

# Why do Millimeters Matter?

# NOAA Models and Tools Support High Accuracy Positioning for Ecosystem Restoration and Ecological Research

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# Step 1: Understand the need for high accuracy elevations and water levels

### Wetland Restoration

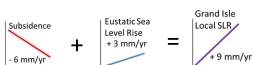
Soil surfaces need to be at proper height with respect to tidal datums (MLW, MHW, etc.) for planted



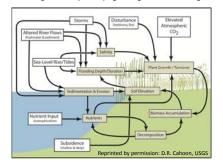
- · Elevations and water levels not on the same vertical scale
- In low-lying microtidal marshes, difference between success and failure may be on the order of centimeters

## **Ecological Research**

- · Vertical wetland soil processes typically occur on the scale of millimeters per year.
- · Sea level trends occur on scales of millimeters per year
- Together, these processes can combine to cause centimeter per year-scale changes in local sea level



- Datum control, datum transformation (e.g. local mean sea level → NAVD 88)
- High accuracy elevation control & local tidal datums
- High accuracy surveying & long term monitoring



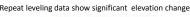
## Step 2: High accuracy elevations suspect in regions of high subsidence

Subsidence on bench mark W 191 in Biloxi MS from 1991 to 2009

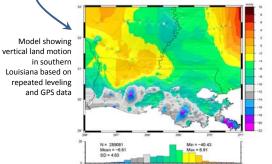


For datasheets, see NGS web site: ngs.noaa.gov

- NOAA's National Geodetic Survey does not publish leveled (orthometric) heights in areas of high subsidence
- The National Vertical Datum of 1988 (NAVD 88) may not be available in all coastal areas

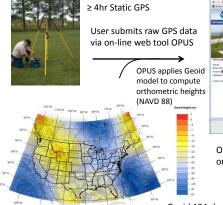






# Step 3: How do I get high accuracy elevations and water levels?

# Elevations in Areas of Rapid Subsidence



Geoid 12A

Web site: ngs.noaa.gov/OPUS/

OPUS can provide  $\sigma \approx 0.04$  m orthometric height (e.g. NAVD 88)

Geoid 12A: hybrid geoid model based on gravity data and GPS on bench marks

# Elevations outside Areas of Rapid Subsidence



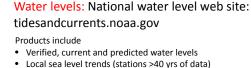
Highest accuracy can be obtained by following geodetic leveling procedures

NGS provides guidelines for obtaining accurate elevations via GPS and leveling



Accurate Elevations for Sea Level Change

Sentinel Sites 2013



• Tidal datums on National Tidal Datum Epoch (1983 - 2001)



Monitor local water levels following NOAA's Sentinel Site guidelines (in review) including:

- · High accuracy sensor
- · Local vertical control network
- Leveled connections to local network
- Leveled or GPS connection to
- Repeated surveys to maintain accurate heights