# Measuring Deflection of the Telescope Mount

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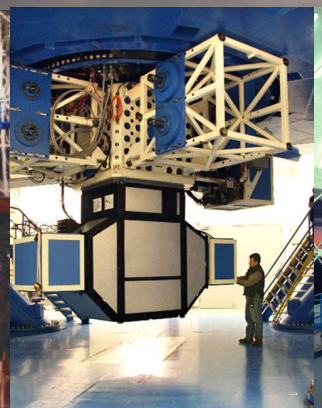
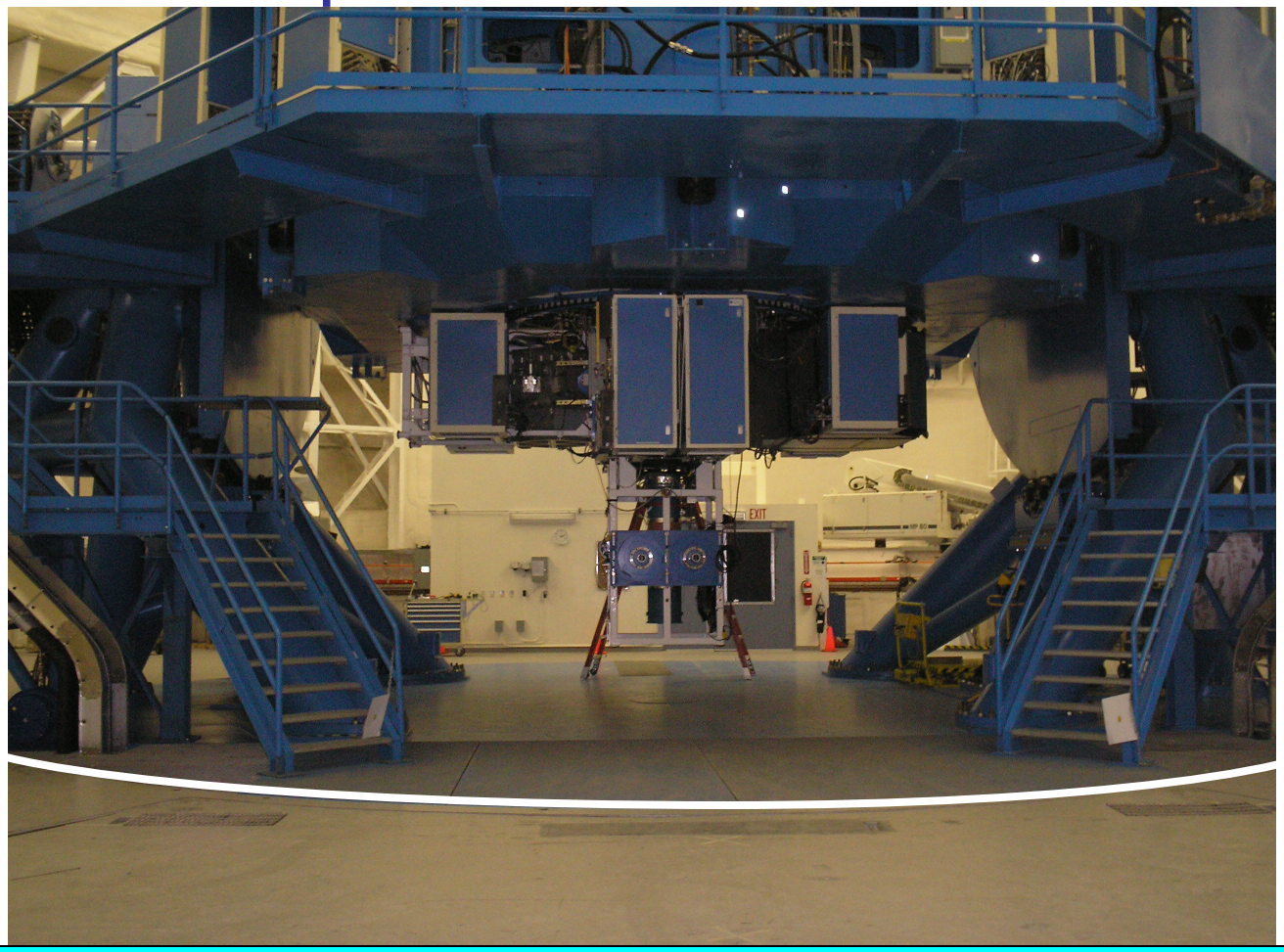


