Ukiah & Gaithersburg Latitude Observatories: Preserving NOAA's Legacy of International Scientific Cooperation & Polar Motion Studies

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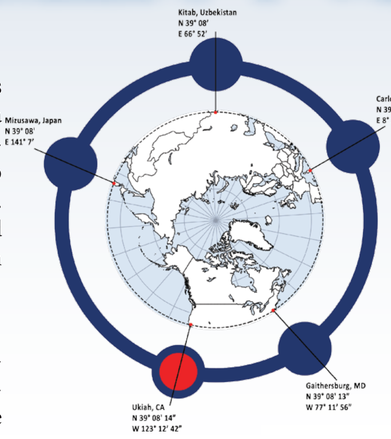
Generations

Transforming the Ukiah & Gaithersburg Latitude Observatories for Future Generations: Preserving the Legacy of the U.S. Latitude Observatories

Preserving our Scientific Heritage

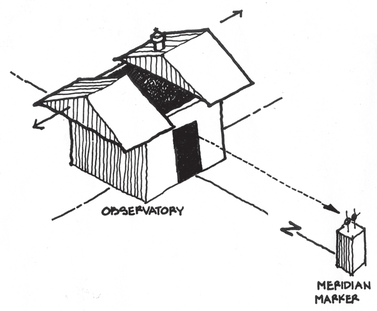
In 1891, American astronomer Seth C. Chandler Jr. announced his discovery that the earth's axis of rotation—and hence the direction of true north—wobbles within the earth with a period of about 14 months, varying latitude everywhere on the globe. Immediately, the International Geodetic Association (IGA) called for an unprecedented international effort to observe and measure the wandering of the earth's pole and its resulting variation of latitude. The U.S. Coast and Geodetic Survey became involved, and by 1899 the IGA had established six International Latitude Observatories at 39° 8' N: three in the United States, the others in Italy, Russia, and Japan. Only two of the U.S. latitude observatories survive today. In 1982, NOAA deeded them to their home cities of Gaithersburg, MD, and Ukiah, CA. Both cities have embraced this history by restoring the observatories and converting the adjacent land into public parks. The historical significance of the Gaithersburg Latitude Observatory was recognized by its designation as a National Historic Landmark. In 2014–15, the National Geodetic Survey (the present-day NOAA successor to the U.S. Coast and Geodetic Survey) loaned the original zenith telescopes to the communities, returning the observatories to



Measuring the Wobble

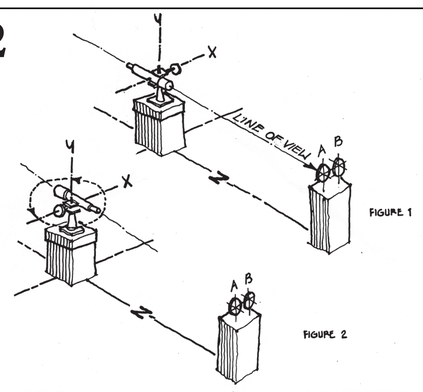
Latitude observatories around the world used the same observational technique—measuring the differences in the angles at which pairs of stars crossed the line of longitude (meridian) at nearly equal distances north and south of a point directly overhead (the zenith). The same star pairs were observed at all of the latitude observatories; any degree of variation between observatories reflected a shift of the earth's axis of rotation. Weather permitting, readings from eighteen pairs of stars were recorded each year.

1



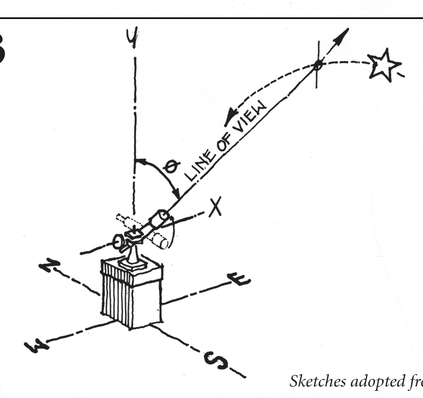
1. Before starting a night's work, the observer would open up the ventilators and retractable roof of the observatory in order to allow the instrumentation to acclimate to the outside temperature. Thus, helping to provide stable conditions for the zenith telescope to accurately operate.

2



2. The telescope was aligned, rotated and leveled, using a series of direct and reverse readings that corrected for errors in the adjustment of the instrument. A stride level attached to the telescope mount was also used to level the telescope within a fraction of a second of arc. The outside meridian marker (little shed the size of pump house) was also an essential part of this calibration process to verify the telescope's north alignment.

3



3. The zenith telescope was aimed to a predetermined sky position, corresponding to the pair of stars that would be observed. As the first star of the pair intersected the telescope's line of view, the observer would record the exact time using a sidereal clock.

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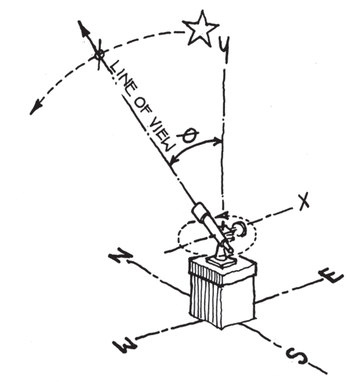

4. The Telescope was then turned 180 degrees about the Y-axis (horizontal) to the north and is now pointed north using the same coordinates as the prior star's recording. Facing opposite the last measurement and aimed toward the second star of the pair, the observer patiently waited as the second star intersects the line of view, and then records the exact time.

