

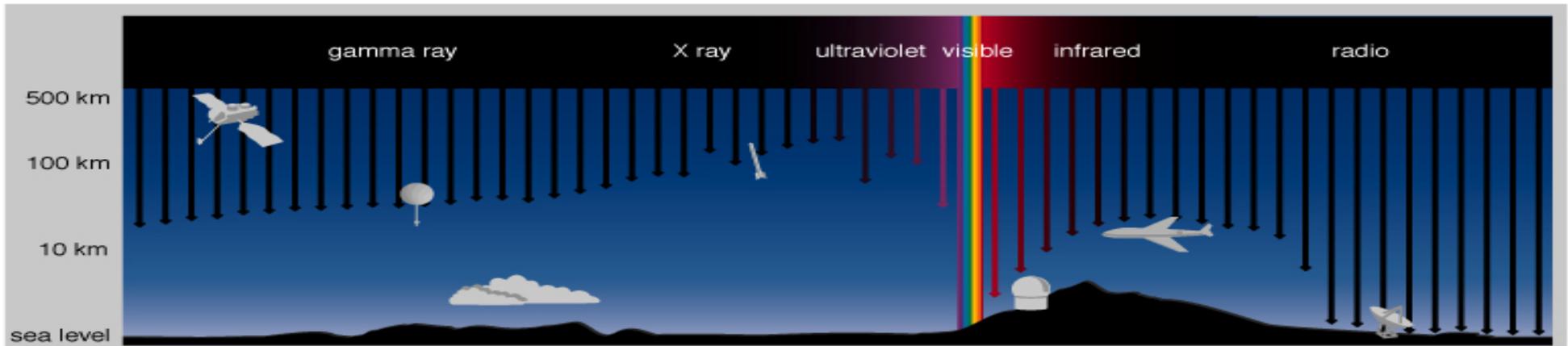
The world's biggest telescopes and where we build them

(Why isn't there an 8m telescope in Birmingham?)

Keelia Scott

What wavelength?

- The distance through the atmosphere that light can travel depends on the wavelength of light
- Optical and Radio wavelengths penetrate all the way to the ground
- To other wavelengths the atmosphere is opaque requiring us to put our instruments at higher altitudes or in space.



My Observing

- AstroSoc



- 16" telescope at the University Observatory
- Demonstrating 3rd Year lab on new 0.5m telescope

