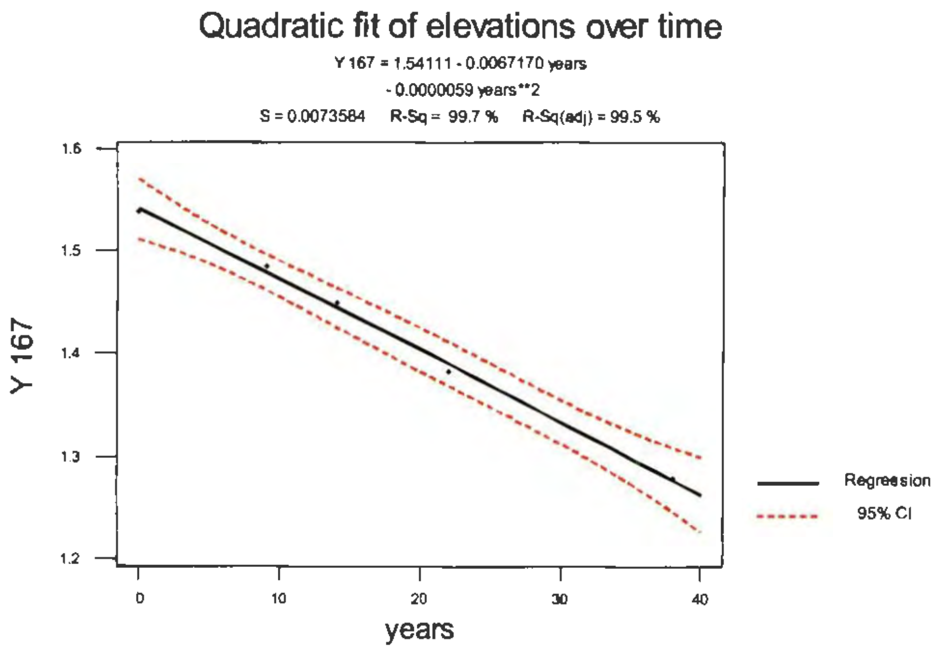
Quadratic fit of elevations over time
H 167 = 2.37364 - 0.0094010 years
+ 0.0000114 years**2
S = 0.0017766 R-Sq = 100.0 % R-Sq(adj) = 100.0 %
H 167
2.4
2.3
2.2
2.1
2.0
0
10
20
30
40
years
Regression
95% CI


Quadratic fit of elevations over time
L 167 = 3.09318 - 0.0238524 years
+ 0.0002779 years**2
S = 0.0312347 R-Sq = 98.7 % R-Sq(adj) = 97.4 %
L 167
3.2
3.1
3.0
2.9
2.8
2.7
2.6
2.5
2.4
0
10
20
30
40
years
Regression
95% CI

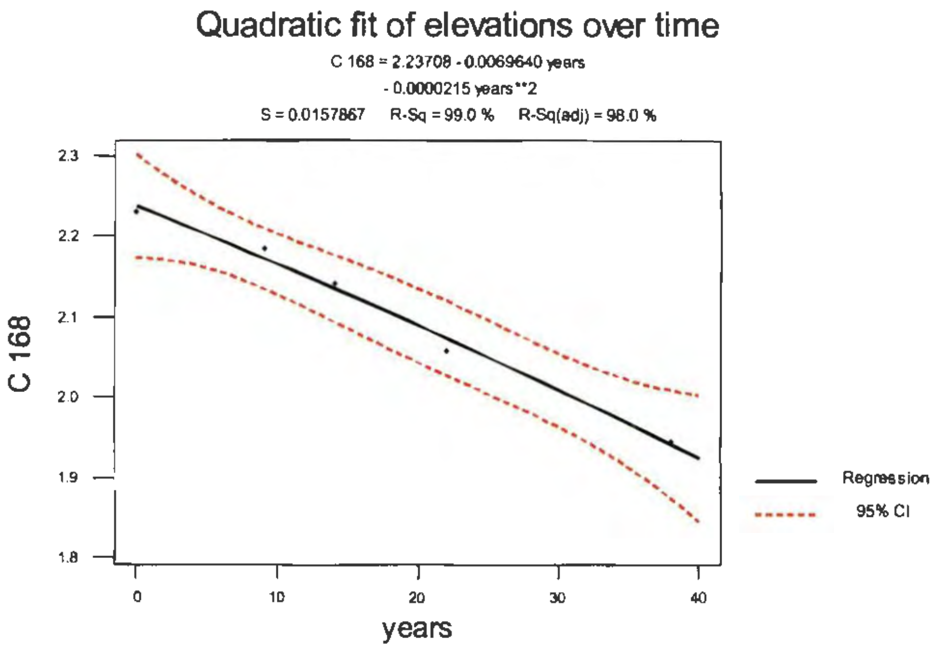

Quadratic fit of elevations over time
P 167 = 3.65786 - 0.0068522 years
- 0.0000043 years**2
S = 0.0039035 R-Sq = 99.9 % R-Sq(adj) = 99.9 %
P 167
3.65
3.55
3.45
3.35
0
10
20
30
40
years
Regression
95% CI


Quadratic fit of elevations over time
Q 167 = 3.22874 - 0.0060725 years
- 0.0000085 years**2
S = 0.0057765 R-Sq = 99.8 % R-Sq(adj) = 99.6 %
3.25
3.15
3.05
2.95
Q 167
0
10
20
30
40
years
Regression
95% CI

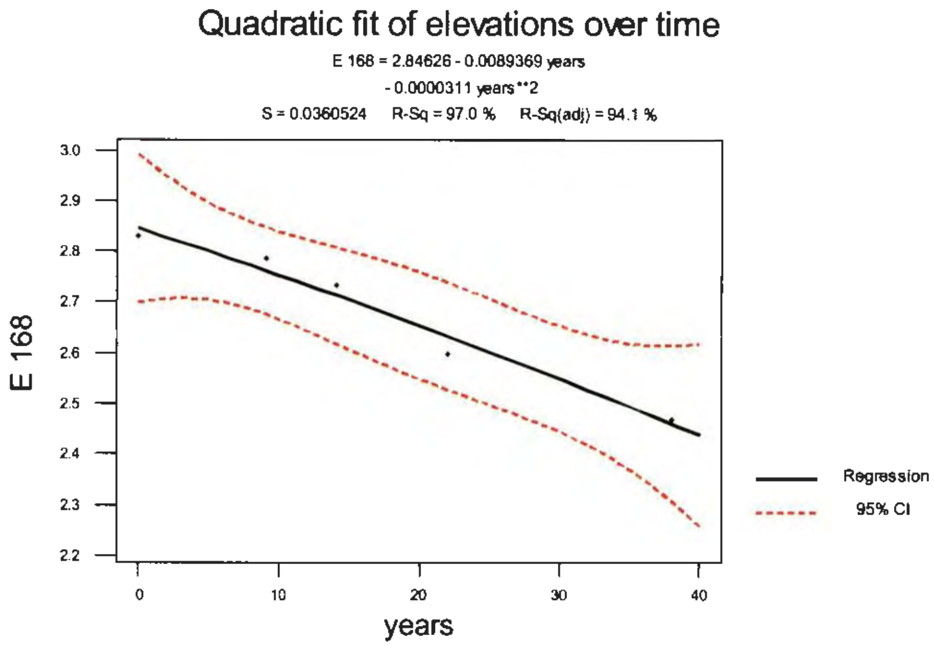

Quadratic fit of elevations over time
W 7 RESET = 4.38845 - 0.0064702 years
- 0.0000060 years**2
S = 0.0051318 R-Sq = 99.9 % R-Sq(adj) = 99.7 %
4.4
4.3
4.2
4.1
W 7 RESET
0
10
20
30
40
years
Regression
95% CI