# Premise

Azimuth

By John White

## The telescope mount tilts when it moves



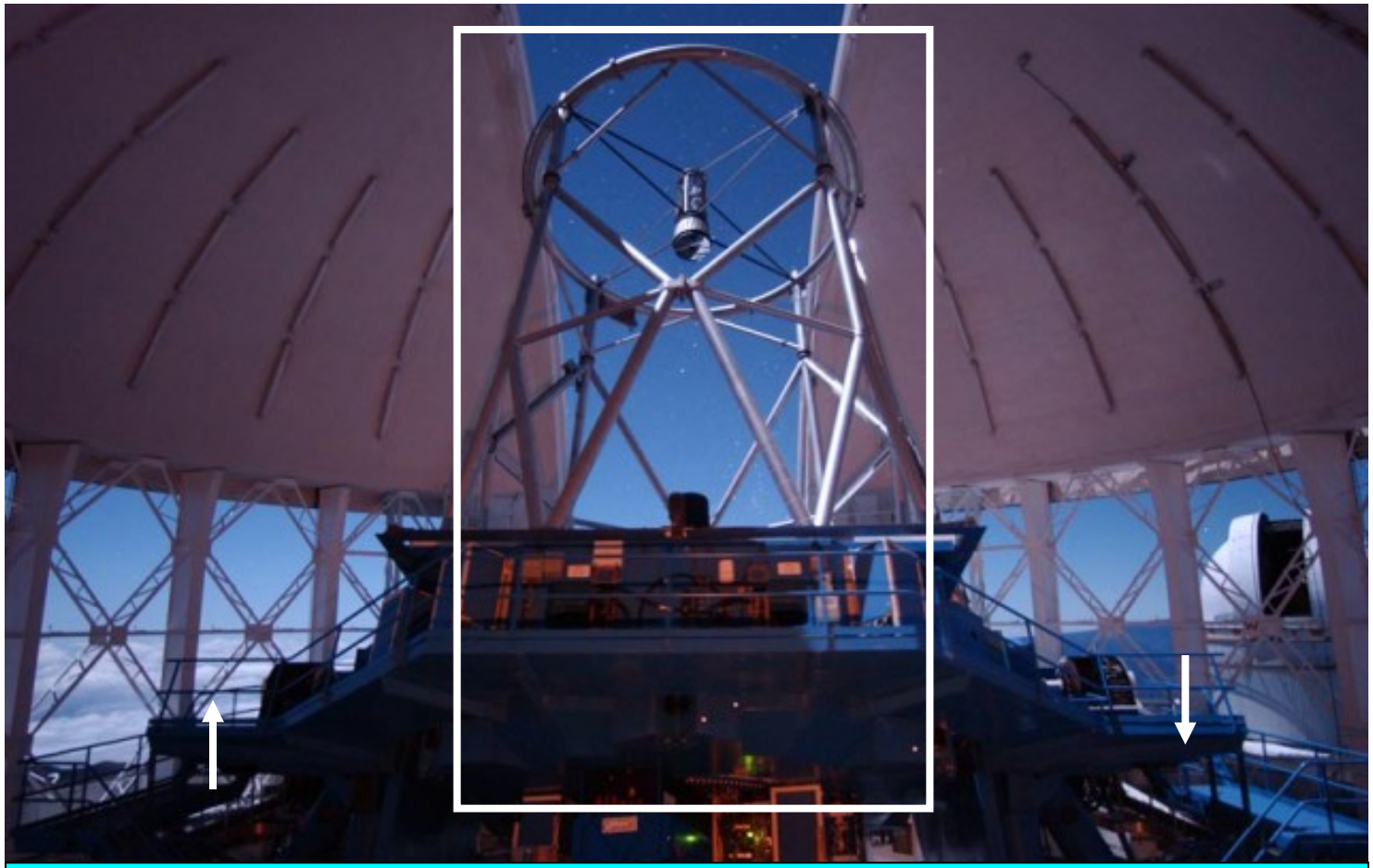
The base is not perfectly circular and flat, so rollers move up and down