- Gemini South Observatory

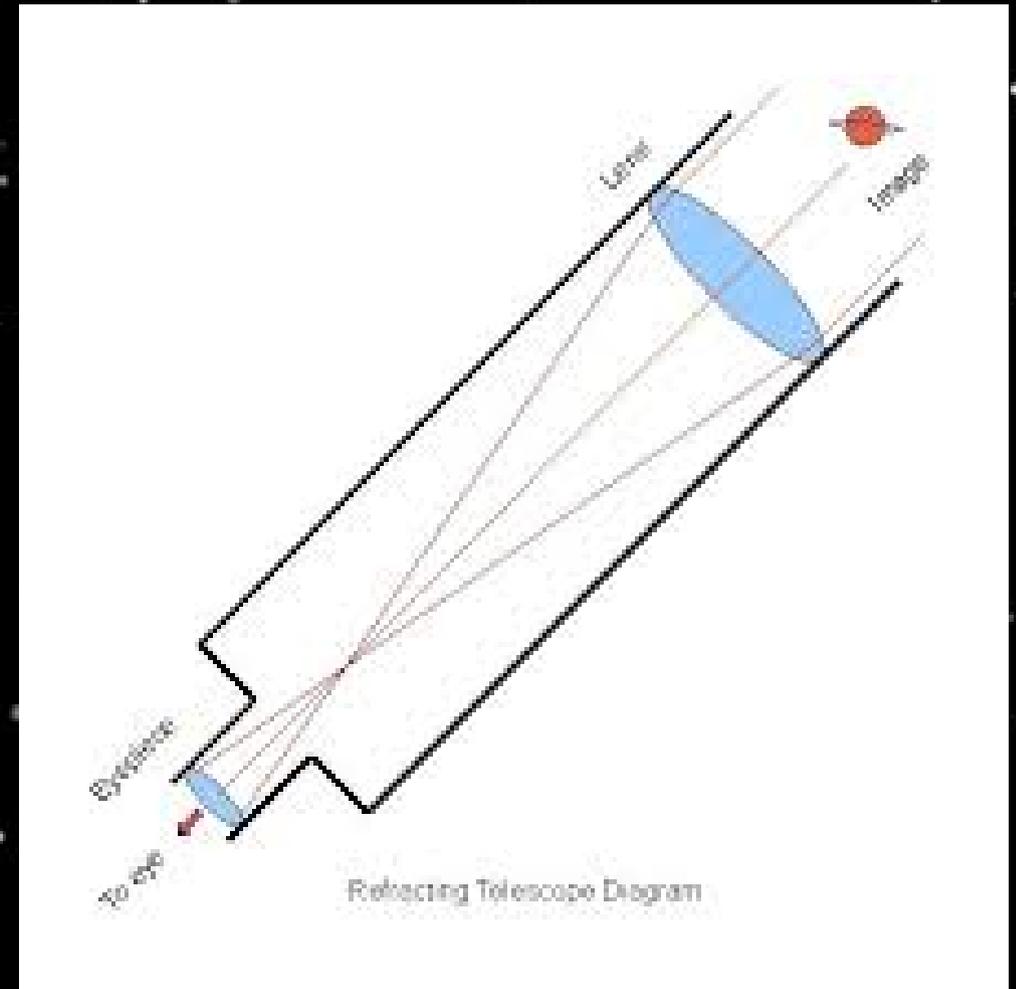


- Herschel Space Observatory



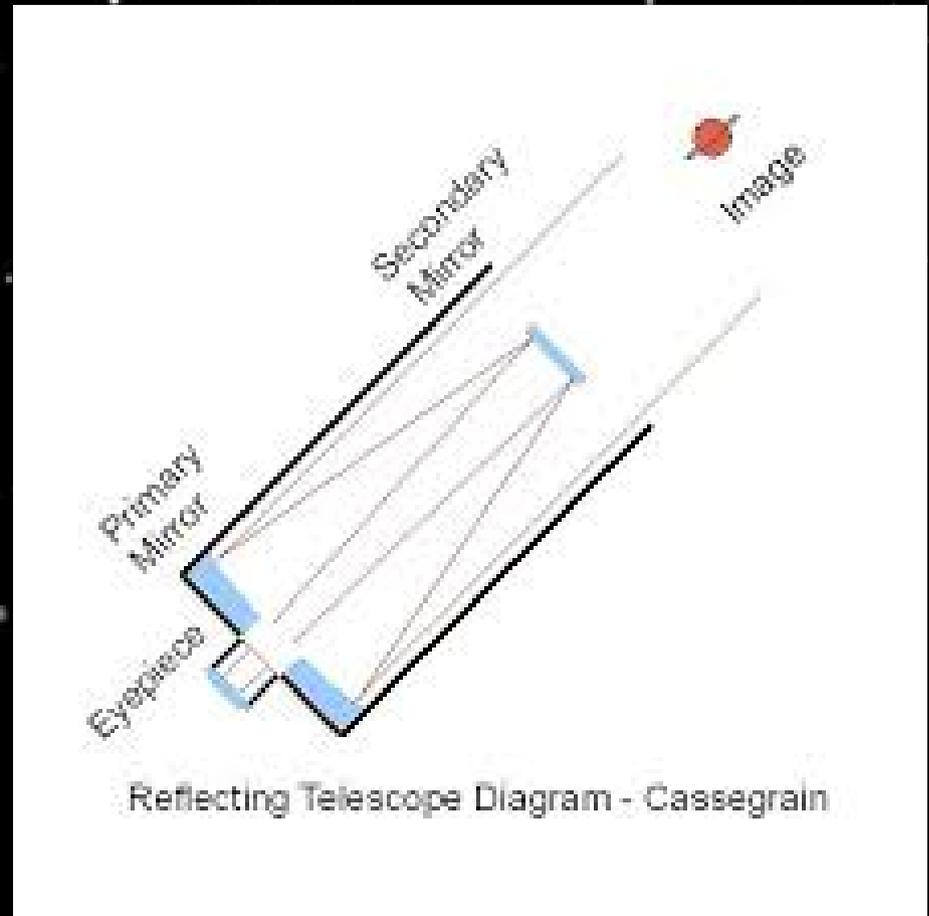
Big Telescope Design

- Refractor telescopes
- Yerkes Observatory
40 inch / 102cm



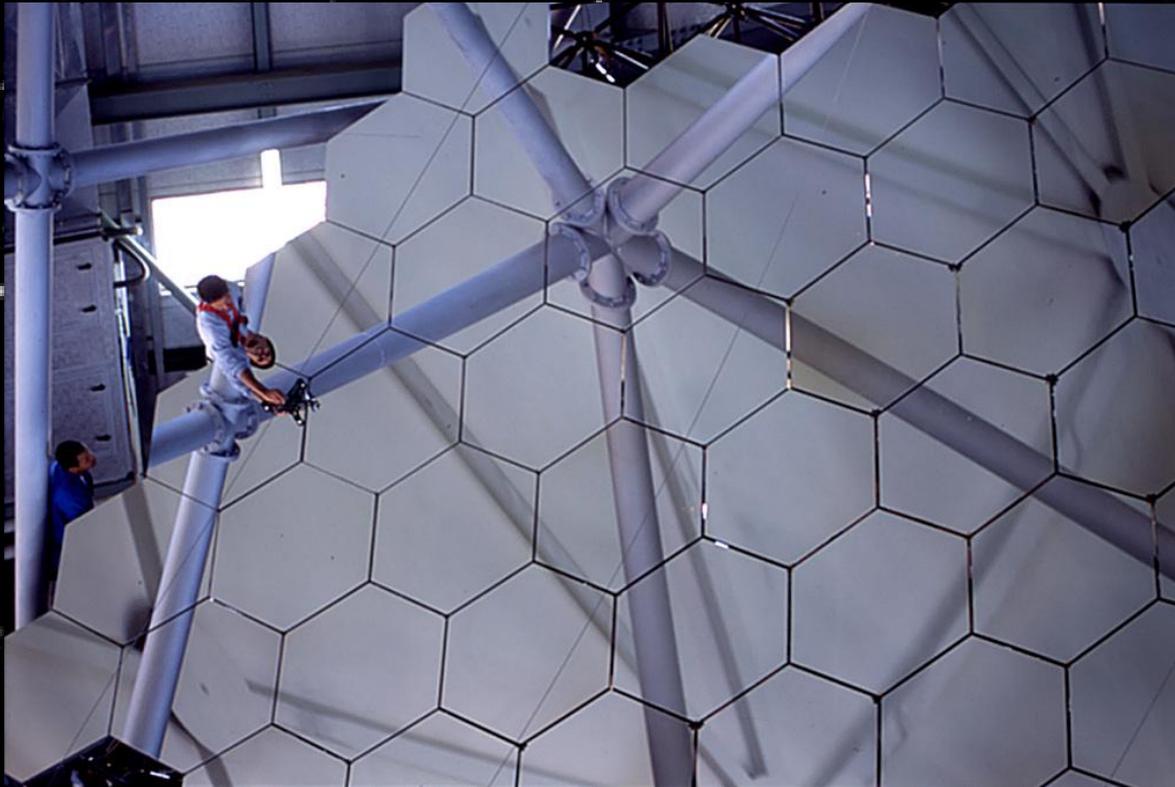
Big Telescope Design

- Reflecting telescopes
- GTC 10.4m telescope

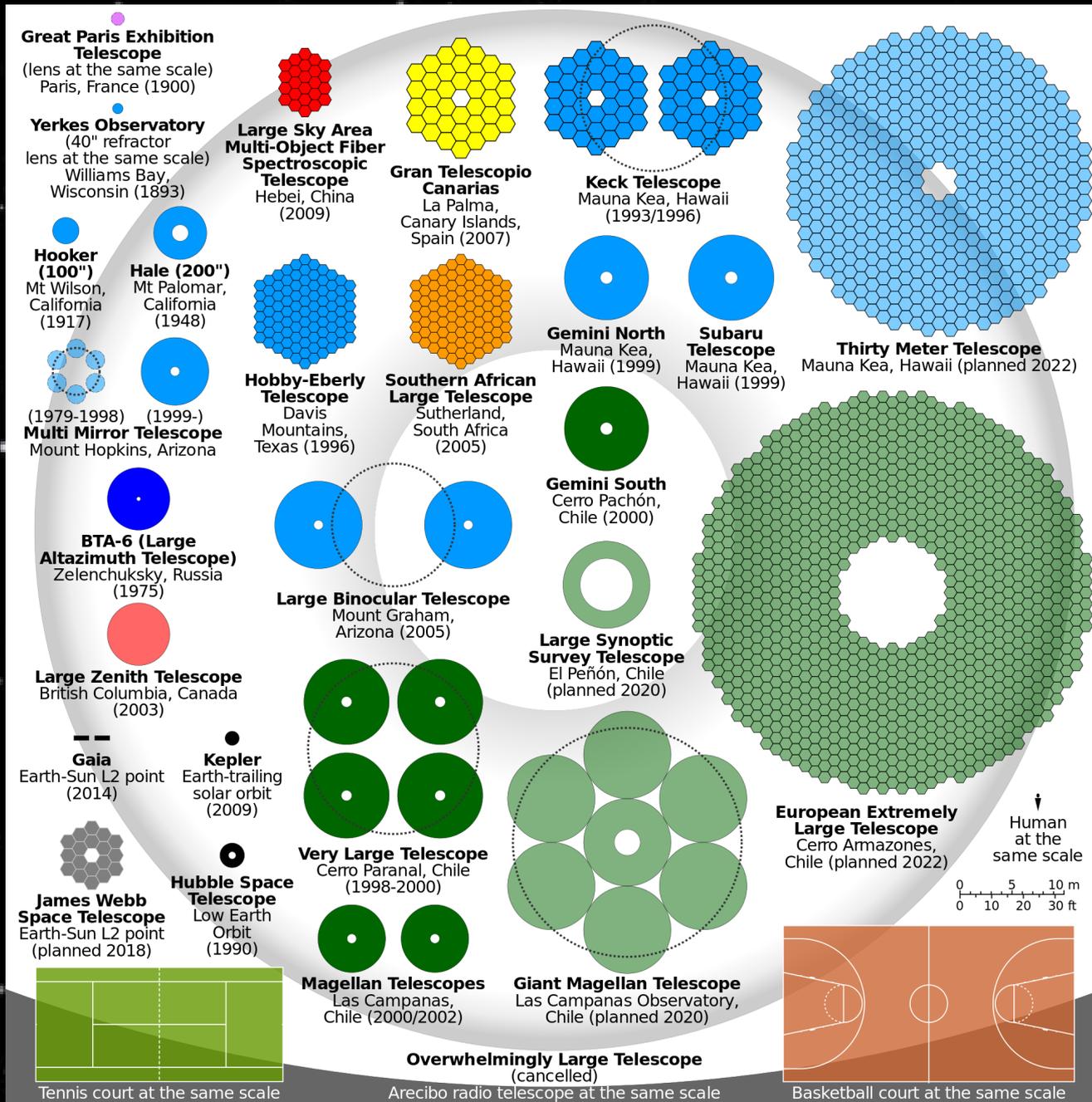


Is bigger always better?