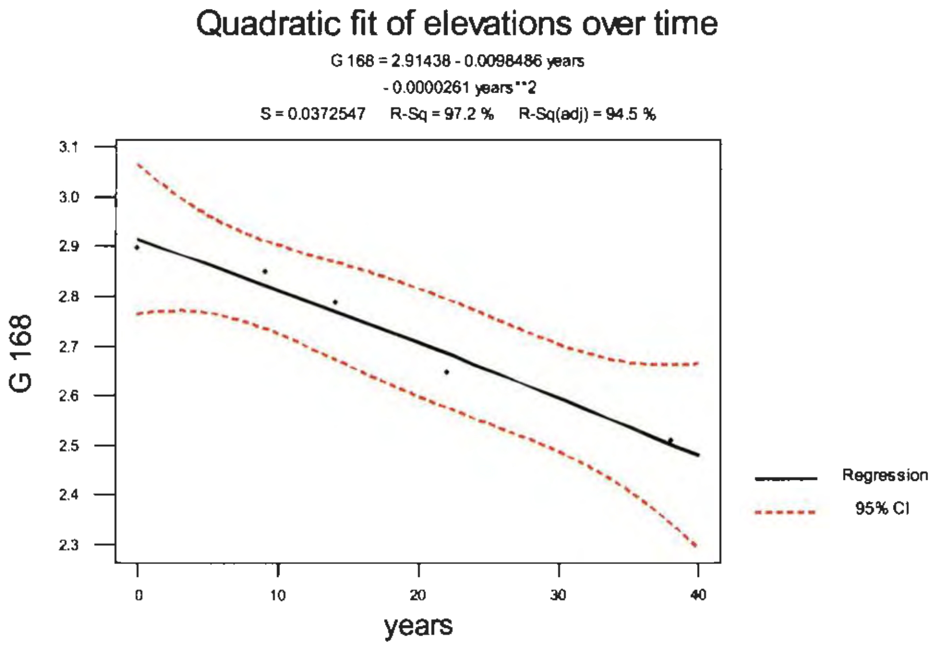


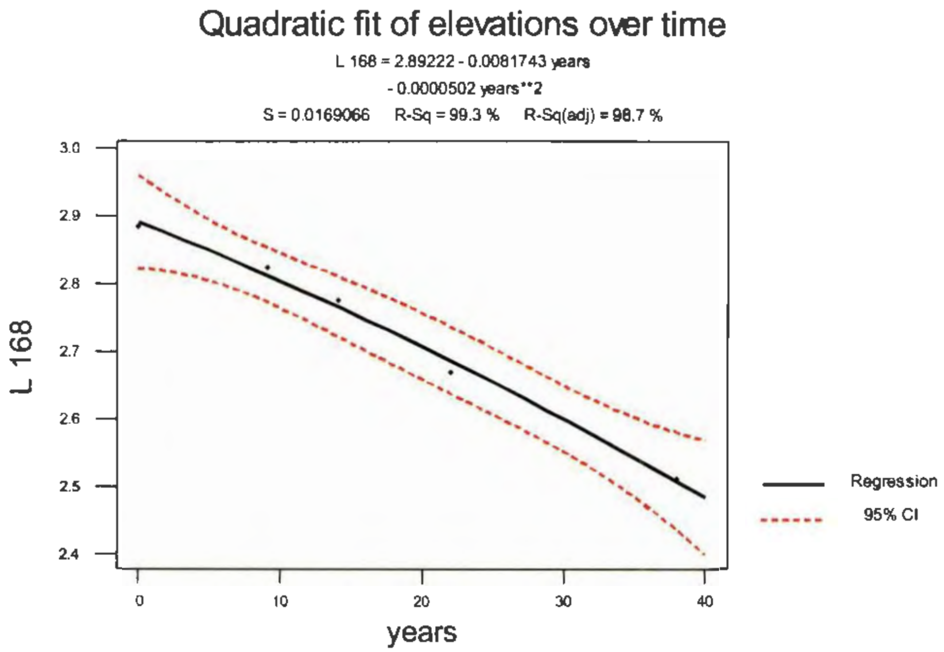
Quadratic fit of elevations over time
Y 167 = 1.54111 - 0.0067170 years
- 0.0000059 years**2
S = 0.0073584 R-Sq = 99.7 % R-Sq(adj) = 99.5 %
Y 167
1.6
1.5
1.4
1.3
1.2
0
10
20
30
40
years
Regression
95% CI

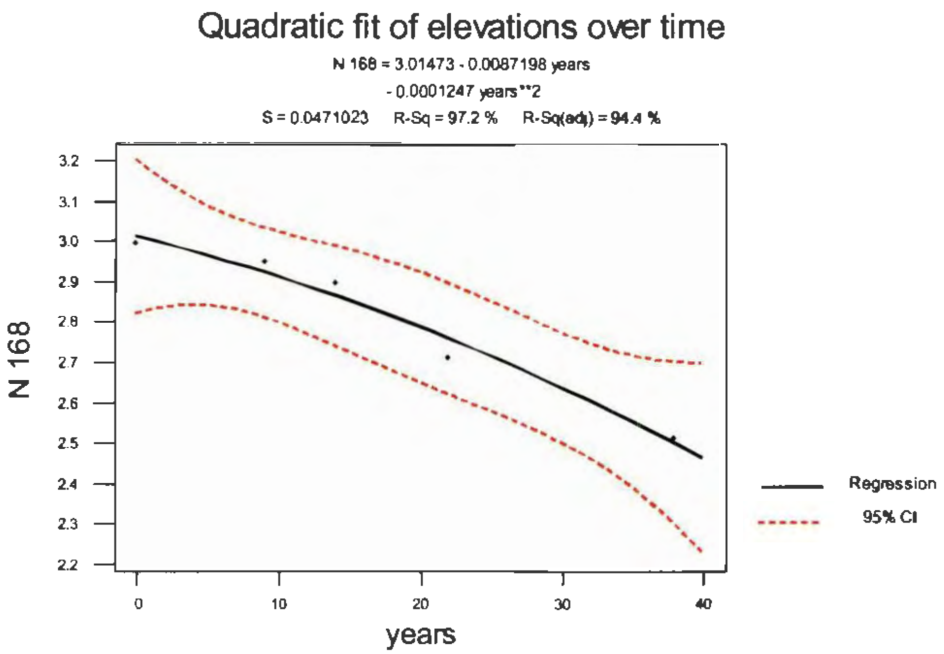


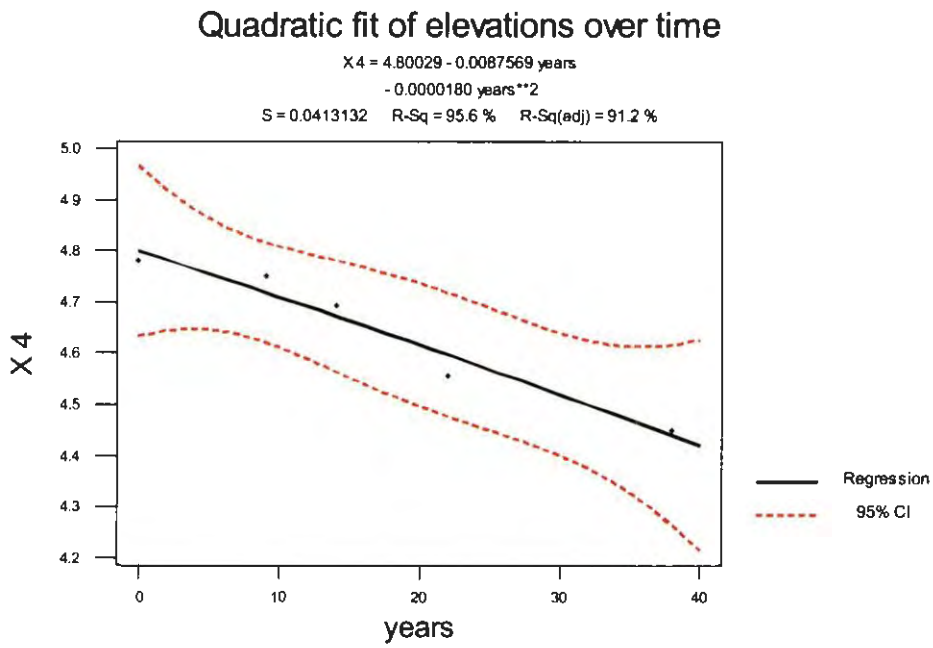
Quadratic fit of elevations over time
C 168 = 2.23708 - 0.0069640 years
- 0.0000215 years**2
S = 0.0157867 R-Sq = 99.0 % R-Sq(adj) = 98.0 %
C 168
2.3
2.2
2.1
2.0
1.9
1.8
0
10
20
30
40
years
Regression
95% CI