# Premise

Elevation

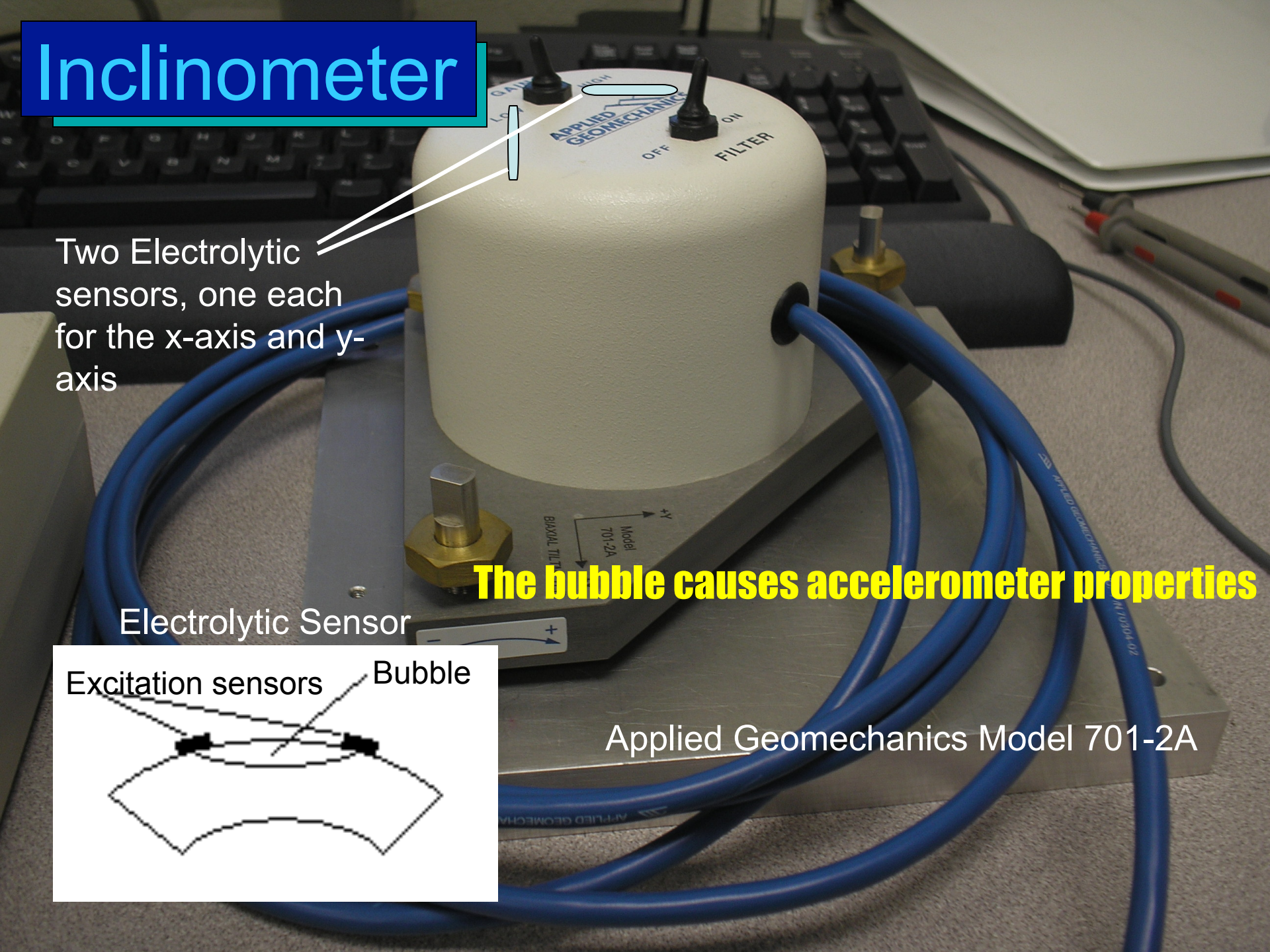
By John White

## The telescope mount tilts when it moves

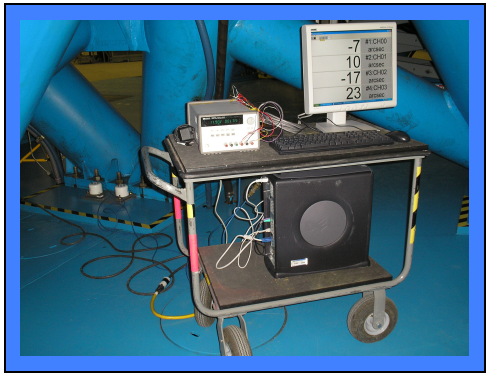


Base mount may tilt unless telescope bearings are perfectly aligned

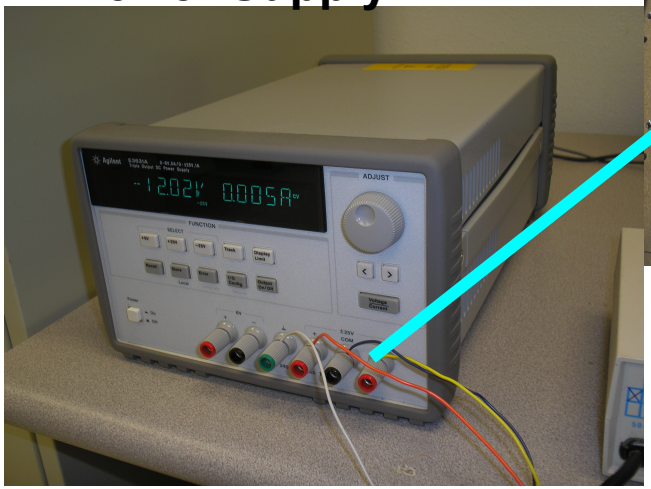
# Inclinometer

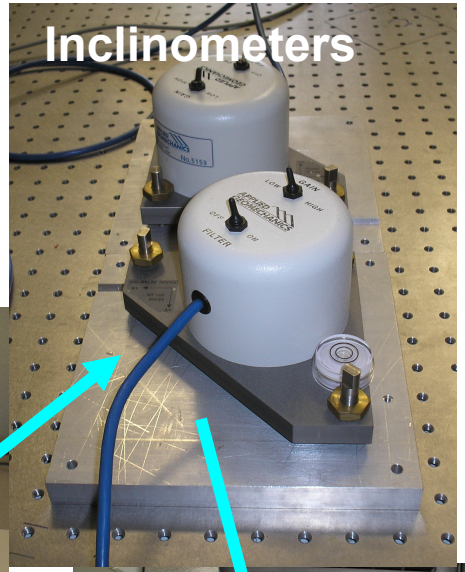


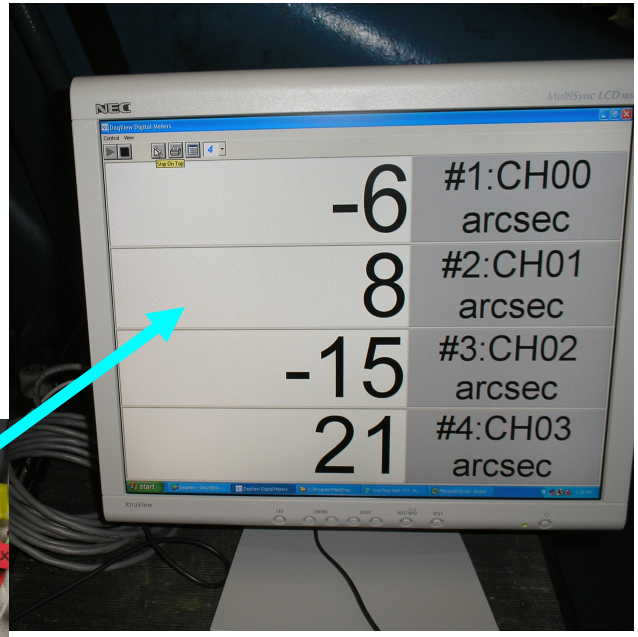
# Setup



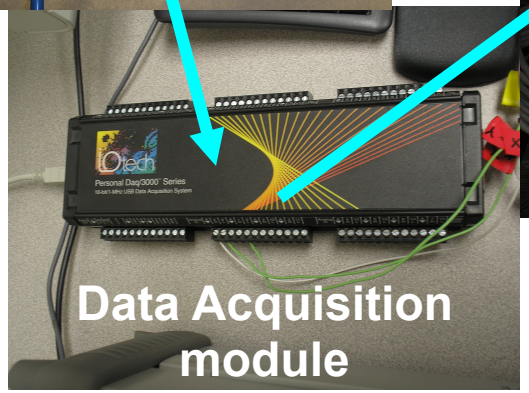
Power Supply






Computer




**Good for extrapolating lots of data directly into the computer**

# Data Collection

## Azimuth axis: between telescope support columns

Rotate clockwise and counter-clockwise, at 1 degree per second and 2 degrees per second, on both sides of the mount base, giving 8 sets of data

## Elevation axis: on elevation platform

Rotate downwards, at 0.5 degrees per second, stopping for 5 seconds every 10 degrees, then back up