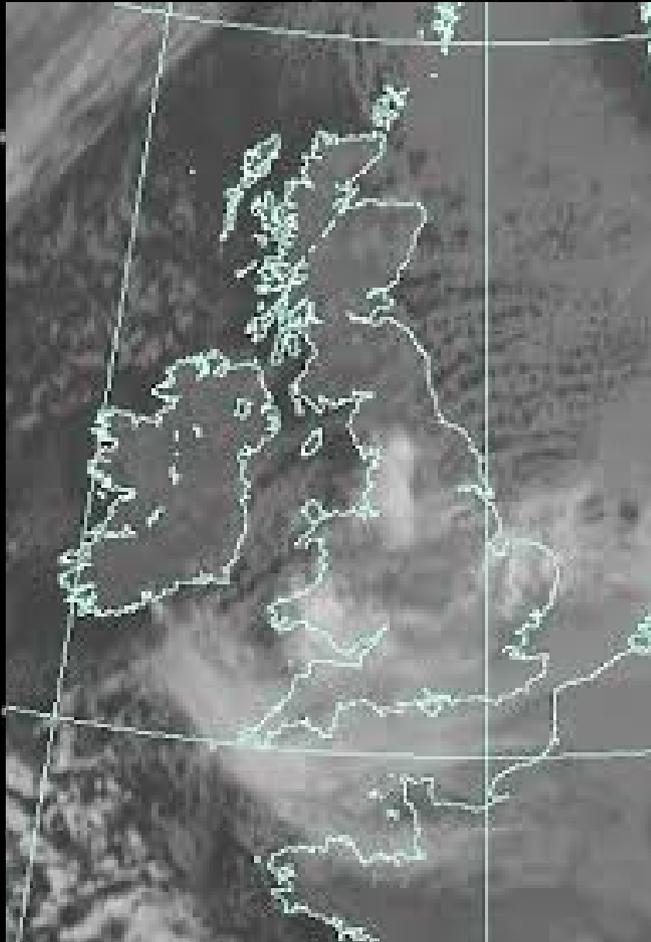
- A single large mirror (>8m) will distort under its own weight.
- Use multiple segments or multiple telescopes to achieve the same result.



Biggest Telescopes in the world



What limits where we can put a telescope?



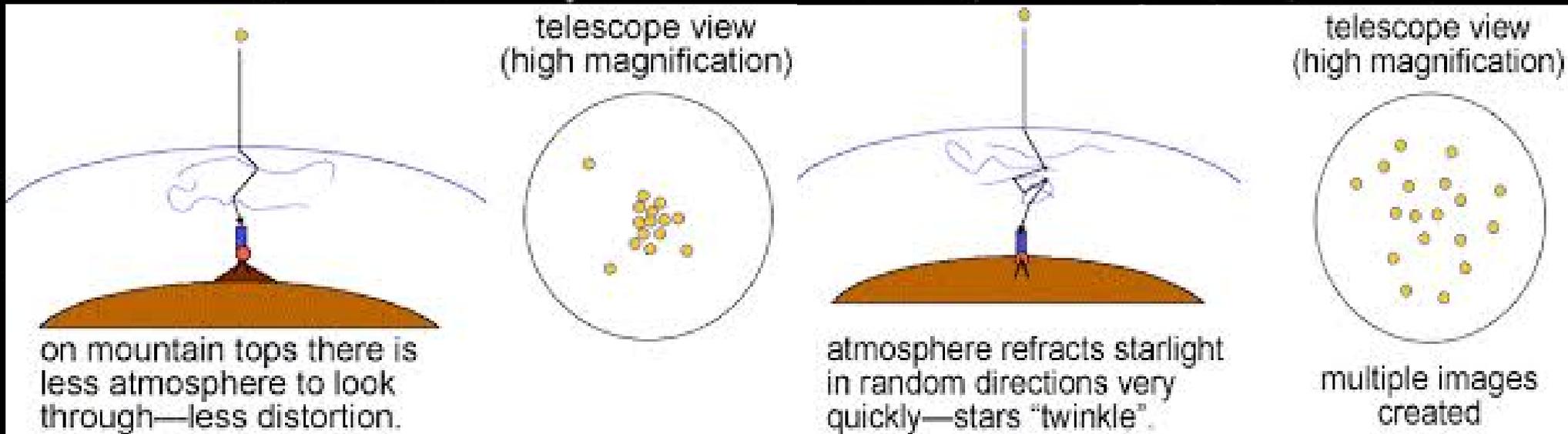
Gary Poyner

- Light pollution
- Cloud cover
- Atmospheric extinction
- Seeing

Twinkle Twinkle Little Star....

