



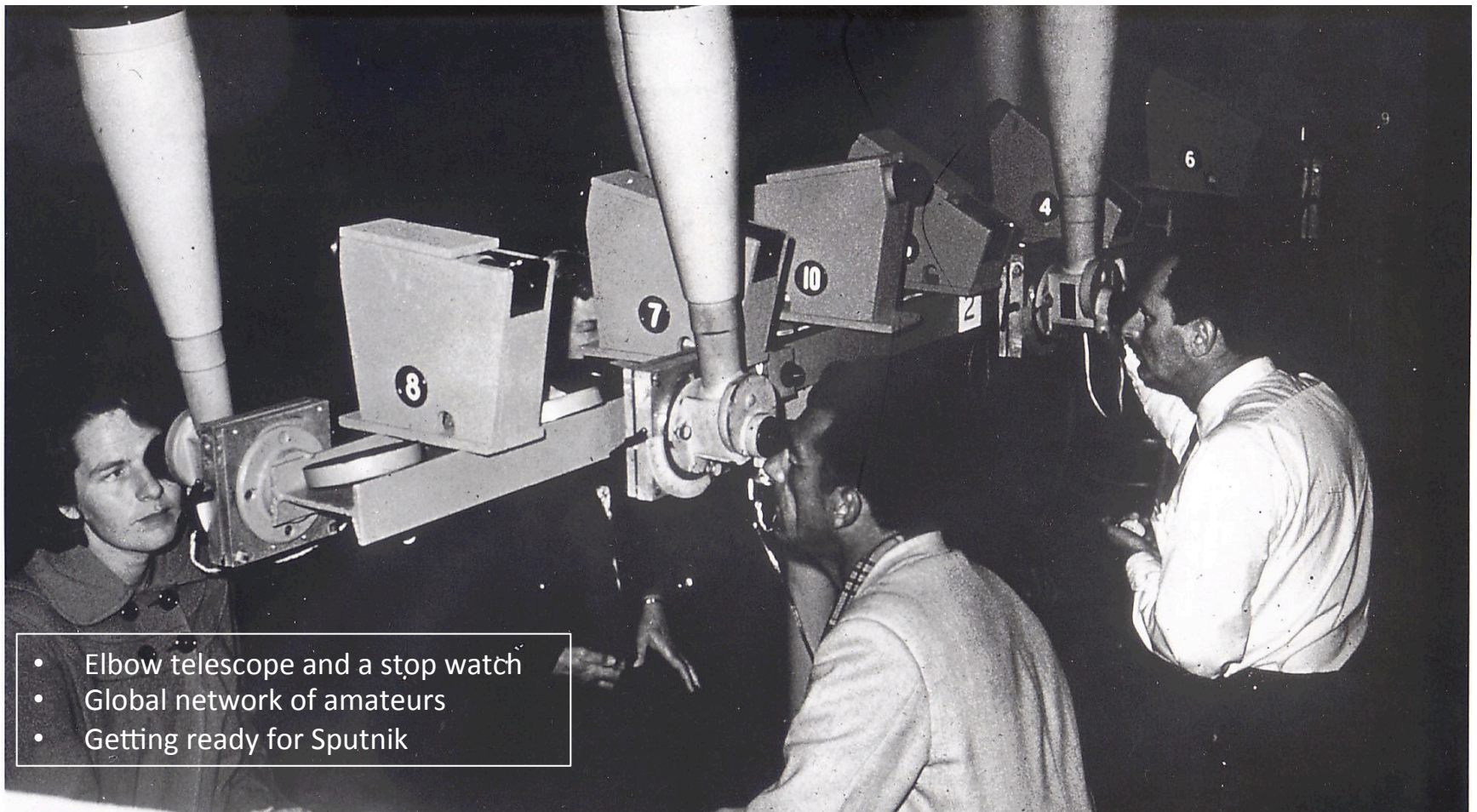
Smithsonian Astrophysical Observatory

The SAO Satellite Tracking Network

1957 - 1983



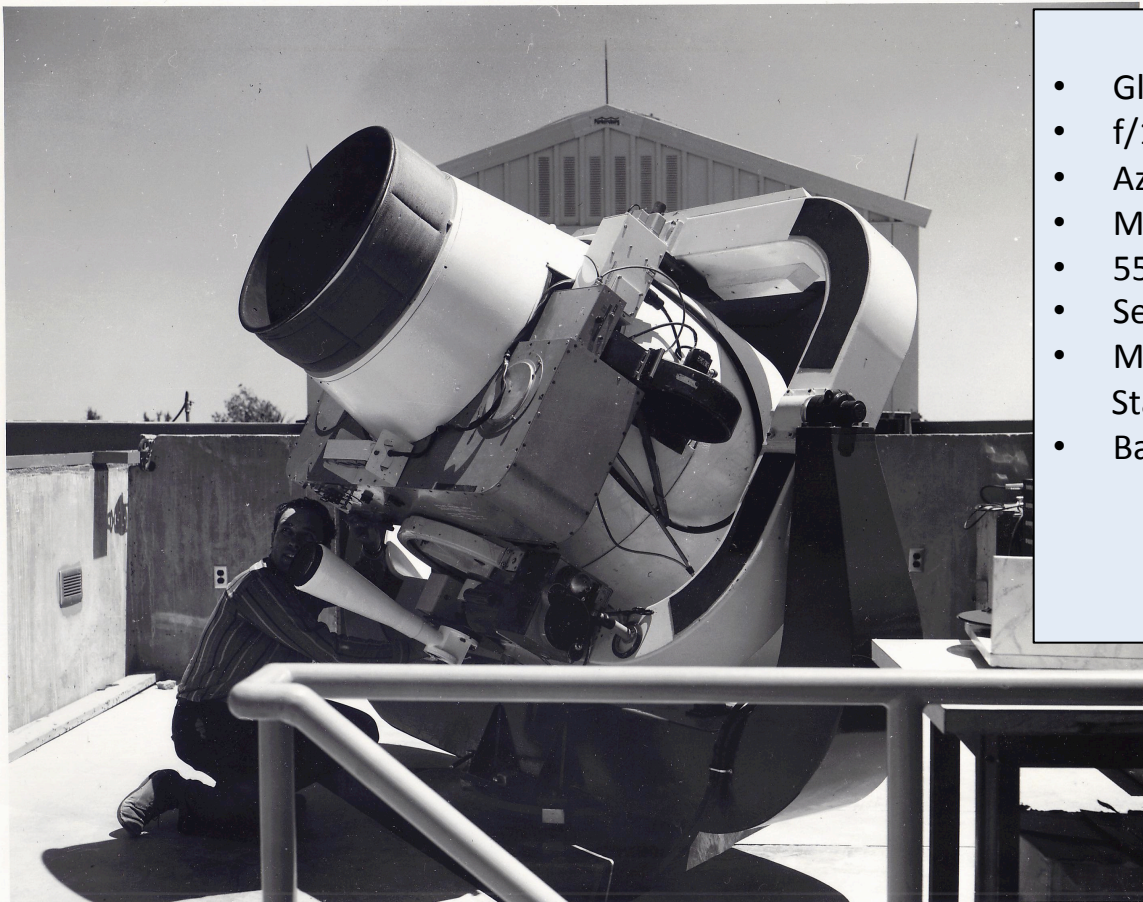
Observing Satellites in the Moonwatch Network (First eyes on the sky)



- Elbow telescope and a stop watch
- Global network of amateurs
- Getting ready for Sputnik