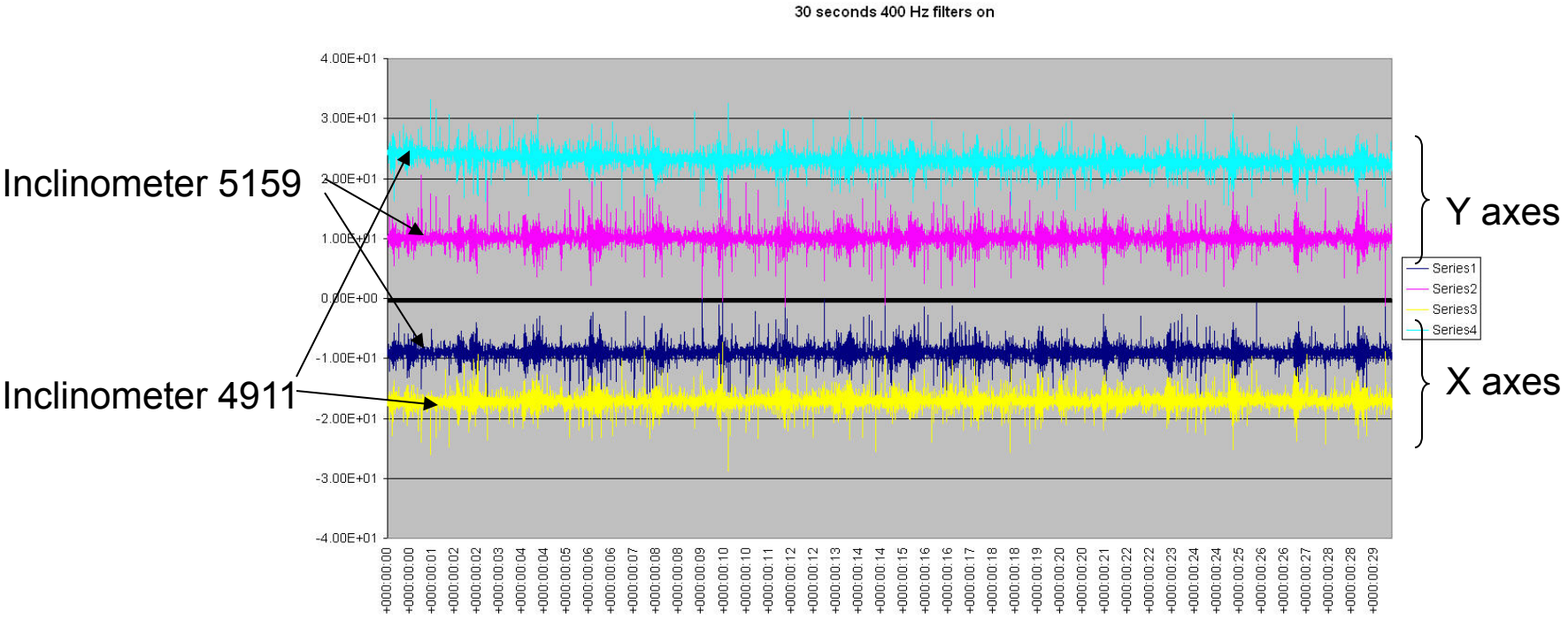
Rotate without stops

Set elevation at 45 degrees, rotate azimuth 360 degrees, at 1 degree per second, clockwise and counter-clockwise