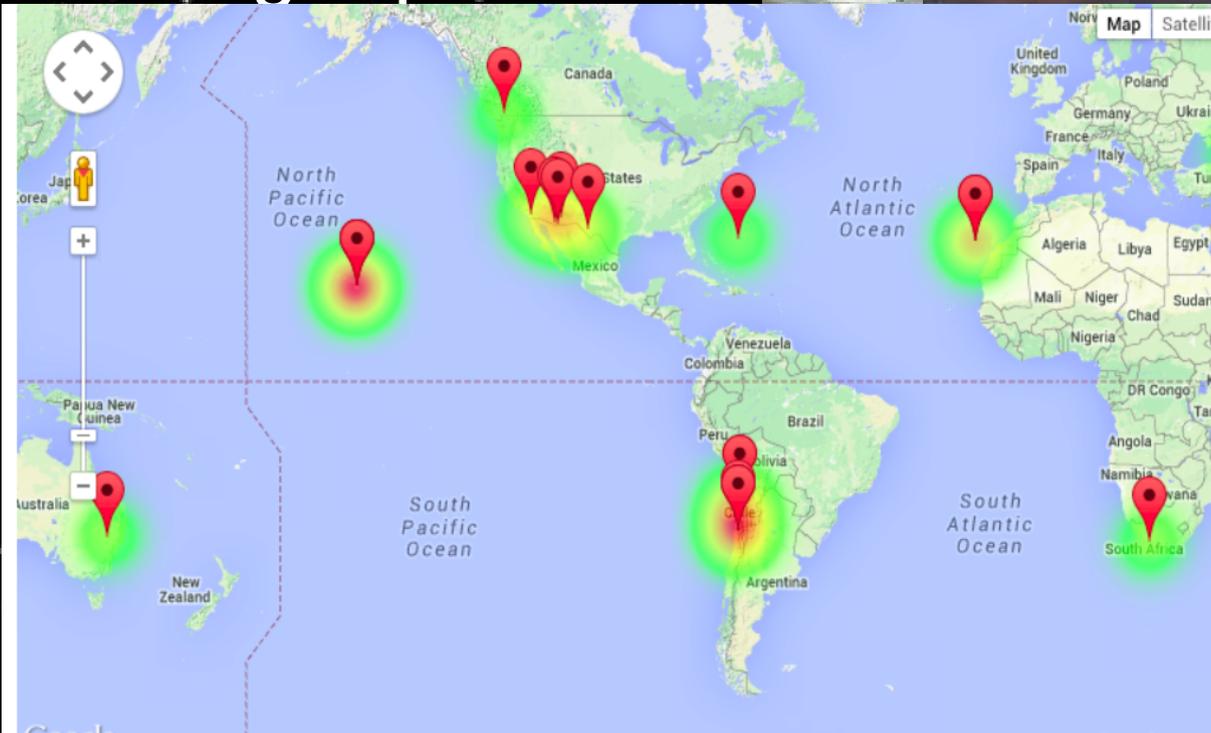
Turbulence in the atmosphere either from rising heat or strong winds high in the atmosphere