Baker Nunn Camera

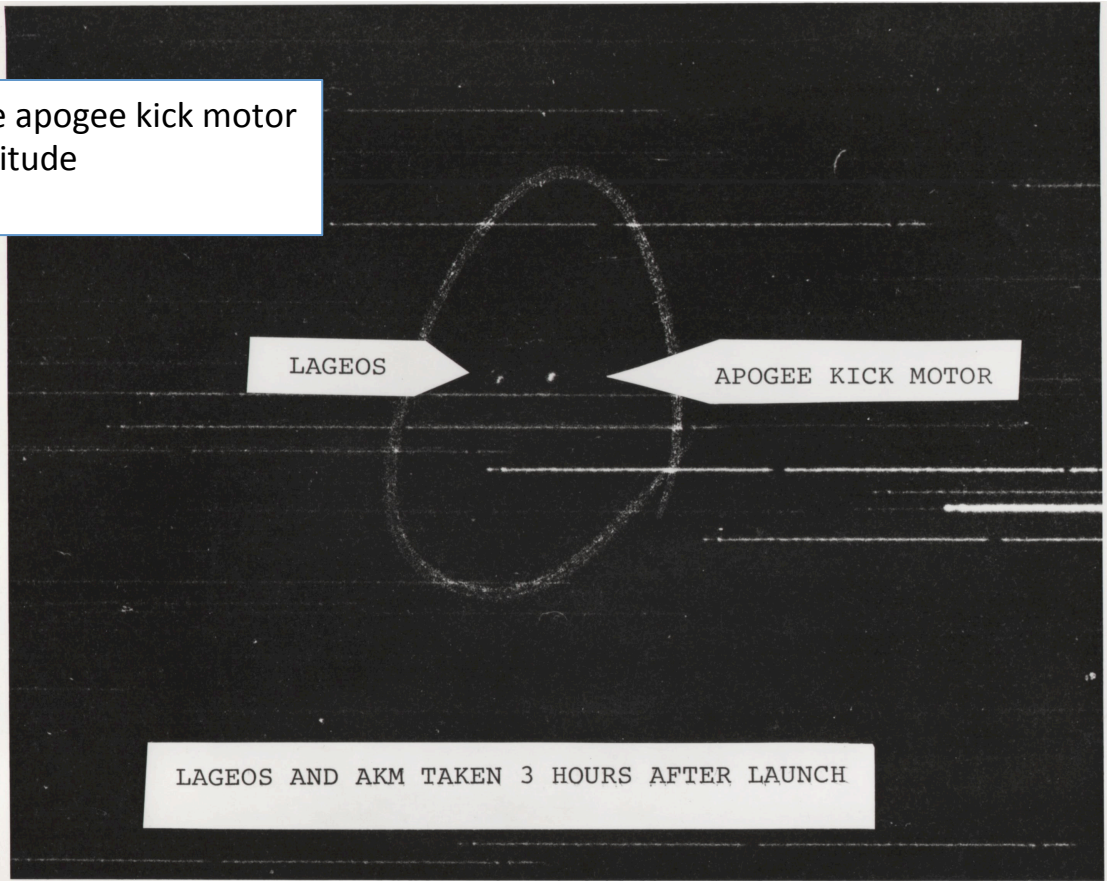


- Global Network
- f/1 Schmidt Camera
- Az-Alt mount
- Mechanized film tracking transport
- 55 mm Film
- See down to 14 – 15 magnitude
- Main source of data for the early SAO Standard Earth Models
- Basis for satellite acquisition and predictions for SLR