All on both sides giving 12 sets of data

# Results

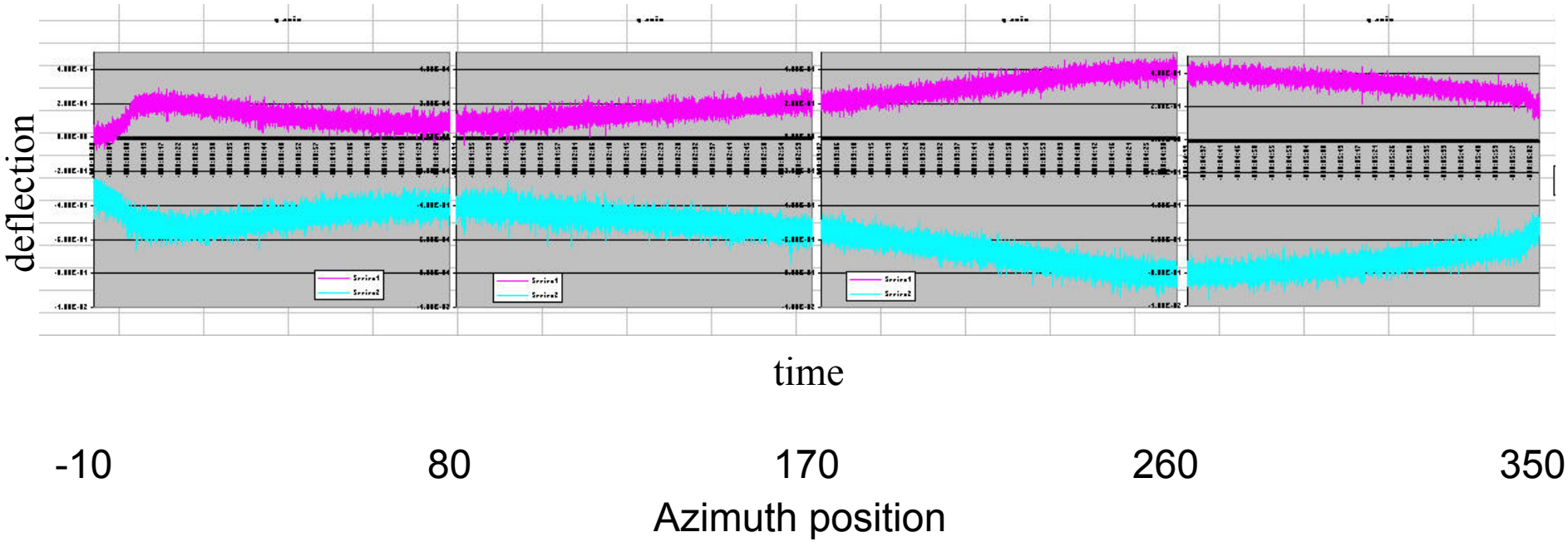
These inclinometers are so precise, they detect the **chirping of the cooling system**



