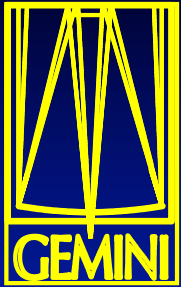


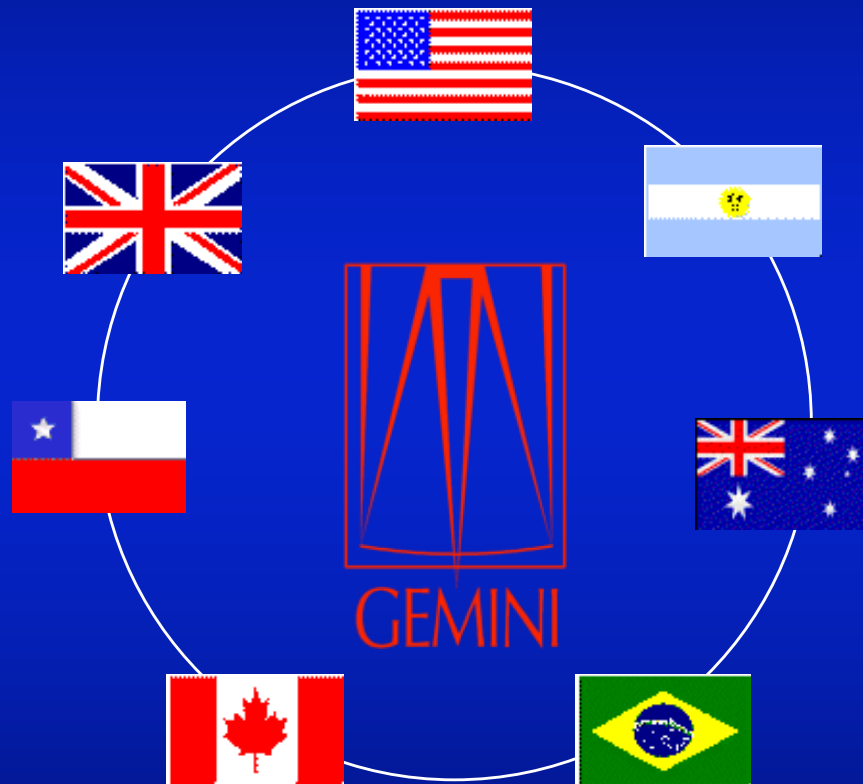
The Gemini Observatory

Connectivity
to
Facilities and Partners
in
South America



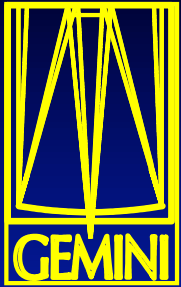


(Like Many Current & Future Major Science Projects)
An International Partnership



Partner shares

- US (NSF) + Host 51.6 %
- UK 22.0 %
- Canada 13.2 %
- Australia 4.4 %
- Chile 4.4 %
- Argentina 2.2 %
- Brazil 2.2 %

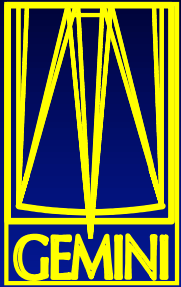


Why an International Partnership?

- Collaboration Combines the Best Talents
- Big Telescopes Cost Too Much for One Country
- Instruments for Big Telescopes Cost Too Much
- Operating Big Telescopes Costs Too Much

(MOSTLY... Big Telescopes, Instruments, and Ops Just Cost Too Much)

US Astronomy Interests Inexorably Tied to International Programs



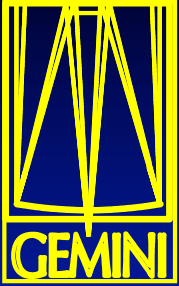
One Observatory Two Telescopes The Whole Sky