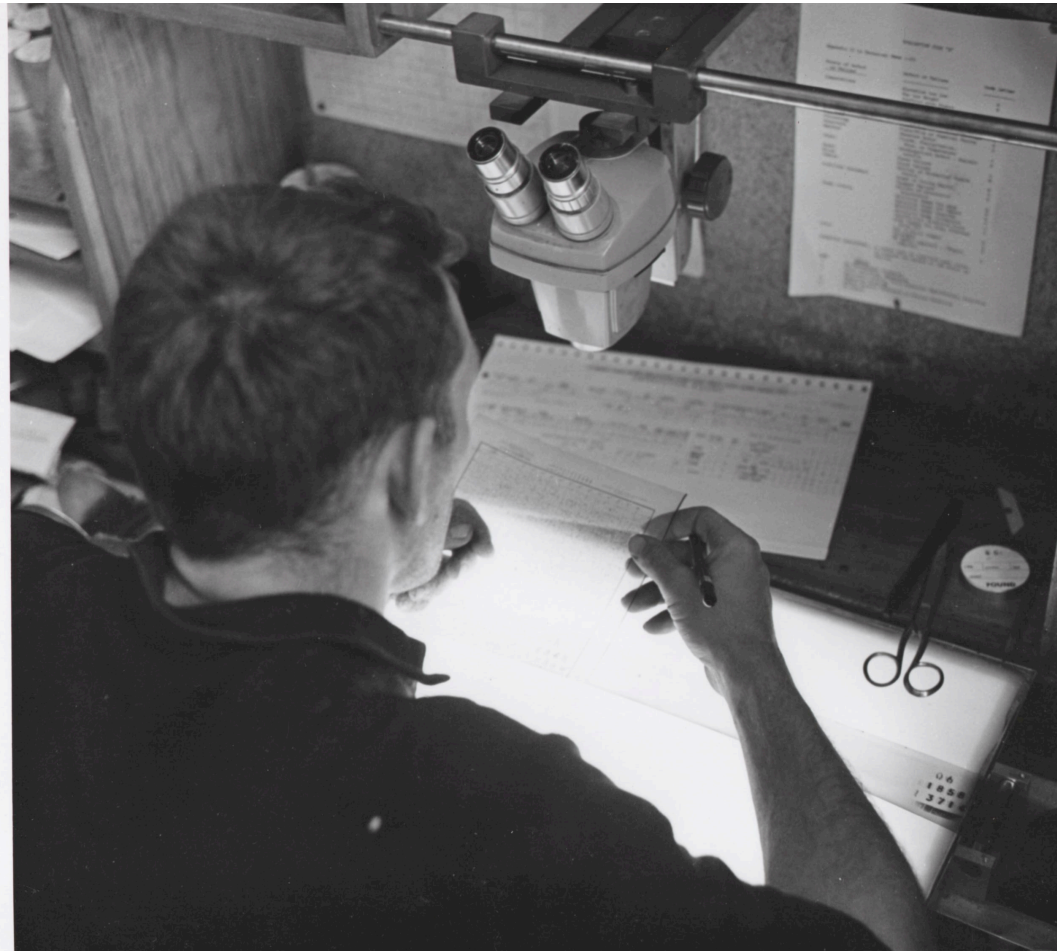
Lageos I BN Photo after Launch taken from Maui