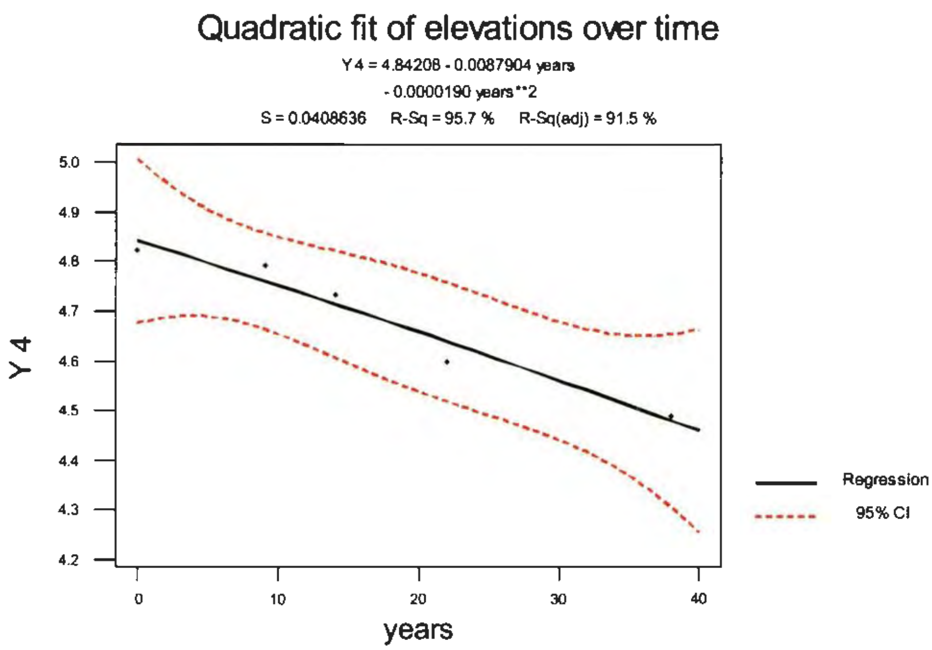

Quadratic fit of elevations over time
E 168 = 2.84626 - 0.0089369 years
- 0.0000311 years**2
S = 0.0360524 R-Sq = 97.0 % R-Sq(adj) = 94.1 %
3.0
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
E 168
0
10
20
30
40
years
Regression
95% CI

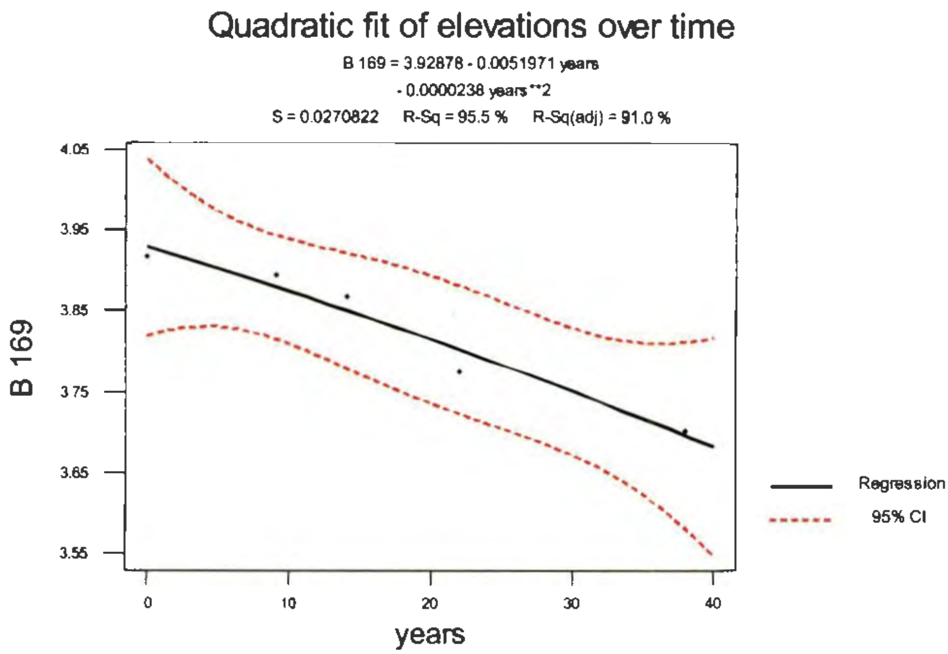

Quadratic fit of elevations over time
G 168 = 2.91438 - 0.0098486 years
- 0.0000261 years**2
S = 0.0372547 R-Sq = 97.2 % R-Sq(adj) = 94.5 %
3.1
3.0
2.9
2.8
2.7
2.6
2.5
2.4
2.3
G 168
0
10
20
30
40
years
Regression
95% CI


Quadratic fit of elevations over time
L 168 = 2.89222 - 0.0081743 years
- 0.0000502 years**2
S = 0.0169066 R-Sq = 99.3 % R-Sq(adj) = 98.7 %
L 168
3.0
2.9
2.8
2.7
2.6
2.5
2.4
0
10
20
30
40
years
Regression
95% CI


Quadratic fit of elevations over time
N 168 = 3.01473 - 0.0087198 years
- 0.0001247 years**2
S = 0.0471023 R-Sq = 97.2 % R-Sq(adj) = 94.4 %
N 168
3.2
3.1
3.0
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
0
10
20
30
40
years
Regression
95% CI


Quadratic fit of elevations over time
X 4 = 4.80029 - 0.0087569 years
- 0.0000180 years**2
S = 0.0413132 R-Sq = 95.6 % R-Sq(adj) = 91.2 %
5.0
4.9
4.8
4.7
4.6
4.5
4.4
4.3
4.2
X 4
0
10
20
30
40
years
Regression
95% CI


Quadratic fit of elevations over time
Y 4 = 4.84208 - 0.0087904 years
- 0.0000190 years**2
S = 0.0408636 R-Sq = 95.7 % R-Sq(adj) = 91.5 %
5.0
4.9
4.8
4.7
4.6
4.5
4.4
4.3
4.2
Y 4
0
10
20
30
40
years
Regression
95% CI


Quadratic fit of elevations over time
B 169 = 3.92878 - 0.0051971 years
- 0.0000238 years**2
S = 0.0270822 R-Sq = 95.5 % R-Sq(adj) = 91.0 %
4.05
3.95
3.85
3.75
3.65
3.55
B 169
0
10
20
30
40
years
Regression
95% CI