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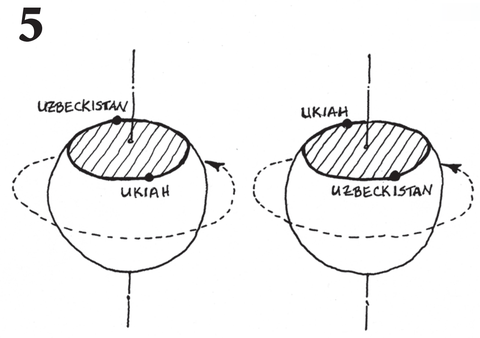

5. As the earth rotates east, the next observatory would observe the exact same star pair using the same predetermined coordinates. The recorded altitude of the first and second star sighting's should have been the same, but over time, there was a measurable variation, today known as the "Chandler Wobble."

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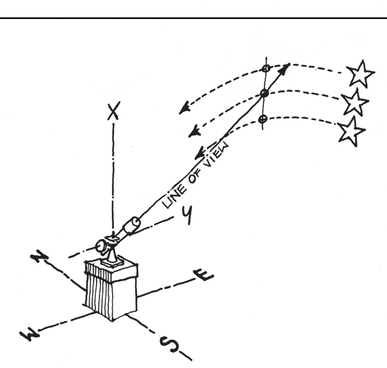


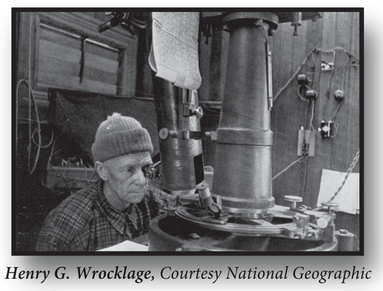
6. Polar motion causes latitudes on opposite sides of the earth to fluctuate in opposite directions. For example, a "wobble" that increased the latitude in Ukiah would quite the opposite decrease the latitude as measured in Uzbekistan. Thus, combining meticulous observations from a group of observatories distributed around the world provided the most accurate and reliable record of polar motion.

Sketches adopted from: Historic American Engineering Record # HAE MD-78, W.L. Neudorfer, 1989

Observing with Consistency: Eight Observers—Eighty Years

In many ways, the work of an observer at a latitude observatory was similar to that of a lighthouse keeper. Both were recordkeeping jobs done by men, both entailed irregular hours in a sometimes cold and hostile environment, and both required a high degree of responsibility. Despite this, there was typically low staff turnover at the observatories. In fact, throughout its 84-year history, only eight men served at the Ukiah Latitude Observatory; they are:

Frank Schlesinger,	*1899–1903*	*Sidney D. Townley,*	*1903–1907*
James D. Maddrill,	*1907–1912*	*William F. Meyer,*	*1912–1922*
Ferdinand Neubauer,	*1918–1919*	*Henry G. Wrocklage,*	*1922–1946*
Leonard F. Caouette,	*1946–1972*	*Robert Pettey,*	*1972–1982*



Henry G. Wrocklage, Courtesy National Geographic

Restoring and Celebrating the Heritage

Through programs and historic exhibits, the observatory parks increase exposure and awareness to NOAA's rich and formative heritage, as well as its enduring modern scientific research and services. Thus, NOAA's legacy and assets of the International Latitude Observatories will be protected and preserved through activities for education, outreach, and tourism.

***About photos: Left**, Martin Bradley "City of Ukiah, Park Interpreter" demonstrating the renovated sliding roof with the Zenith Telescope installed. **Middle,** A dramatic photo showing off the return of the telescope sitting on its original mounts with roof open and ready for action. **Right,** One of the many community park events held at the Ukiah observatory, celebrating the "Tours of Earth and Sky."*

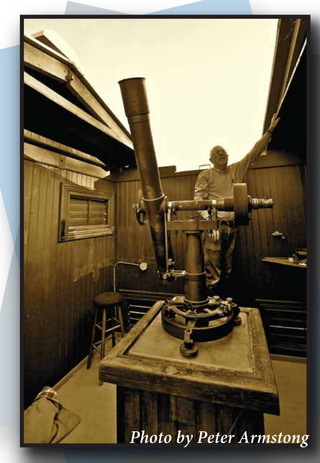


Photo by Peter Armstong

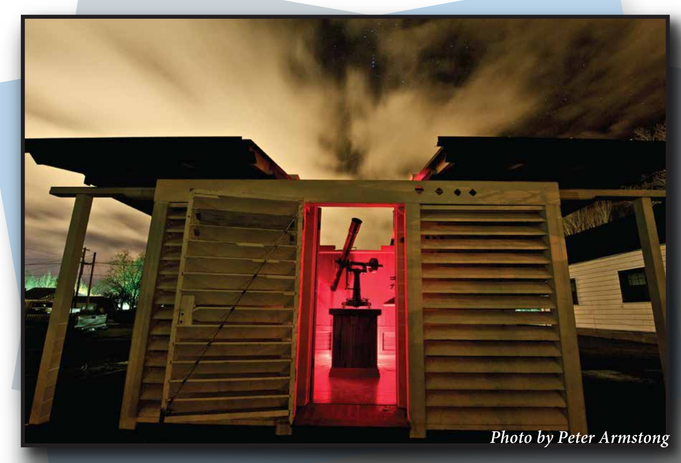


Photo by Peter Armstong

Photo by Martin Bradley, Courtesy City of Ukiah

Find Out More

City of Ukiah
http://www.cityofukiah.com/
http://www.cityofukiah.com/observatory-park/

City of Gaithersburg
http://www.gaithersburgmd.gov/
http://www.gaithersburgmd.gov/about-gaithersburg/city-facilities/international-latitude-observatory

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