- With 4th stage apogee kick motor
- 12 – 13 magnitude
- May 4, 1976





Photoreduction of BN Films





Smithsonian Astrophysical Observatory

BN Photo of Comet Kohoutek 1973



October 27 - 31, 2014

19th International Workshop on Laser Ranging
Annapolis MD

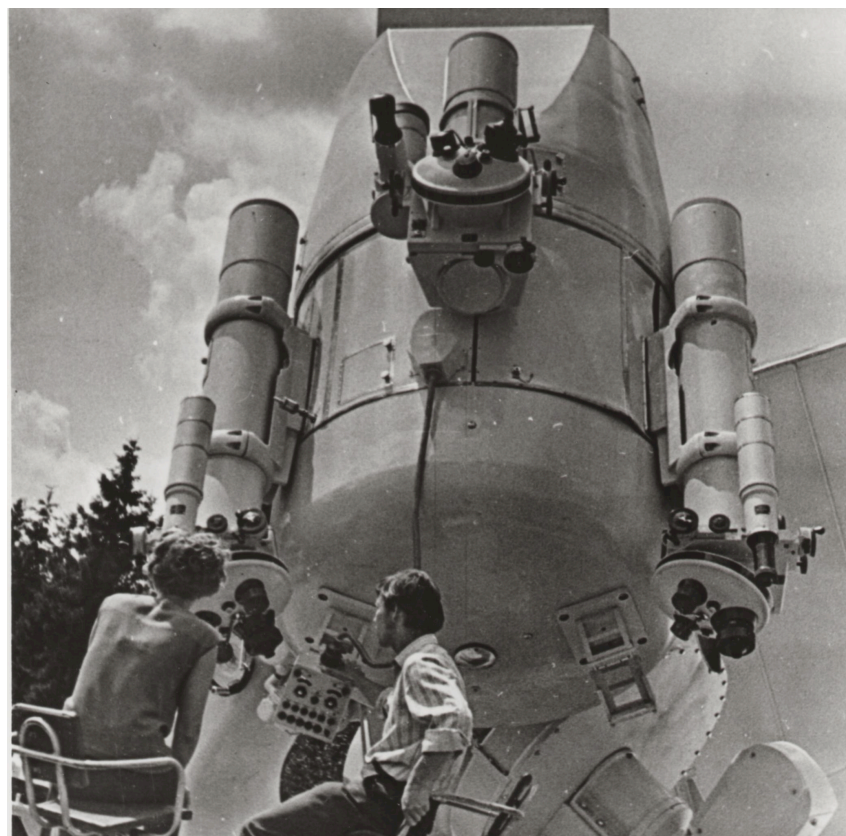