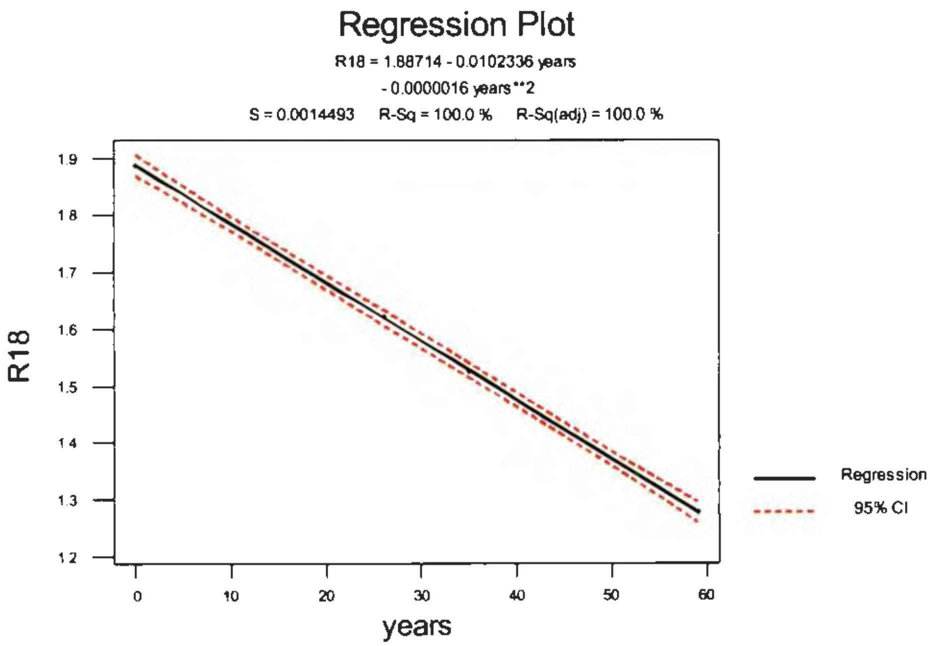
Minitab Project Report

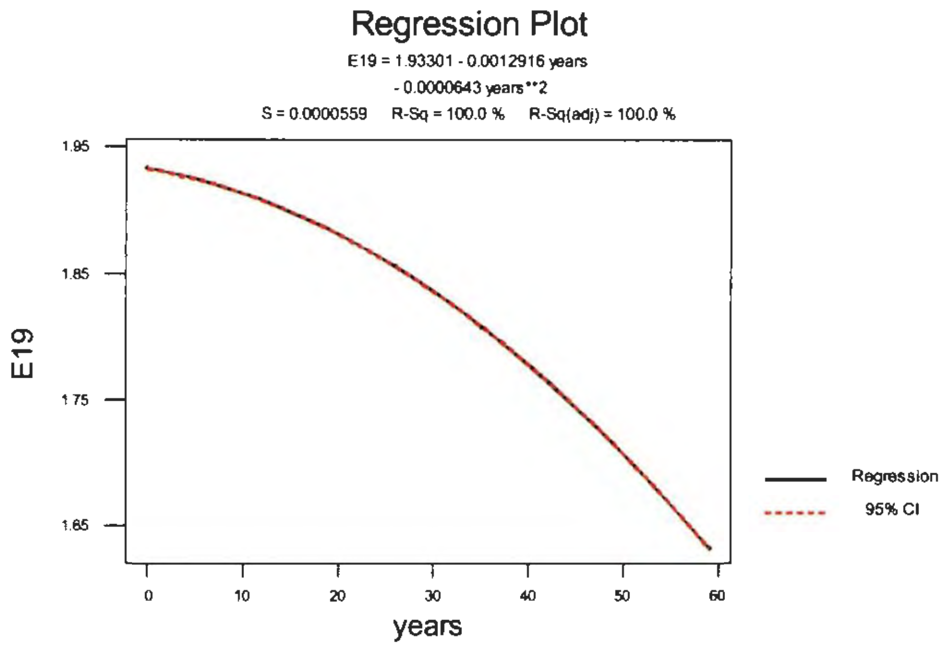
Temporal variation in the subsidence rates at benchmarks along the line from Kenner, Louisiana, to Jackson, Mississippi

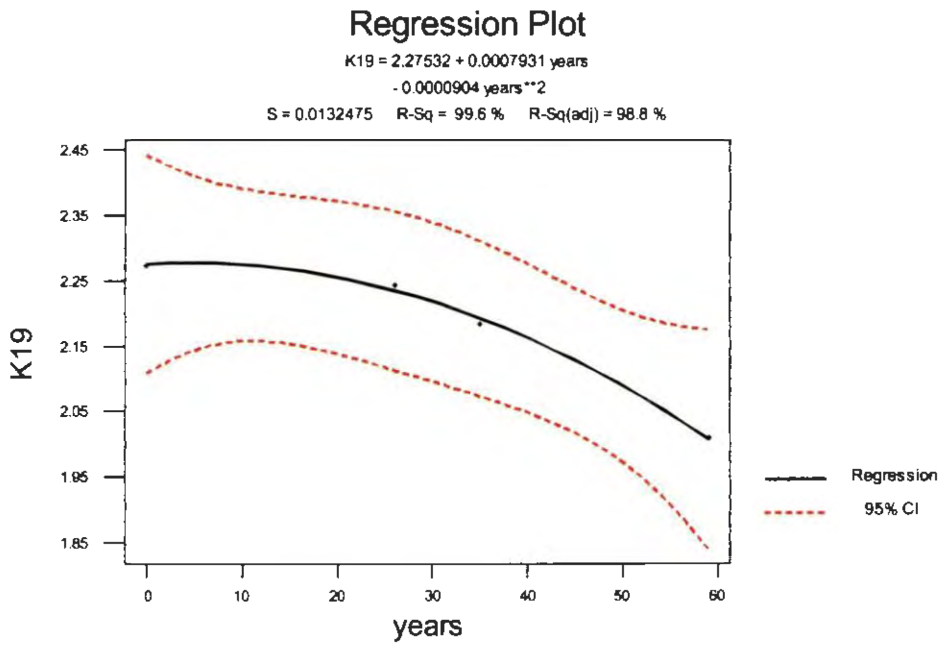
Data Display
row 1 = intercept
row 2 = linear coeficient, i.e., rate, in mm/yr
row 3 = quadratic coeficient, i.e., change in rate per yer, in mm/yr/yr

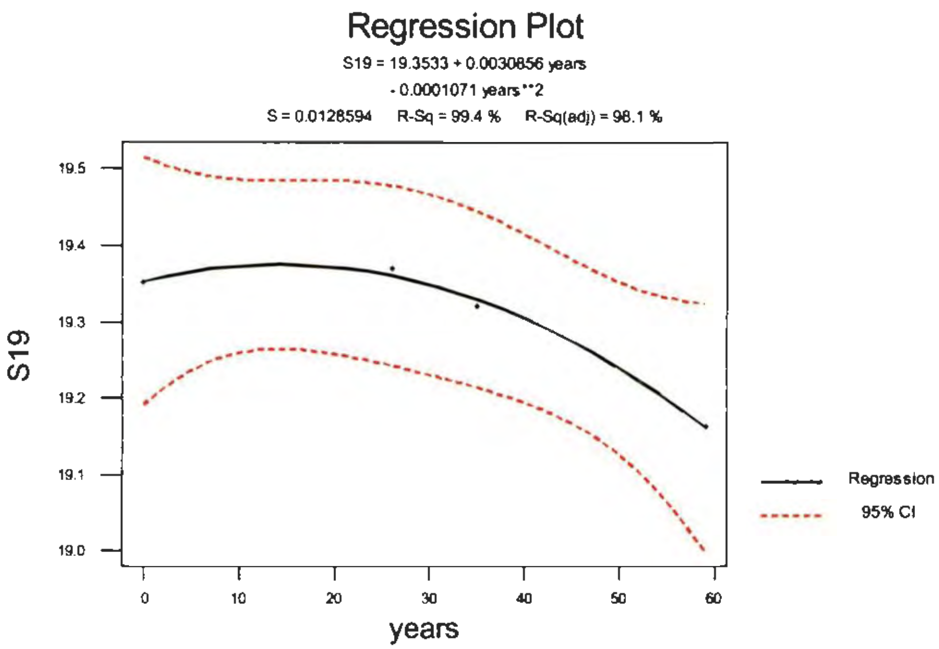
Row	mean	stdev	median	max	min	range
1	79.06308	52.69799	88.66814	144.89457	1.88714	143.00743
2	0.00109	0.00317	0.00214	0.00371	-0.01023	0.01394
3	-0.00008	0.00003	-0.00009	-0.00000	-0.00011	0.00011

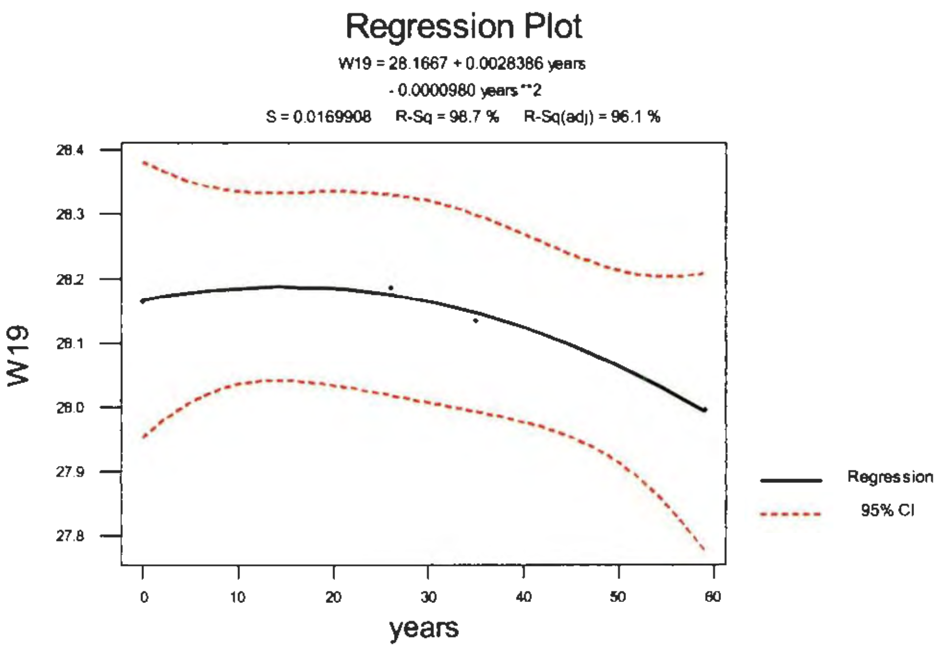
Randomly selected points along the line from Kenner to Jackson
18 points, or about 10% of total
Selected only from among points with four computed elevation values