- Small islands and coastal regions make ideal low seeing locations



Location, Location, Location

- High
- Dry
- Clear skies
- No light pollution

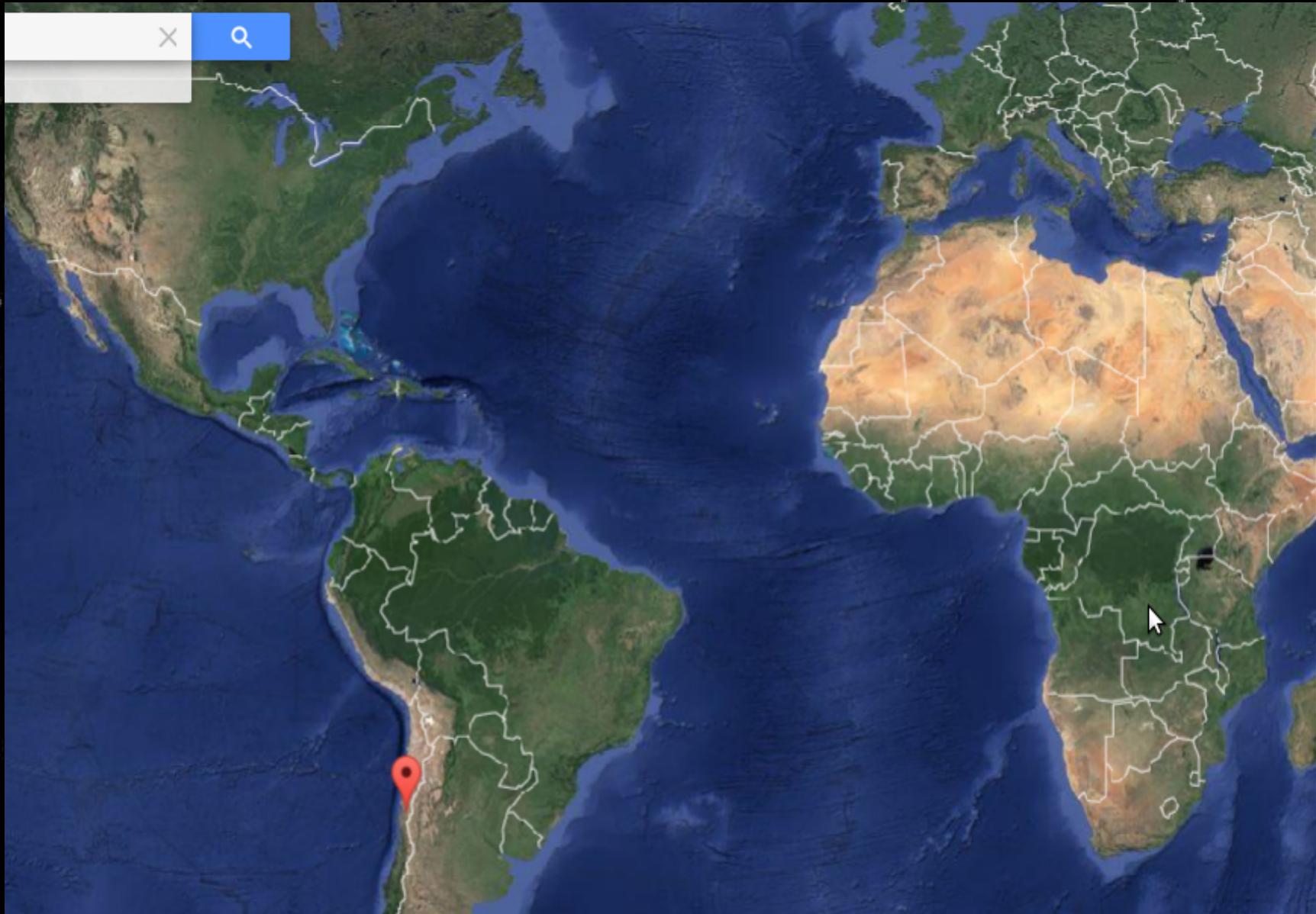


Gemini South

- 8.1m Optical Telescope
- Summit of Cerro Pachon - Chile
- 2722m / 8930ft
- Instruments
 - GMOS, multi object spectroscopy
 - T-ReCS, mid infrared 5-27 μ m