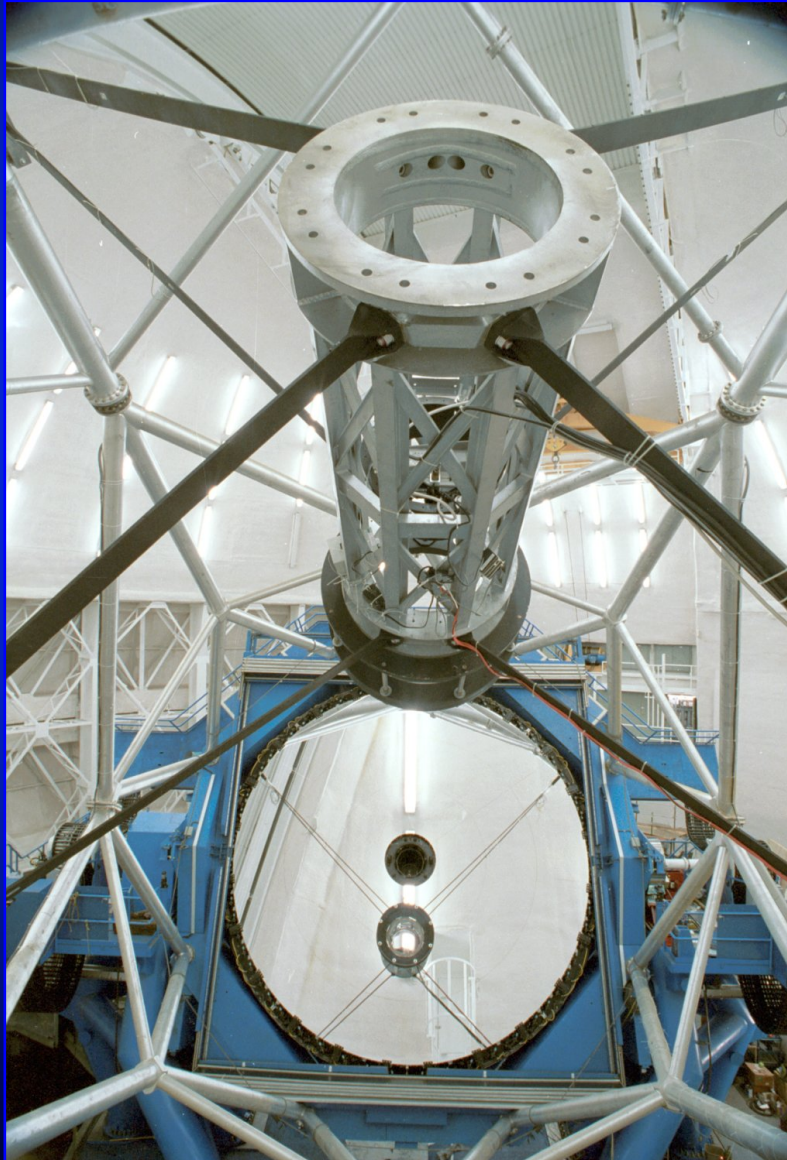
Mauna Kea Hawai'i
13,700 ft

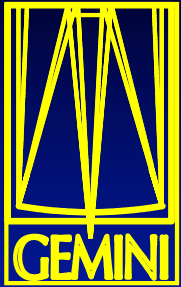
Cerro Pachón Chile
9,000 ft



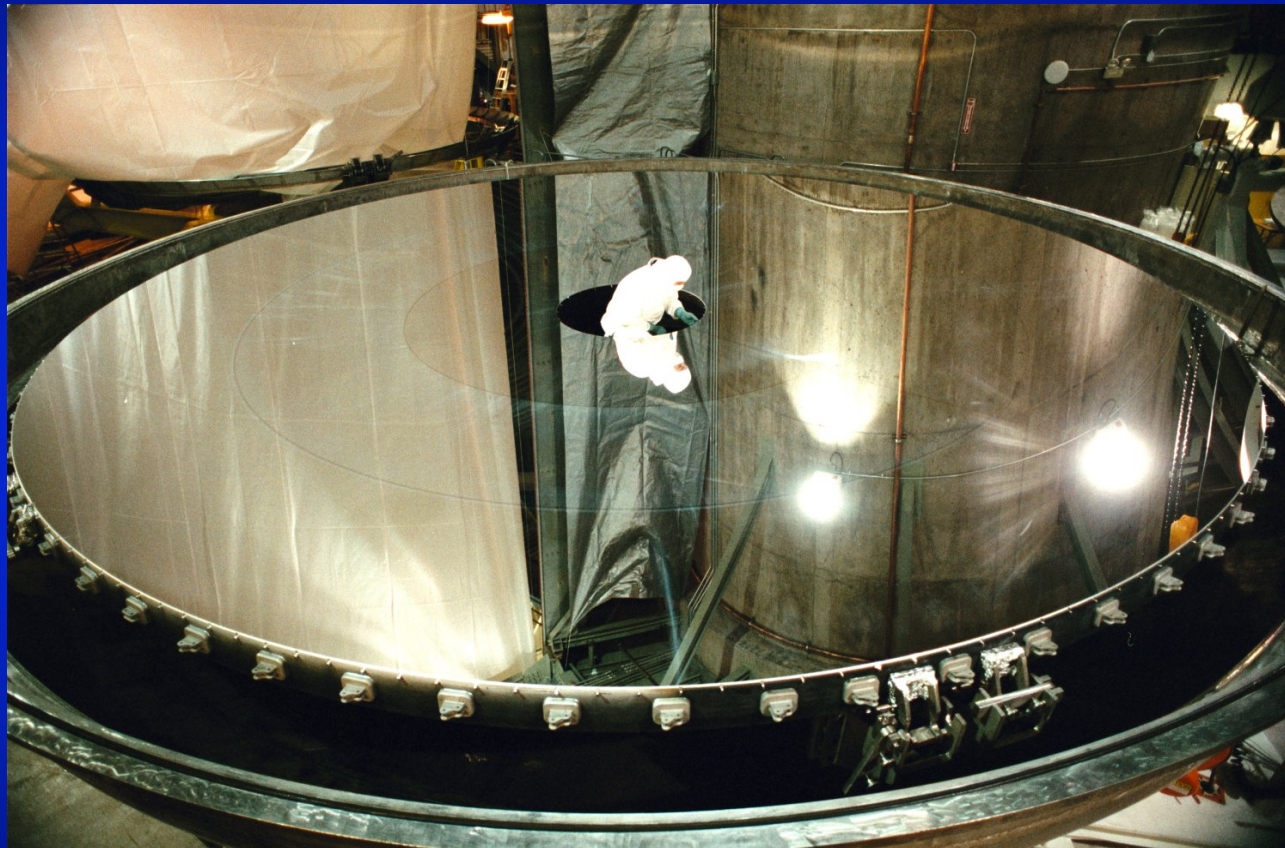


Two views of Gemini North

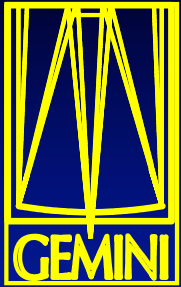




Inspecting an 8m Mirror

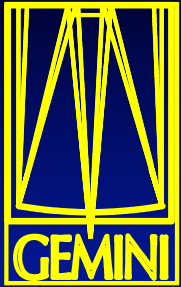


The Gemini North (Hawai'i) after a recent coating



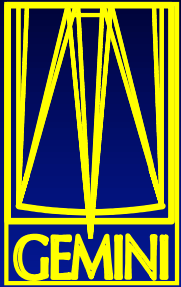
Some Basic Statistics

- Telescope Cost (one) \$92M
- Primary Mirror Cost \$15M
- Weight of the Telescope 380 Tons
- Weight of the Dome 650 Tons
- Excellent Performance in Visible light
- **Optimized for Infrared Observing**



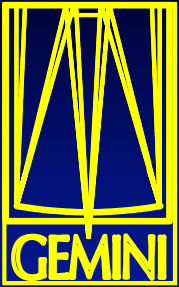
Typical Science Missions

- Black Holes in Galactic Cores
- Stellar Nurseries
- Visualizing Planets Around Other Stars
- Evolution of Planetary Systems
- Formation and Evolution of Galaxies
- Evolution and Formation of Elements