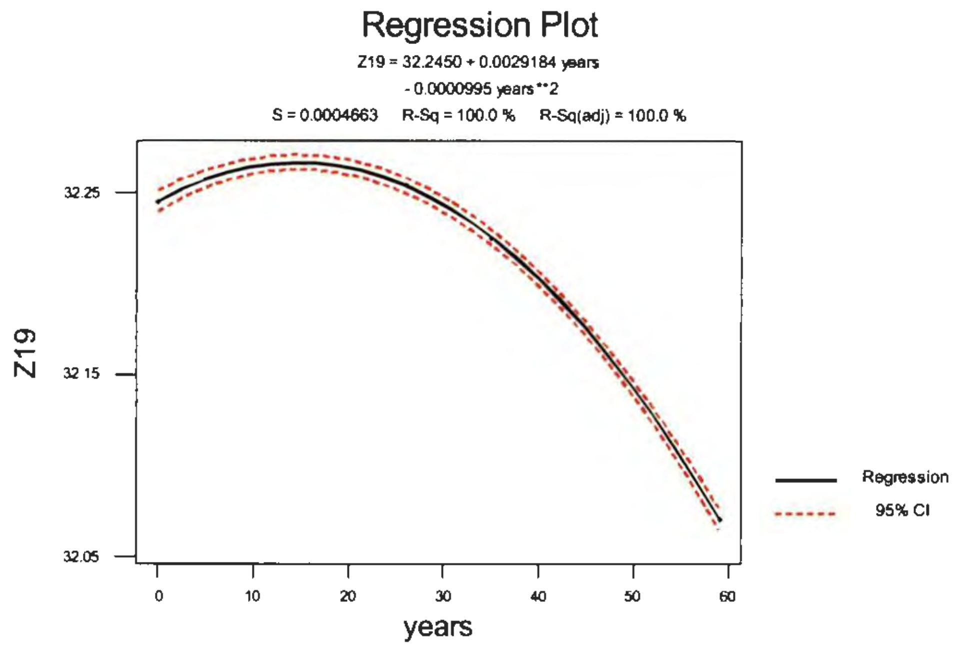


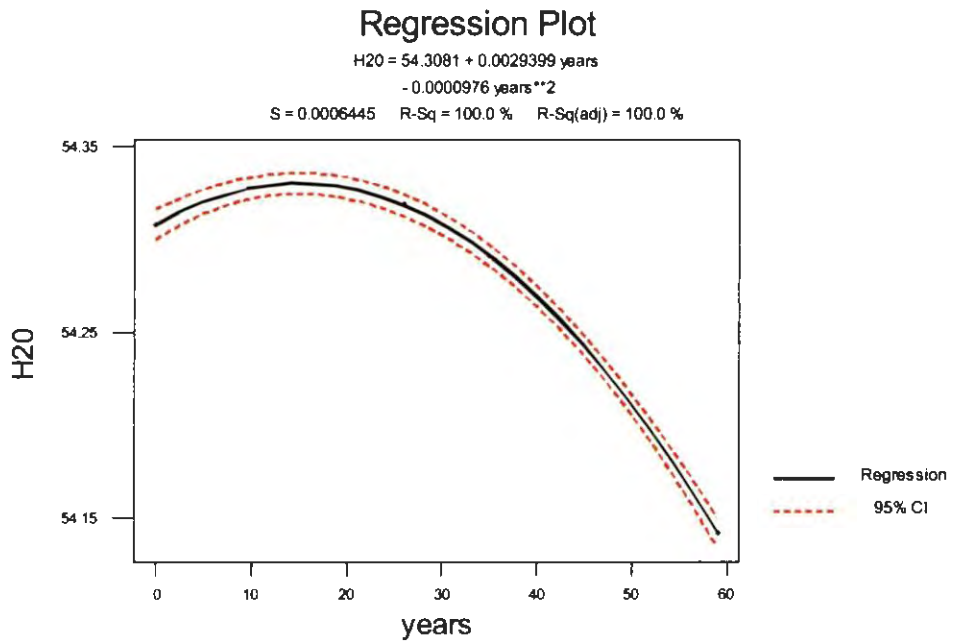

Regression Plot
E19 = 1.93301 - 0.0012916 years
- 0.0000643 years**2
S = 0.0000559 R-Sq = 100.0 % R-Sq(adj) = 100.0 %
1.95
1.85
1.75
1.65
E19
0
10
20
30
40
50
60
years
Regression
95% CI

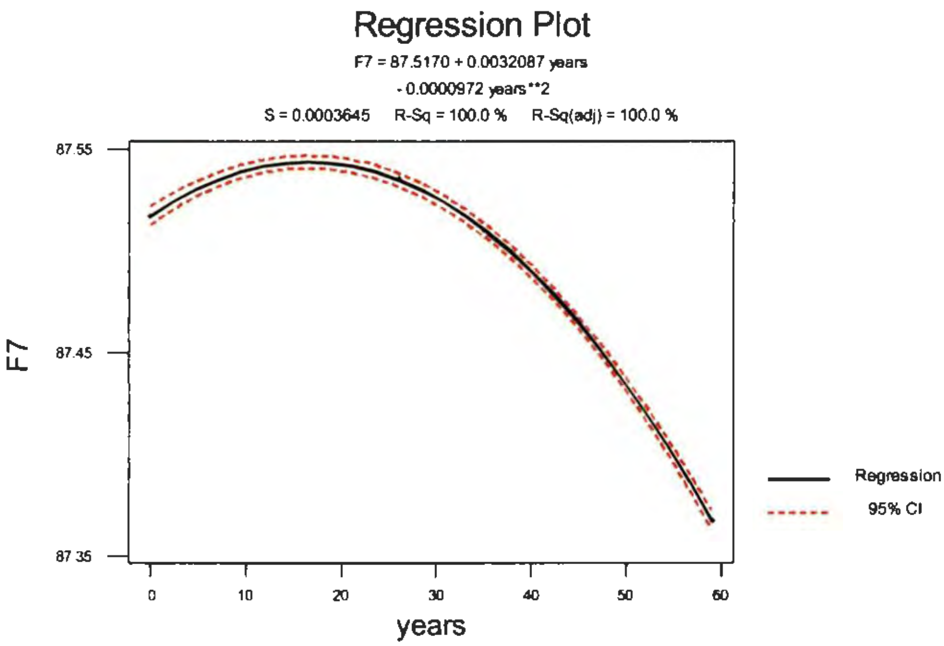

Regression Plot
K19 = 2.27532 + 0.0007931 years
- 0.0000904 years**2
S = 0.0132475 R-Sq = 99.6 % R-Sq(adj) = 98.8 %
2.45
2.35
2.25
2.15
2.05
1.95
1.85
K19
0
10
20
30
40
50
60
years
Regression
95% CI