Russian Cameras

AFU 75 Camers

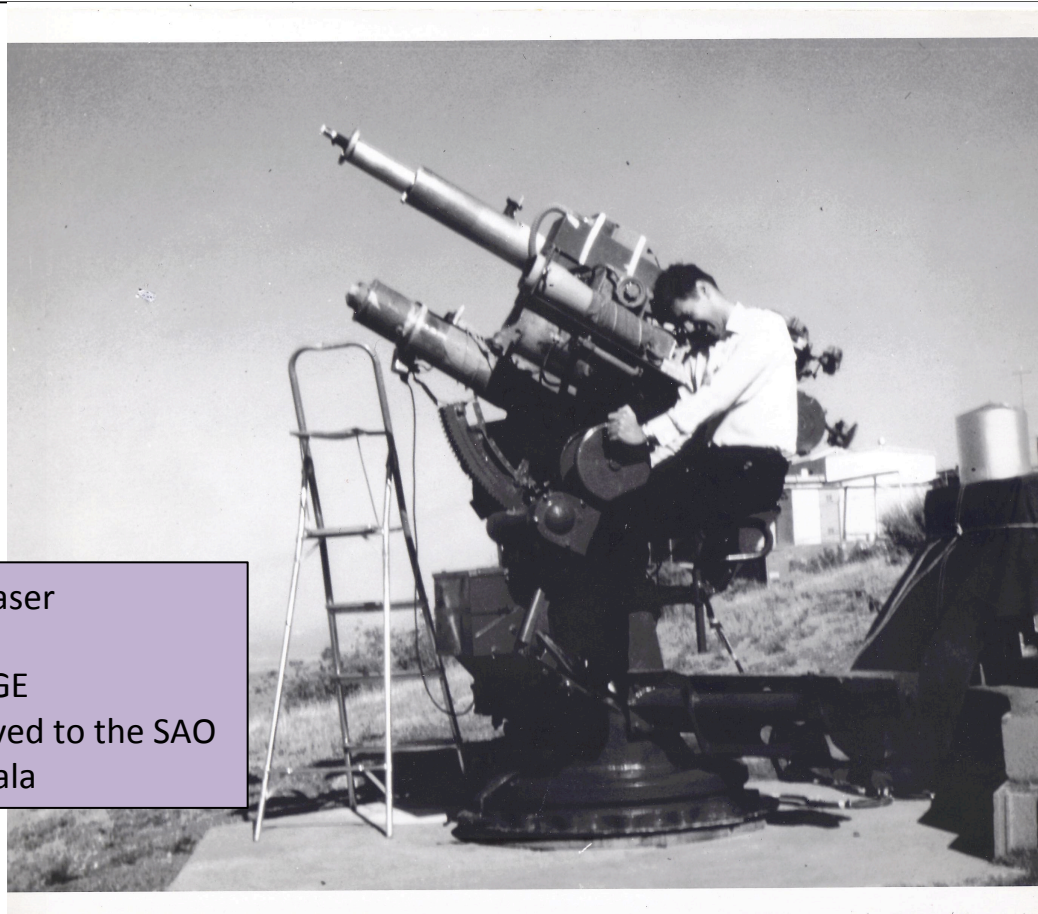


UAV Camera





First SAO Laser Ranging System Organ Pass, New Mexico 1966



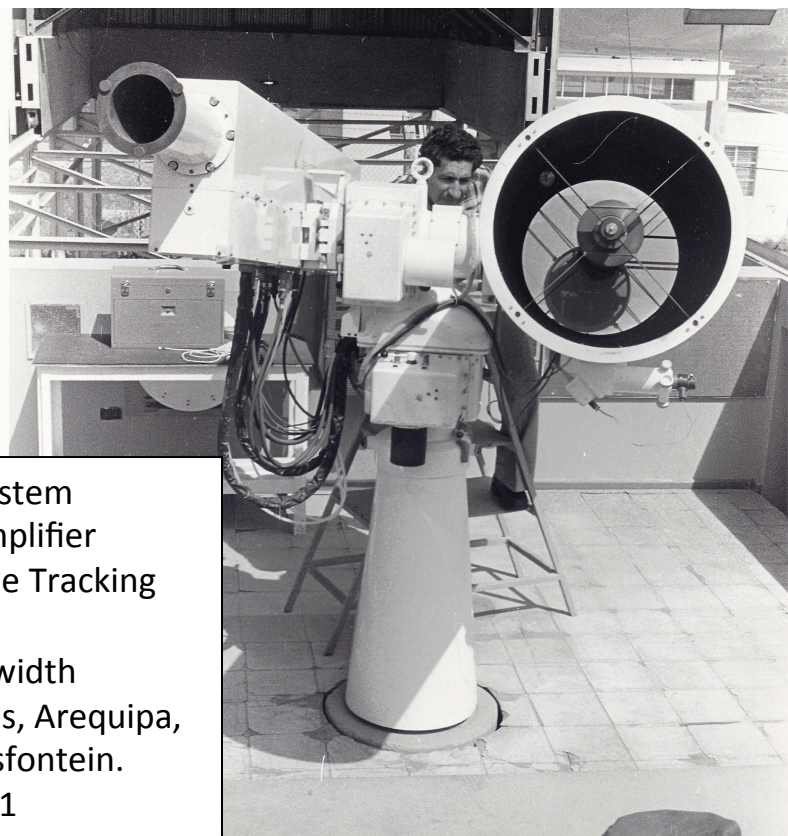
- Q switched ruby laser
- Visual tracking
- Partnership with GE
- Subsequently moved to the SAO site at Mt. Haleakala