# Results

## Azimuth

Y axes of clockwise rotation at 1 degree per second



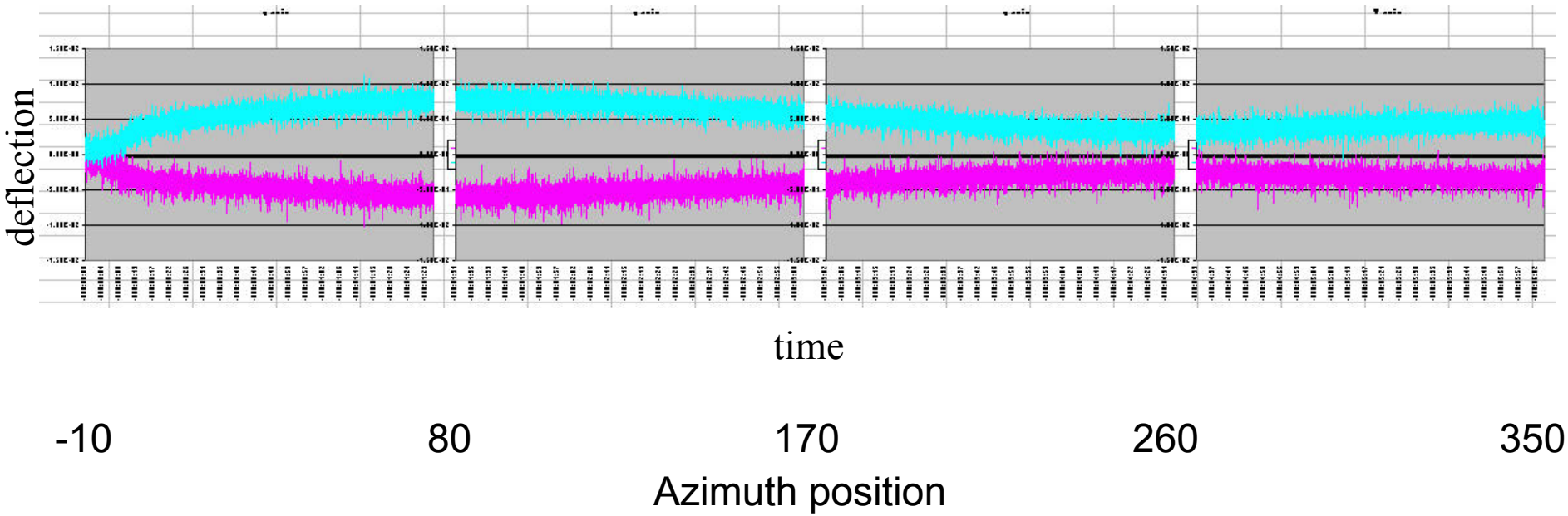

All the Azimuth data show a 30-40 arcsecond total deflection as the telescope is rotated 360 degrees.