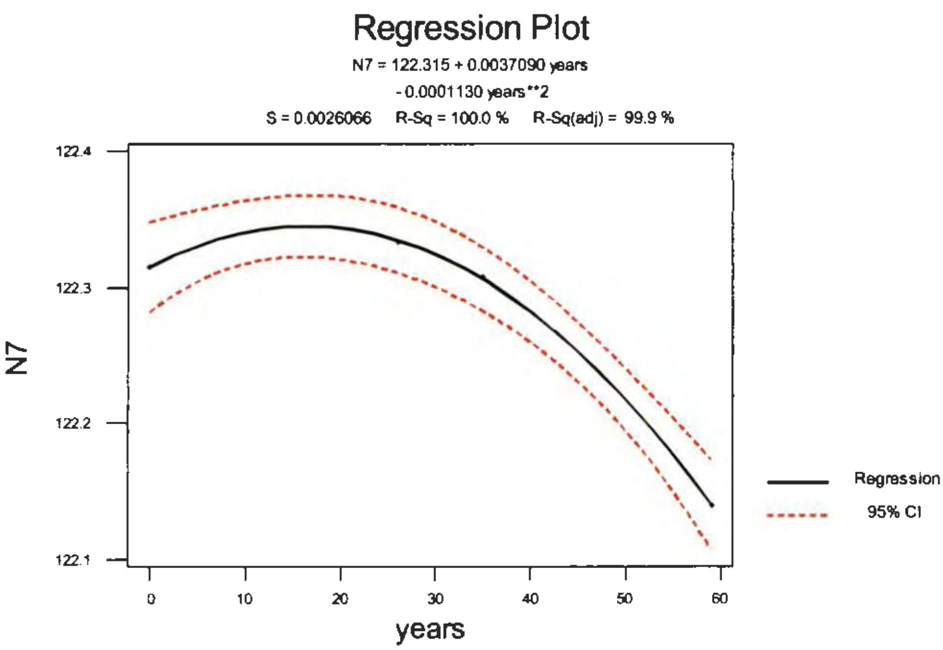

Regression Plot
S19 = 19.3533 + 0.0030856 years
- 0.0001071 years**2
S = 0.0128594 R-Sq = 99.4 % R-Sq(adj) = 98.1 %
19.5
19.4
19.3
19.2
19.1
19.0
S19
0
10
20
30
40
50
60
years
Regression
95% CI

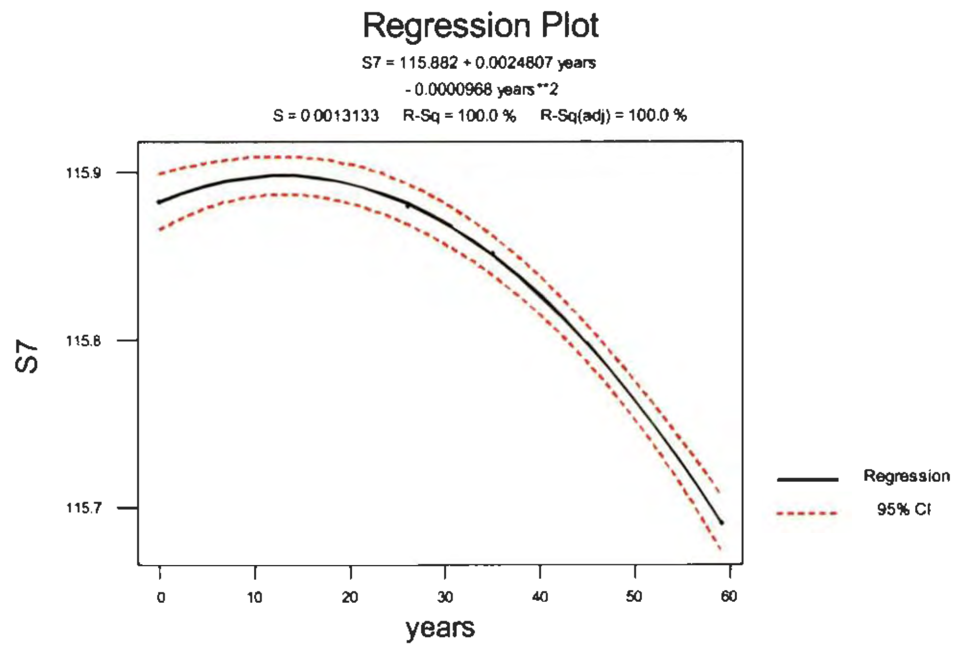

Regression Plot
W19 = 28.1667 + 0.0028386 years
- 0.0000980 years**2
S = 0.0169908 R-Sq = 98.7 % R-Sq(adj) = 96.1 %
28.4
28.3
28.2
28.1
28.0
27.9
27.8
W19
0
10
20
30
40
50
60
years
Regression
95% CI

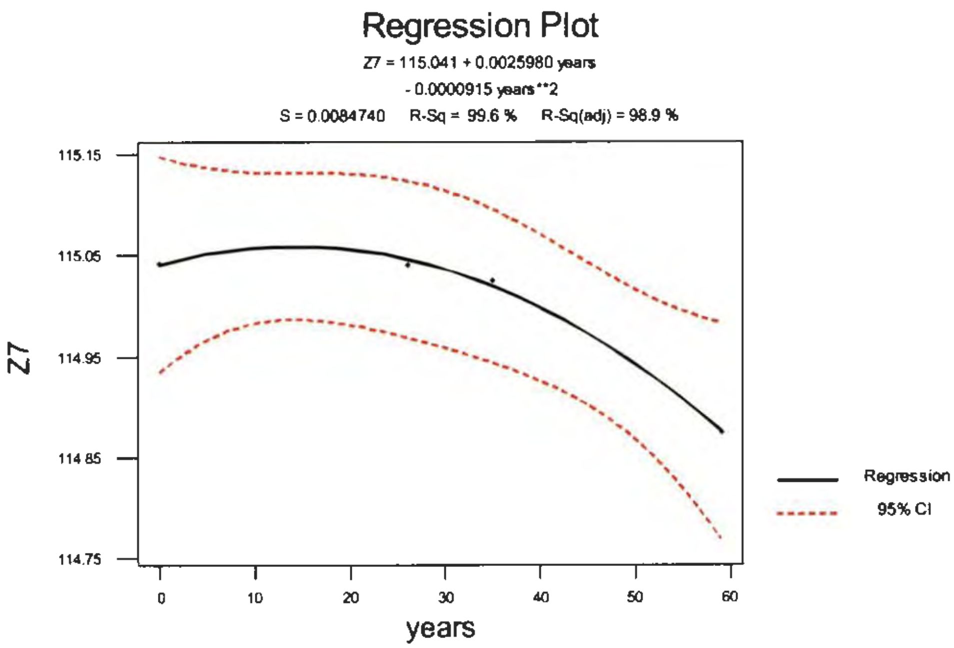

Regression Plot
Z19 = 32.2450 + 0.0029184 years
- 0.0000995 years**2
S = 0.0004663 R-Sq = 100.0 % R-Sq(adj) = 100.0 %
Z19
32.25
32.15
32.05
0
10
20
30
40
50
60
years
Regression
95% CI

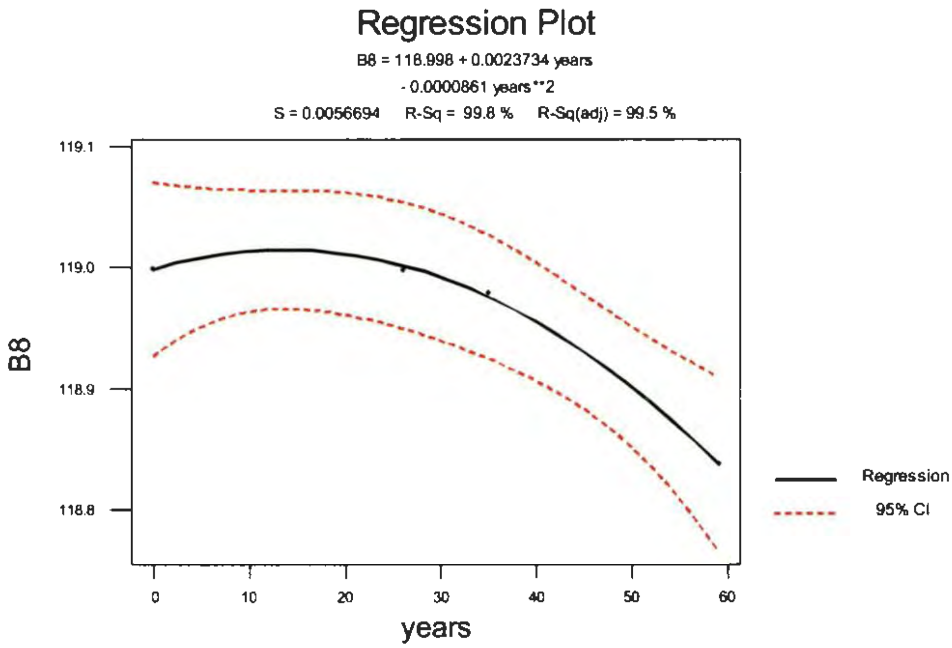

Regression Plot
H20 = 54.3081 + 0.0029399 years
- 0.0000976 years**2
S = 0.0006445 R-Sq = 100.0 % R-Sq(adj) = 100.0 %
H20
54.35
54.25
54.15
0
10
20
30
40
50
60
years
Regression
95% CI