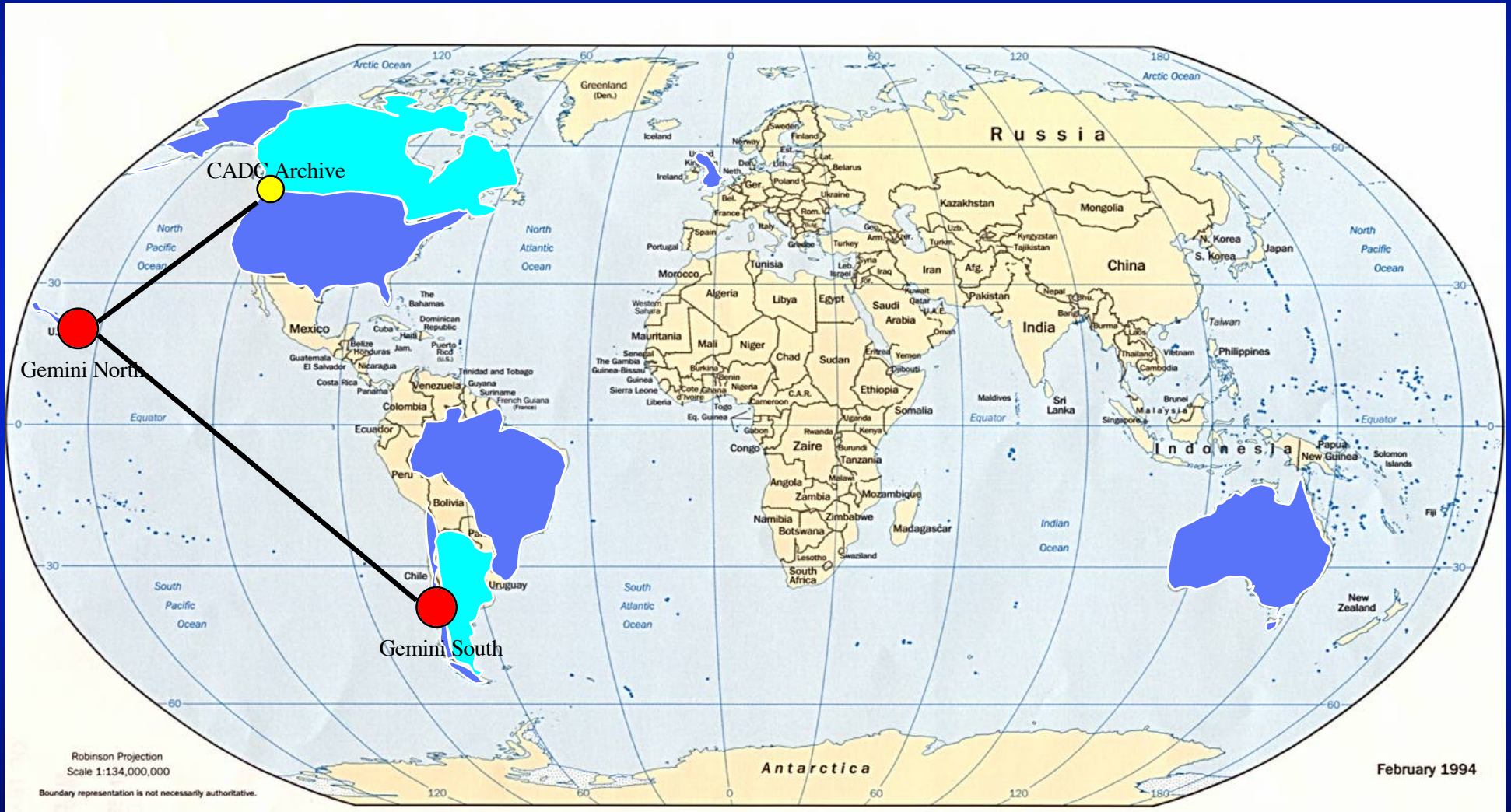


High-Performance Networking: Key to Cost-Effective Science

- Two 8m Optical/IR Telescopes 7K Miles Apart
- Partnership of Seven Nations
- Hostile Environment – Working at 14,000 Feet!
- Internet Applications
 - Videoconferencing (H.323), Telecollaboration, Etc.
 - Remote Execution of Observing, Sea Level or Partner Site
 - Remote Specification of Observing Sequences
 - Data Delivery to Scientists and Archives
 - Remote Analysis of Data, Grid Processing
 - Network-based Education and Outreach



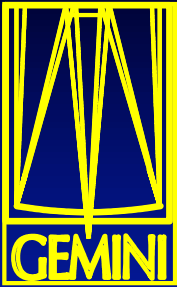
Primary Operational Links (Logical Topography)