**1 arcsecond = 2 kilometers on the Moon**

# Results

## Elevation

Y axes of clockwise rotation at 1 degree per second with Elevation at 45 degrees



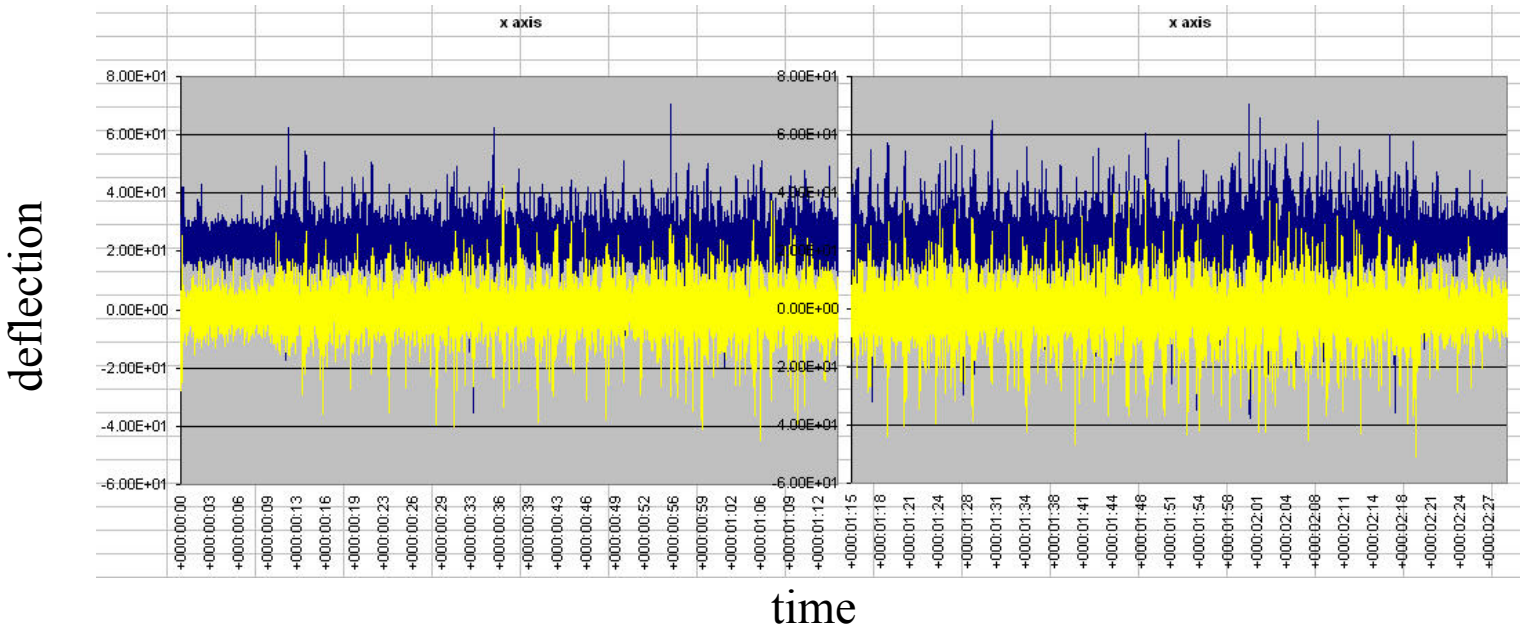

With the Elevation set at 45 degrees, there was no major change in the range of deflection when the telescope was rotated about the Azimuth axis

This means that the Elevation axis is very stable and well balanced

# Results

## Elevation

X axes of downwards rotation at 0.5 degree per second




90 55 20

Elevation position

There was no major overall deflection as the elevation axis was rotated

# In the Future…

Analyze the deflection in comparison with other variables on the telescope like bearing pressure, wind, and temperature.

Send the data, equipment, and setup instructions down to Gemini South so the same readings can be taken there, where they can be used to help align the Multi Conjugate Adaptive Optics (MCAO).

*Thank you for helping to make my project a success*

Mentor: John White

Neal Masuda,

Chris Yamasaki,

Layne Novak,

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