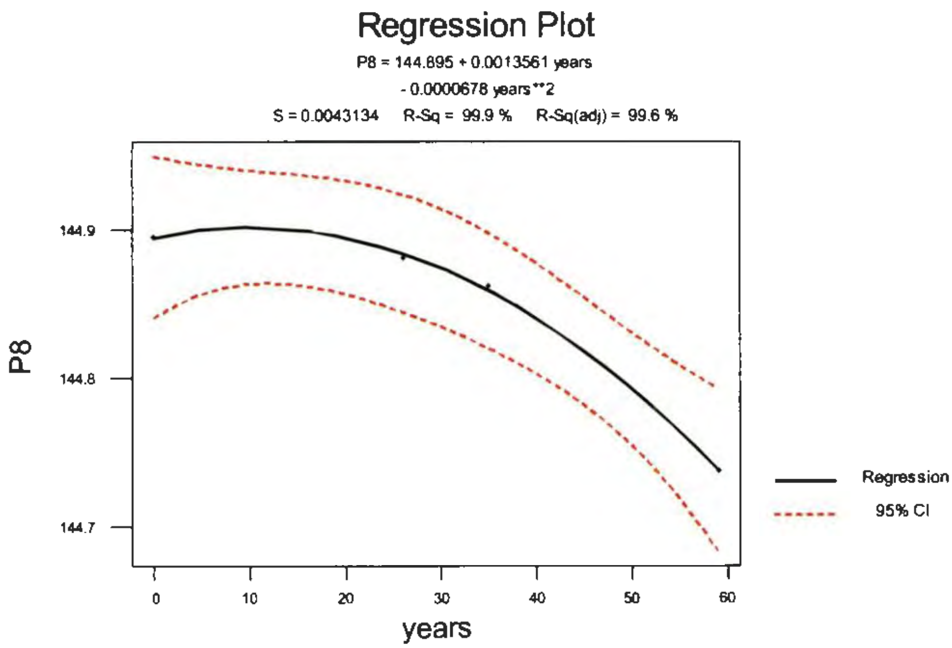

Regression Plot
F7 = 87.5170 + 0.0032087 years
- 0.0000972 years**2
S = 0.0003645 R-Sq = 100.0 % R-Sq(adj) = 100.0 %
87.55
87.45
87.35
F7
0
10
20
30
40
50
60
years
Regression
95% CI

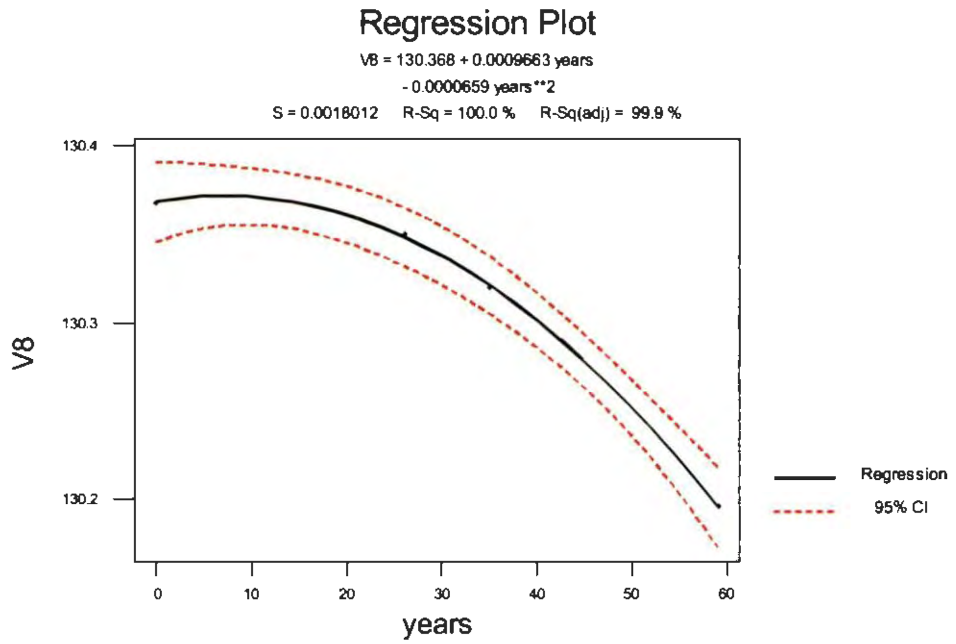

Regression Plot
N7 = 122.315 + 0.0037090 years
- 0.0001130 years**2
S = 0.0026066 R-Sq = 100.0 % R-Sq(adj) = 99.9 %
122.4
122.3
122.2
122.1
N7
0
10
20
30
40
50
60
years
Regression
95% CI

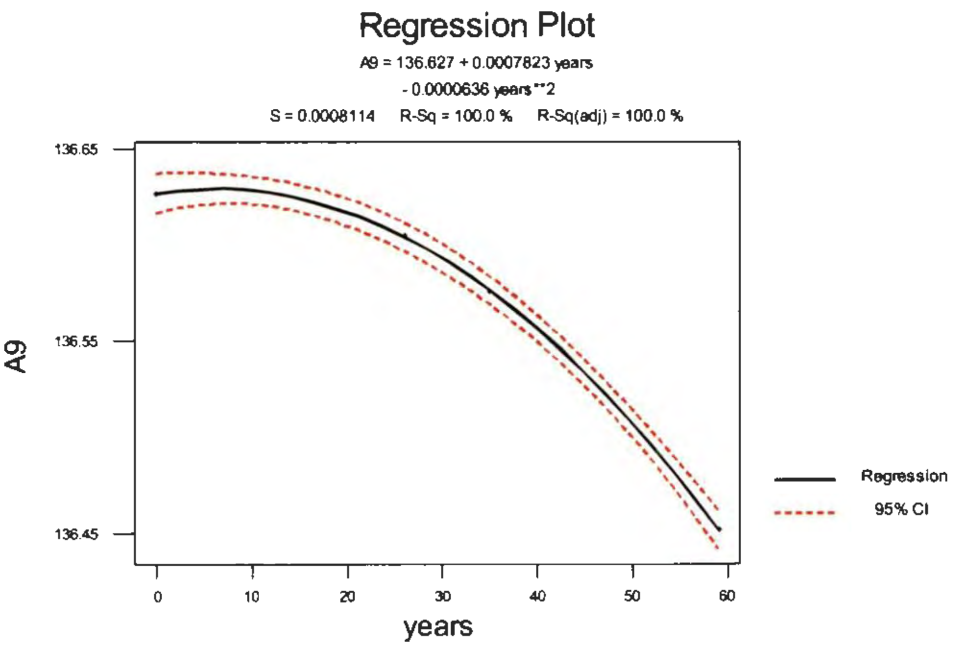

Regression Plot
S7 = 115.882 + 0.0024807 years
- 0.0000968 years**2
S = 0.0013133 R-Sq = 100.0 % R-Sq(adj) = 100.0 %
115.9
115.8
115.7
S7
0
10
20
30
40
50
60
years
Regression
95% CI