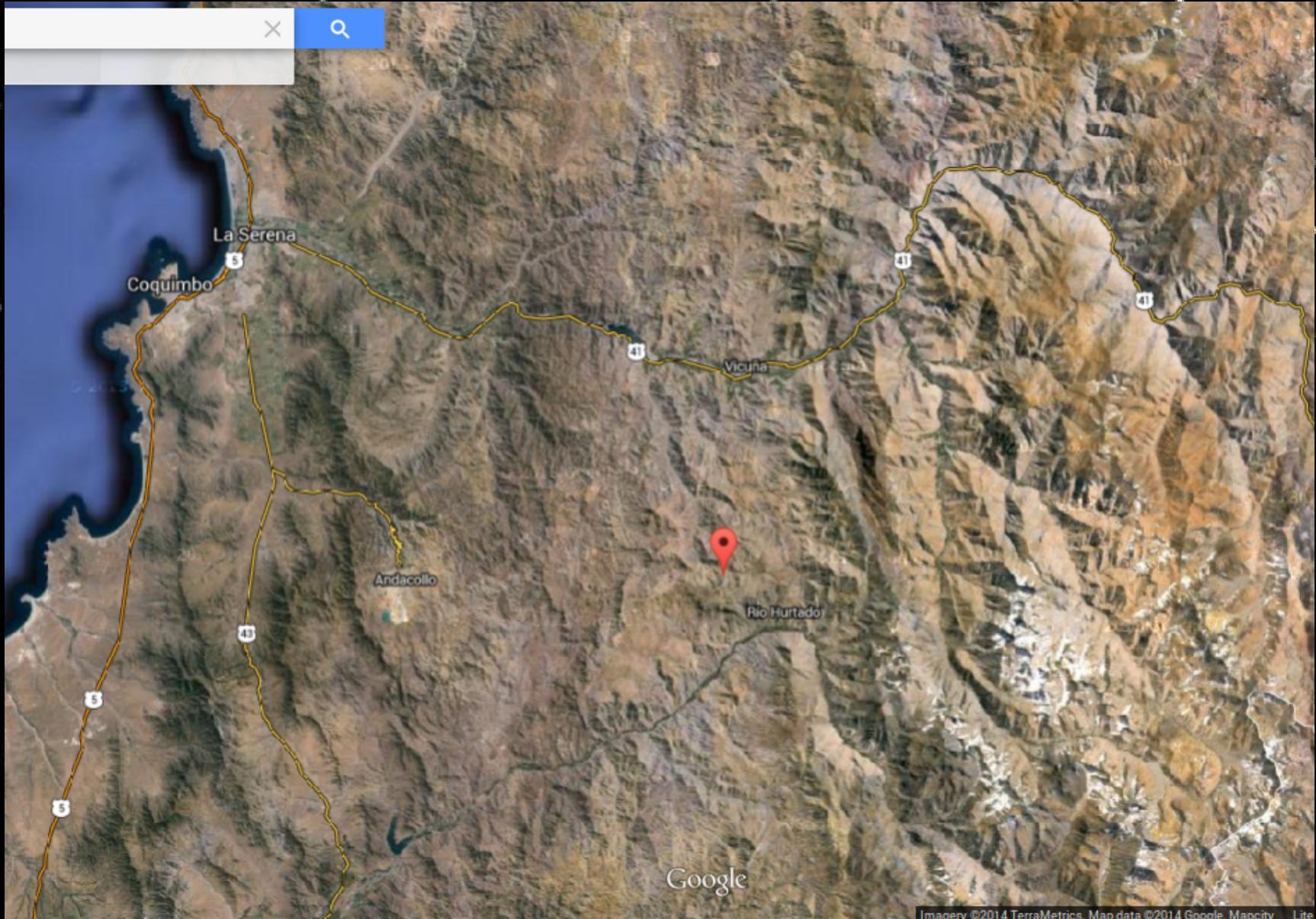
The Journey



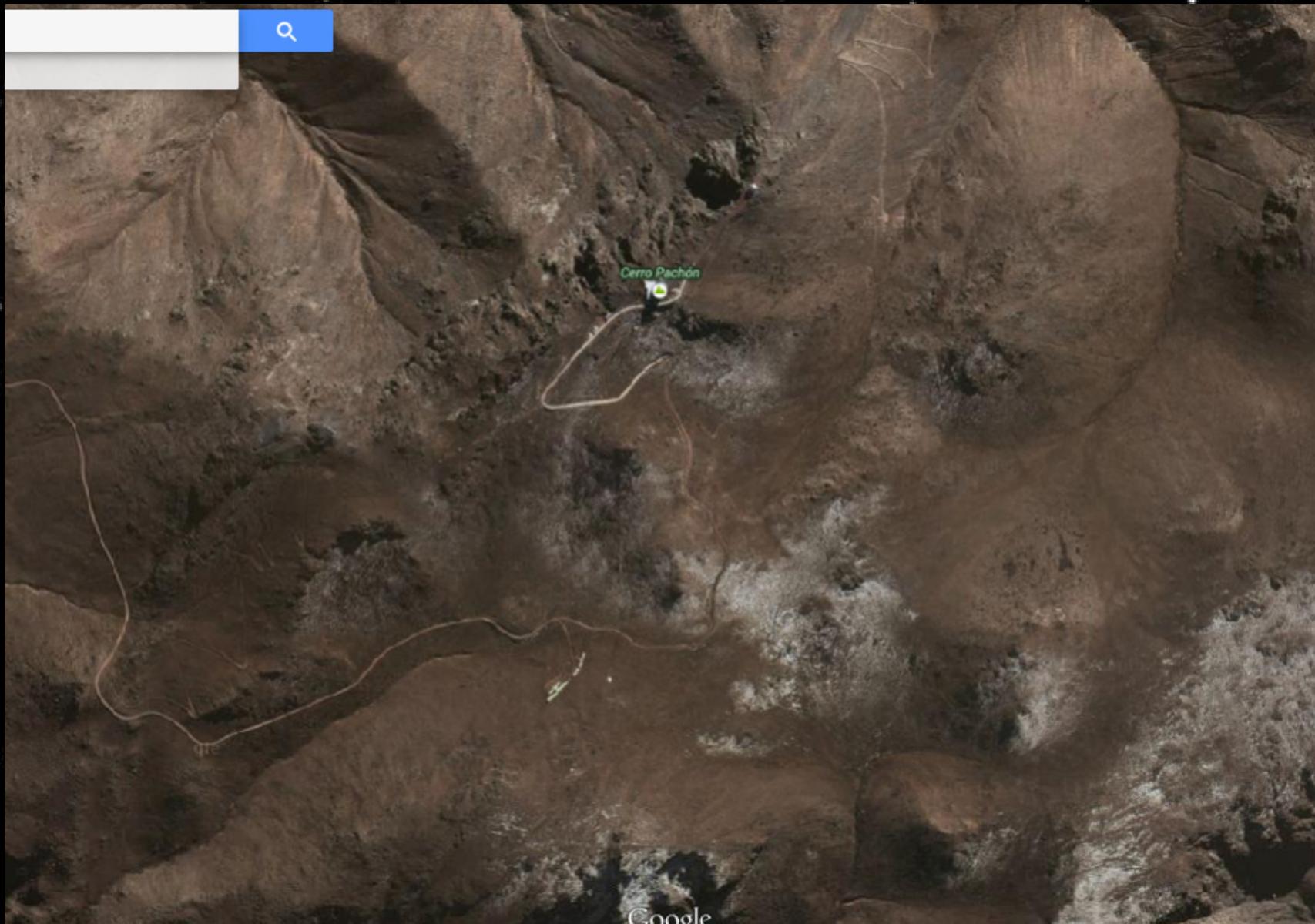
The Journey



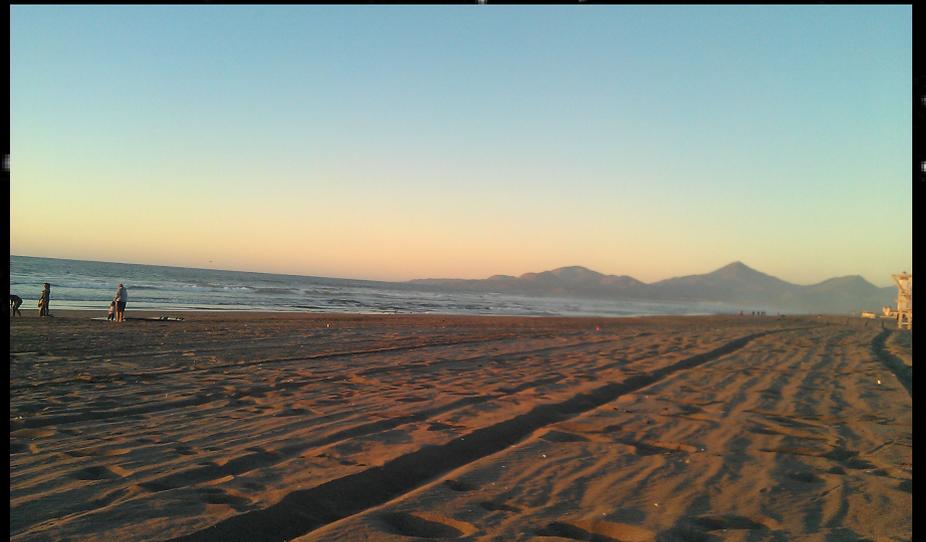
The Journey



The Journey



Base Camp



Trip up the Mountain



Trip up the Mountain

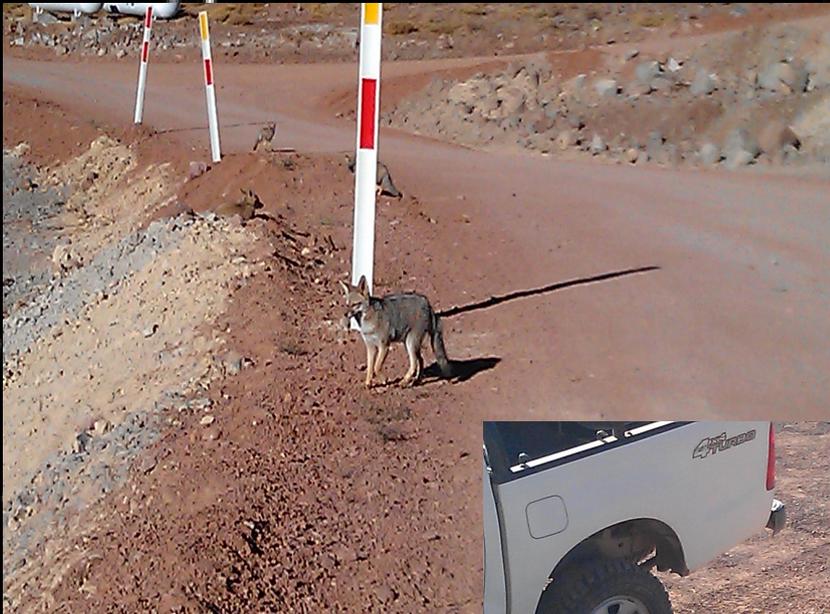


Trip up the Mountain

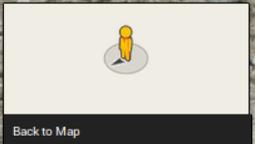


Trip up the Mountain