SAO Production SLR System Arequipa, Peru

With David Hallenbeck

With Diglio Simone

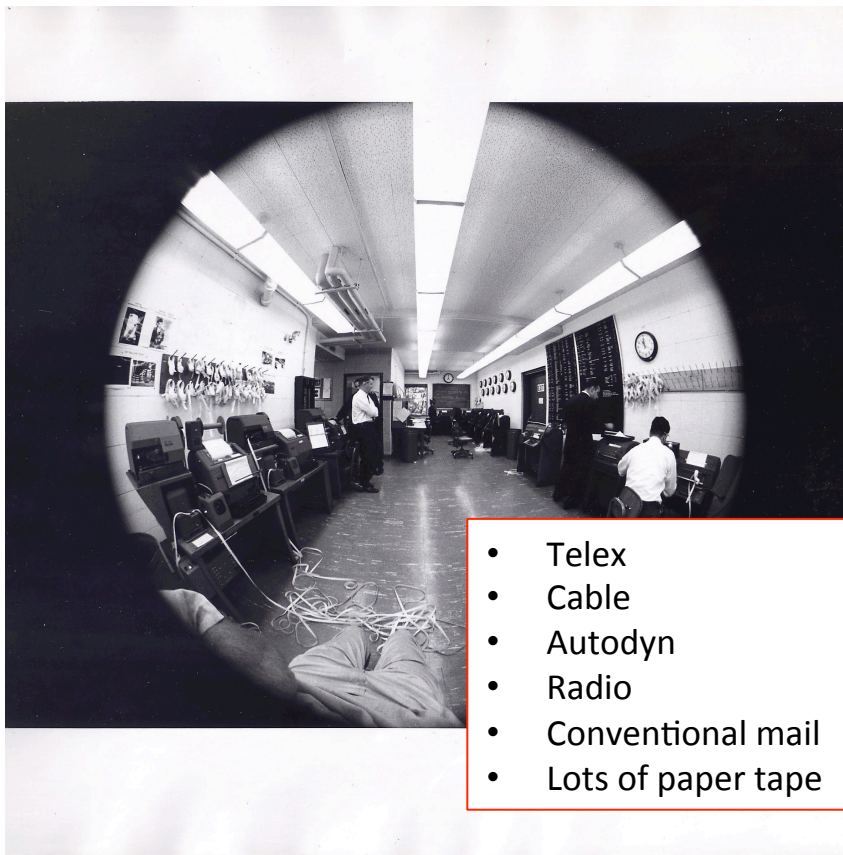


- Bi-Static, Az-Alt System
- Ruby oscillator/amplifier
- Day and Night Time Tracking
- 4 – 30 ppm
- 20 – 5 nsec pulse width
- Sites at Mt Hopkins, Arequipa, Natal, and Olifontsfontein.
- Deployed 1970 - 71



Network Infrastructure

Early Communications



- Telex
- Cable
- Autodyn
- Radio
- Conventional mail
- Lots of paper tape

Timing



Portable Clock

Station Clock



Mt. Hopkins (Arizona) Station

Primary Research and Development Site at 7600'