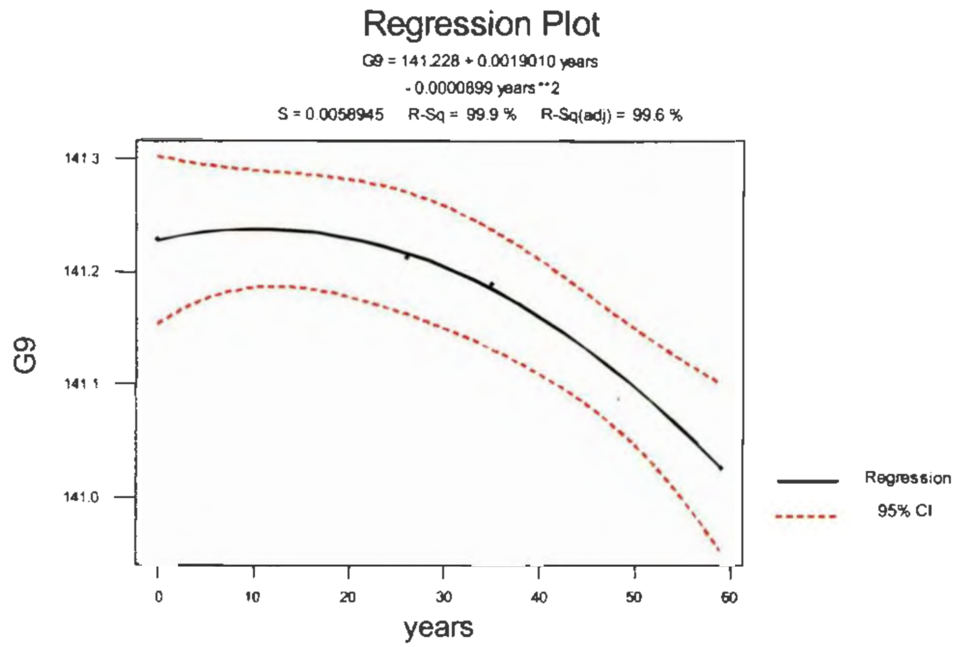

Regression Plot
Z7 = 115.041 + 0.0025980 years
- 0.0000915 years**2
S = 0.0084740 R-Sq = 99.6 % R-Sq(adj) = 98.9 %
115.15
115.05
114.95
114.85
114.75
Z7
0
10
20
30
40
50
60
years
Regression
95% CI

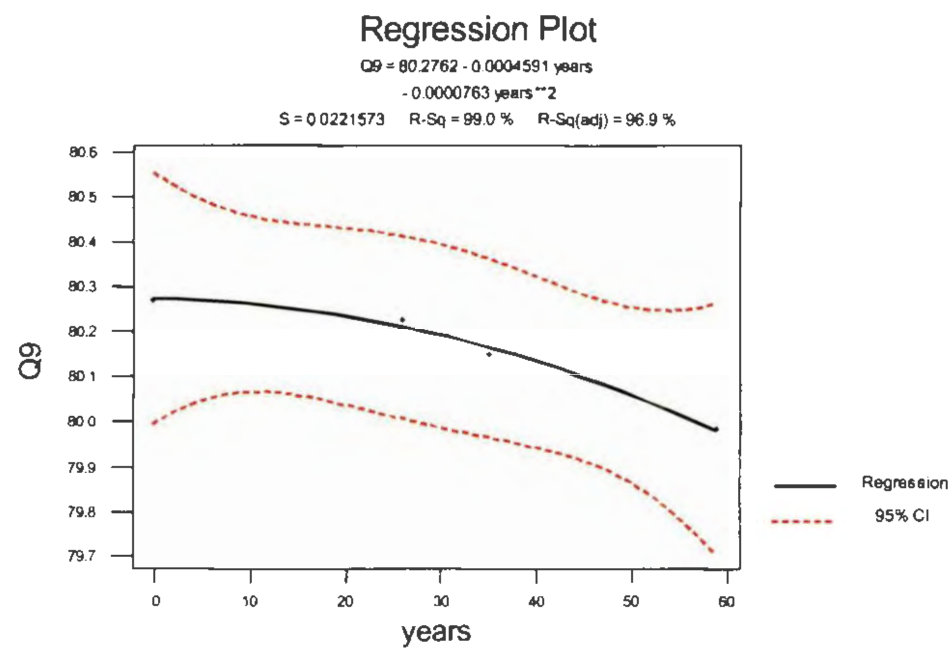

Regression Plot
B8 = 118.998 + 0.0023734 years
- 0.0000861 years**2
S = 0.0056694 R-Sq = 99.8 % R-Sq(adj) = 99.5 %
119.1
119.0
118.9
118.8
B8
0
10
20
30
40
50
60
years
Regression
95% CI

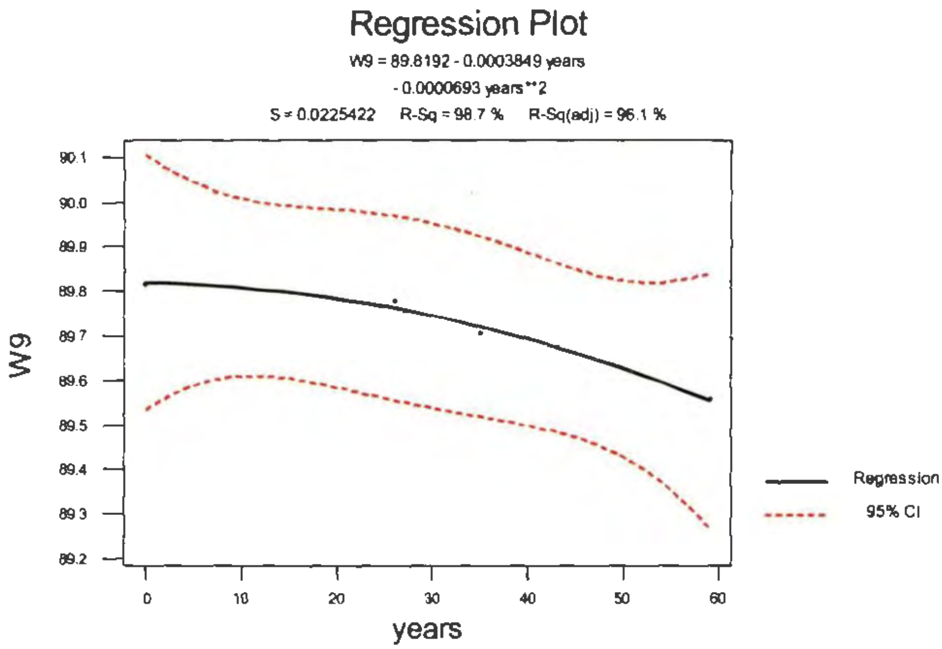

Regression Plot
P8 = 144.895 + 0.0013561 years
- 0.0000678 years**2
S = 0.0043134 R-Sq = 99.9 % R-Sq(adj) = 99.6 %
144.9
144.8
144.7
P8
0
10
20
30
40
50
60
years
Regression
95% CI


Regression Plot
V8 = 130.368 + 0.0009663 years
- 0.0000659 years**2
S = 0.0018012 R-Sq = 100.0 % R-Sq(adj) = 99.9 %
130.4
130.3
130.2
V8
0
10
20
30
40
50
60
years
Regression
95% CI


Regression Plot
A9 = 136.627 + 0.0007823 years
- 0.0000636 years**2
S = 0.0008114 R-Sq = 100.0 % R-Sq(adj) = 100.0 %
136.65
136.55
136.45
A9
0
10
20
30
40
50
60
years
Regression
95% CI


Regression Plot
G9 = 141.228 + 0.0019010 years
- 0.0000899 years**2
S = 0.0058945 R-Sq = 99.9 % R-Sq(adj) = 99.6 %
141.3
141.2
141.1
141.0
G9
0
10
20
30
40
50
60
years
Regression
95% CI


Regression Plot
Q9 = 80.2762 - 0.0004591 years
- 0.0000763 years**2
S = 0.0221573 R-Sq = 99.0 % R-Sq(adj) = 96.9 %
80.6
80.5
80.4
80.3
80.2
80.1
80.0
79.9
79.8
79.7
Q9
0
10
20
30
40
50
60
years
Regression
95% CI


Regression Plot
W9 = 89.8192 - 0.0003849 years
- 0.0000693 years**2
S = 0.0225422 R-Sq = 98.7 % R-Sq(adj) = 96.1 %
90.1
90.0
89.9
89.8
89.7
89.6
89.5
89.4
89.3
89.2
W9
0
10
20
30
40
50
60
years
Regression
95% CI