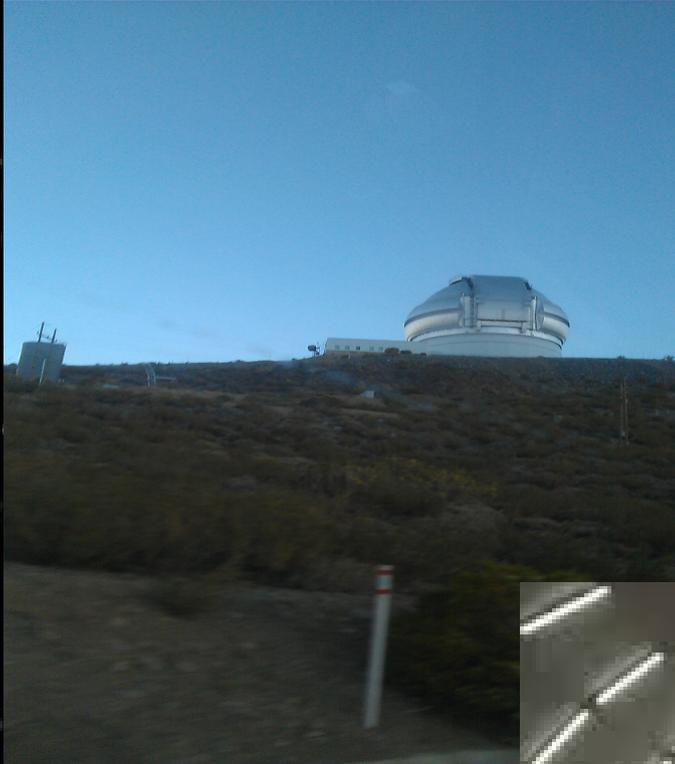




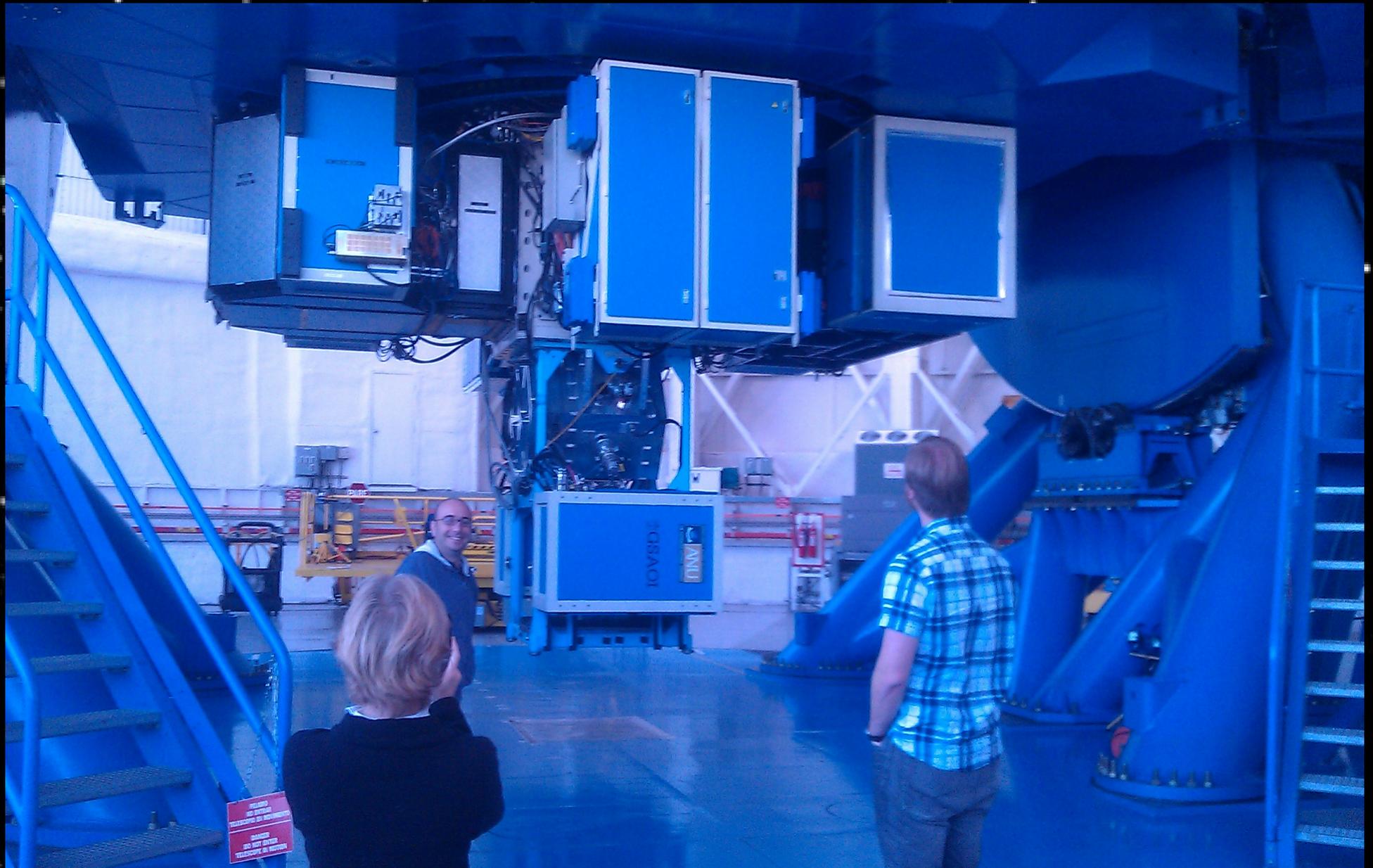
← Cerro Pachon
Street View



At the Summit



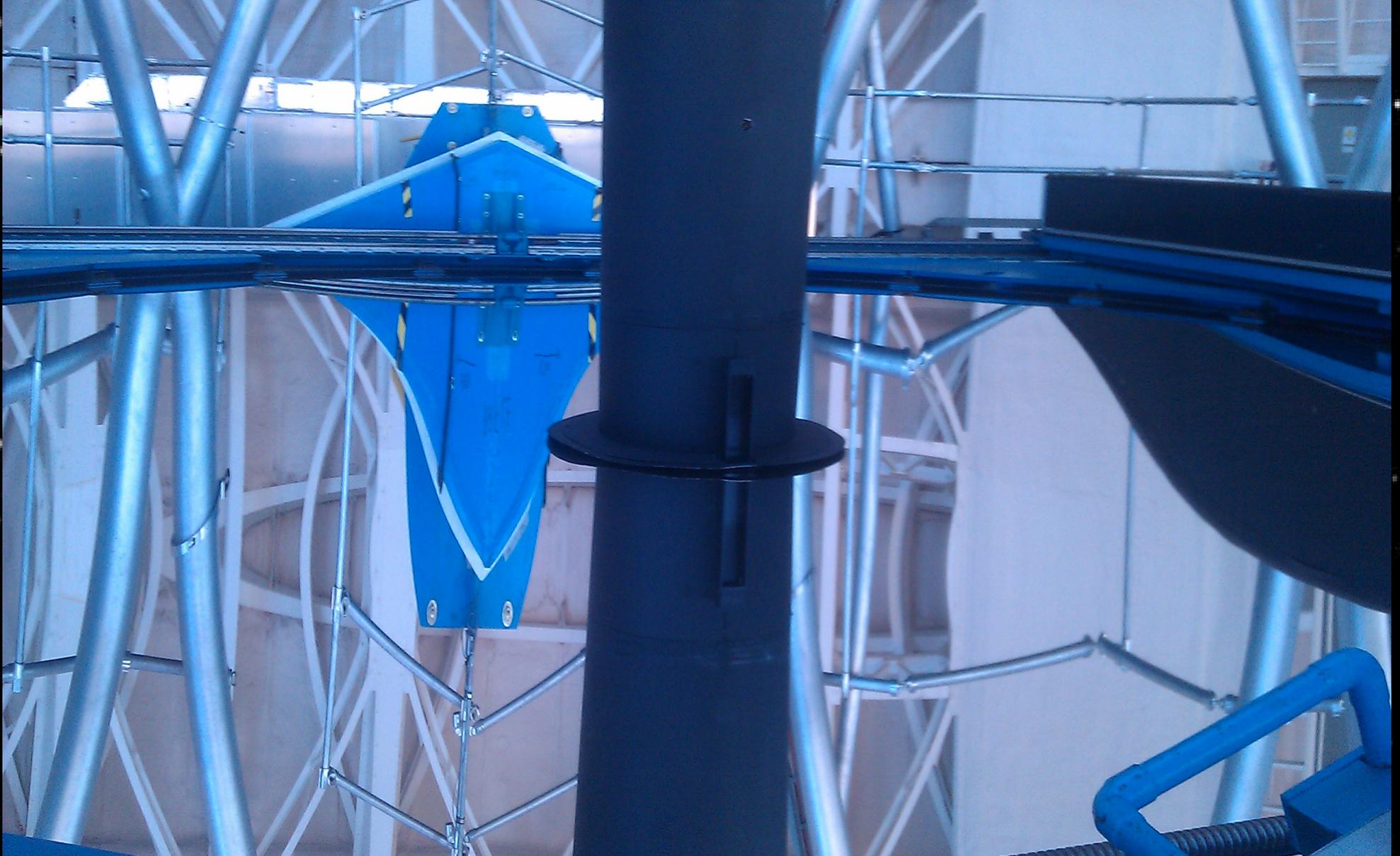
The Telescope and Instruments



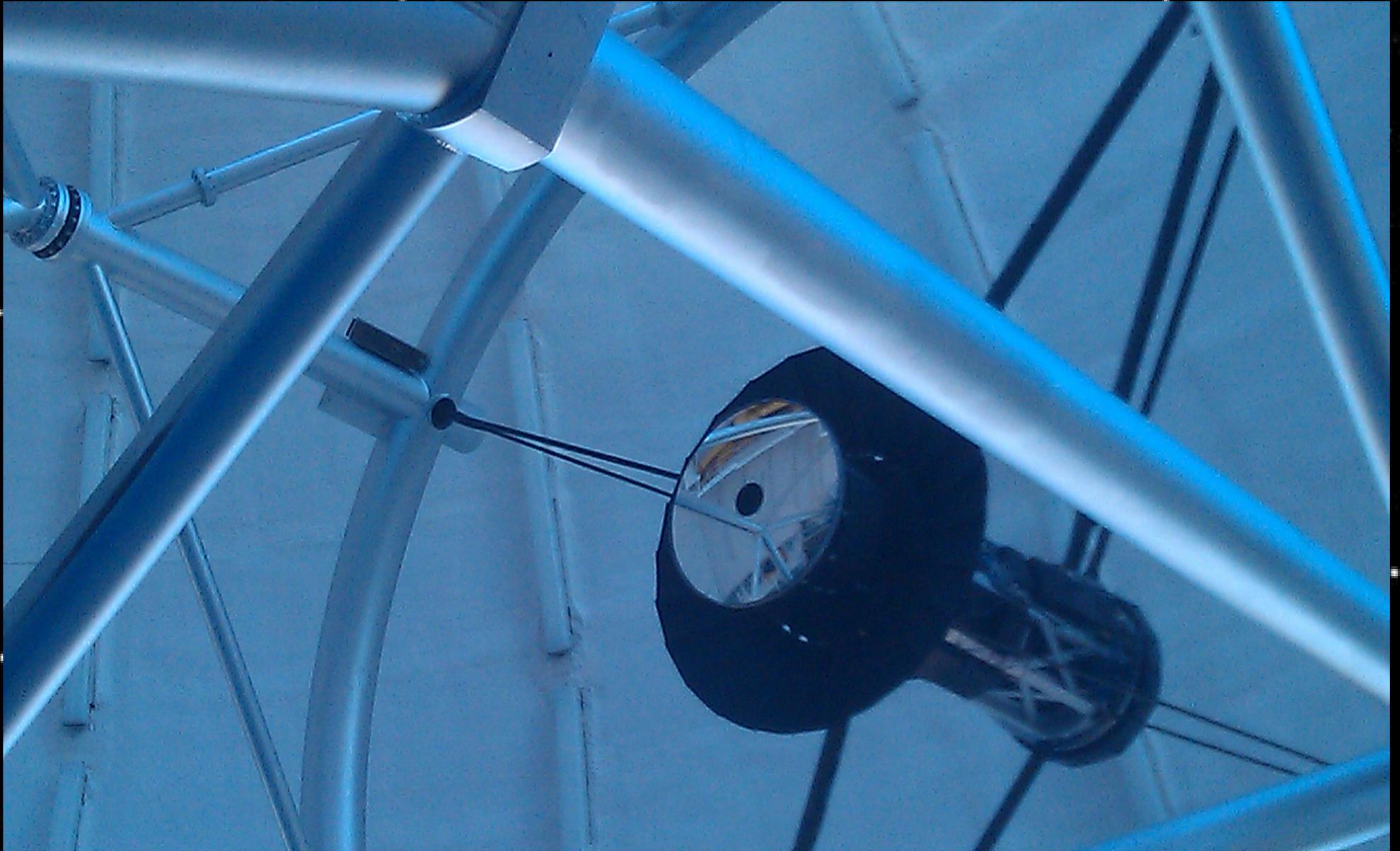
The Telescope and Instruments



The Telescope and Instruments



The Telescope and Instruments



Astronomy!



The Future: Extremely Large Telescopes

- EELT
 - 39.3m
 - Cerro Armazones, Chile
 - 798 segments
 - Planned completion 2022



- 30m telescope
 - Mauna Kea Hawaii
 - 492 segments
 - \$970 million to \$1.4 million
 - Planned completion 2020

Telescope resolution

- Angular resolution – smallest angle on the sky that can be resolved
- Depends on the wavelength of light and diameter of the telescope.
 - $R=0.02\lambda/D$