Smithsonian Astrophysical Observatory

Tokyo Astronomical Observatory SLR System

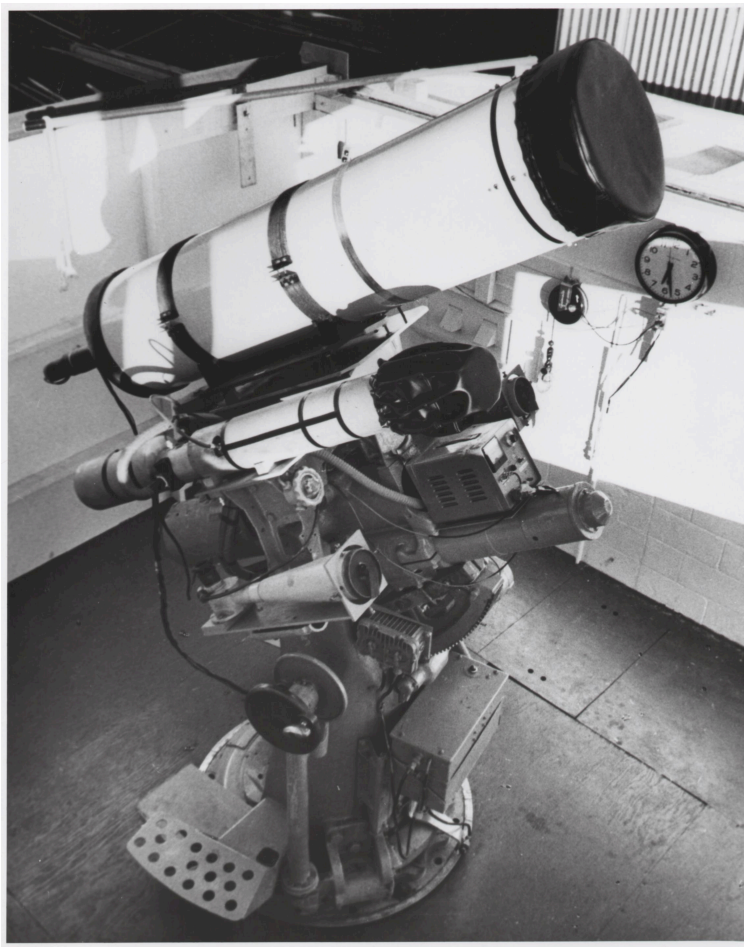


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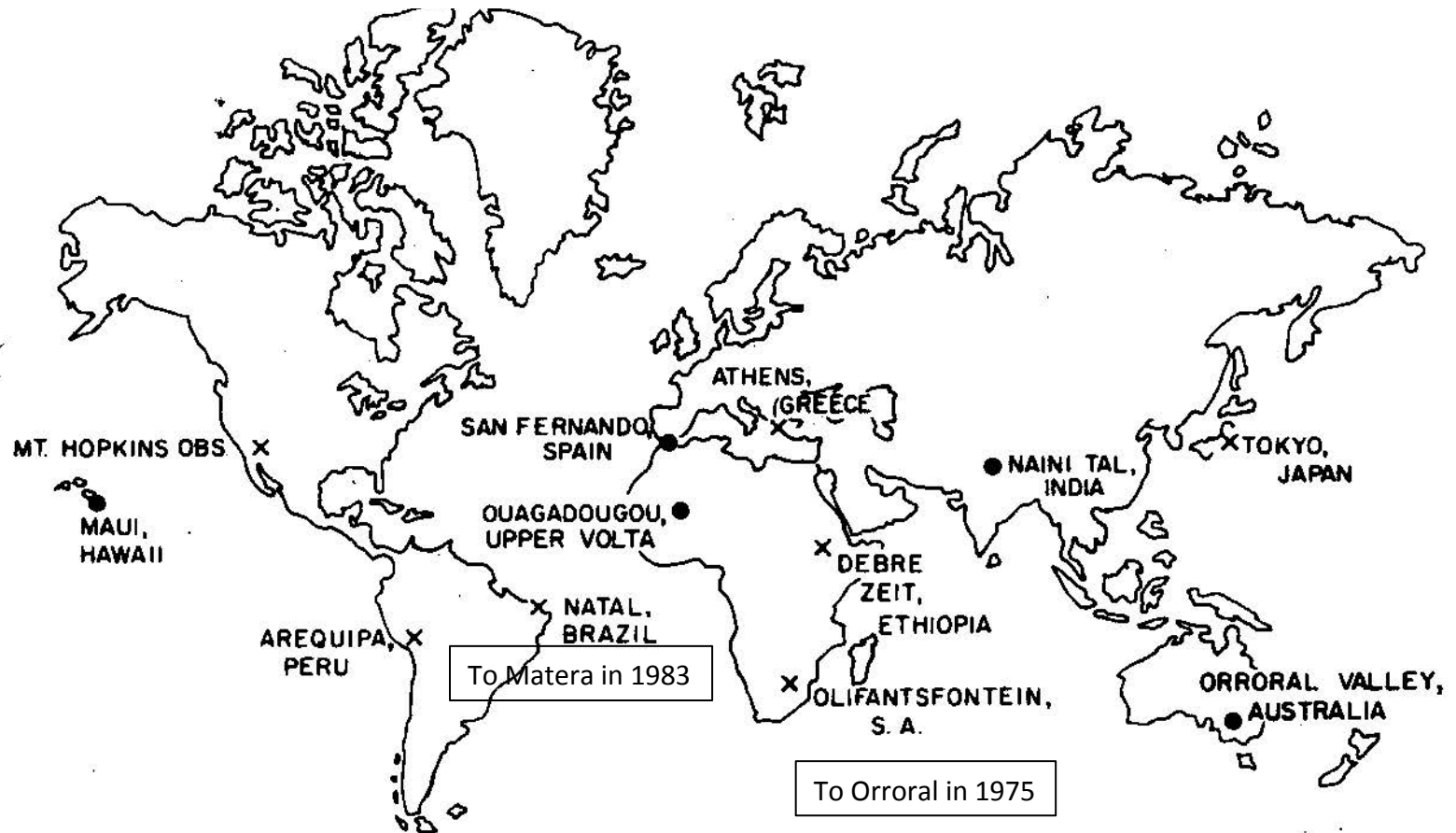


Early SLR System in Athens





SAO and Partner Network





ARLACO EXPERIMENT 1970



- Co-location Experiment between MOBLAS -1 and SAO -1
- Early demonstration of 1 meter performance





SAO Lunar Ranging Transmitter at the Oak Ridge Observatory in Harvard, MA 1972-3.