Robinson Projection
Scale 1:134,000,000

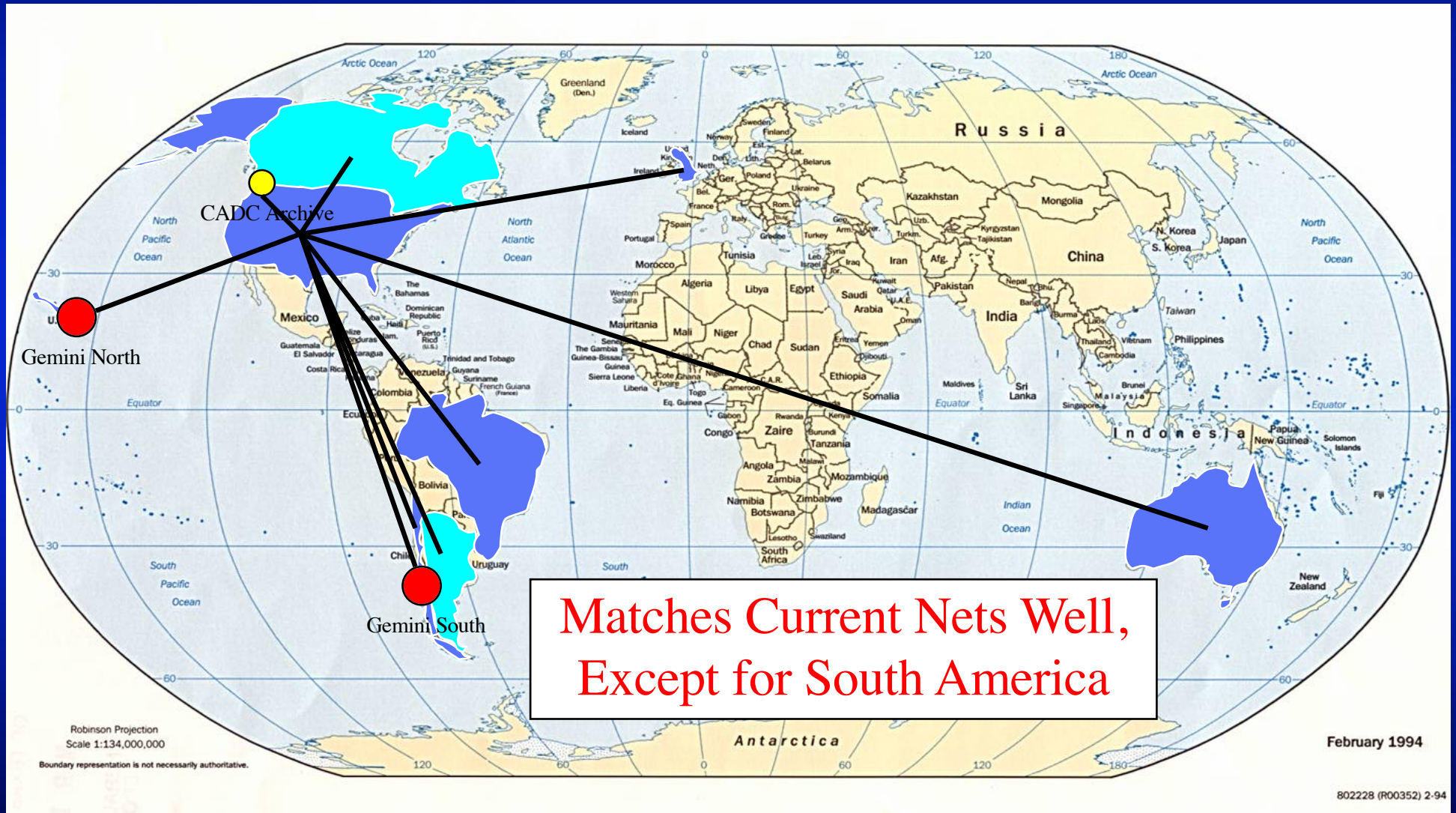
Boundary representation is not necessarily authoritative.

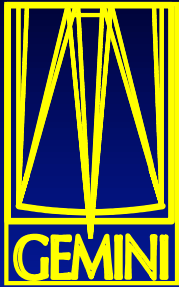
February 1994



Primary Research Links

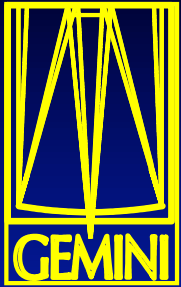
(Logical, But Somewhat More Literal Topography)





Current Status

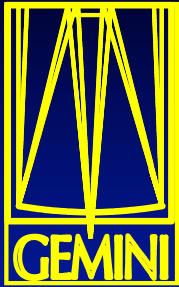
- **Big Island Observatories to Abilene – On Line**
45 Mbps
NSF Start-up Grants to Gemini and U. Hawaii
- **Chile Summits to Base Facilities – On Line**
155 Mbps Two-Hop Microwave (Serves Gemini, CTIO, and SOAR)
NSF Grant to Gemini and CTIO
- **Chile Base Facilities to Abilene – Out for Bids**
8 - 16 Mbps to AMPATH (Serves Gemini, CTIO, SOAR, and Carnegie)
NSF AST Start-up Grant Pending to Gemini



I2 to Gemini South and Collaborators

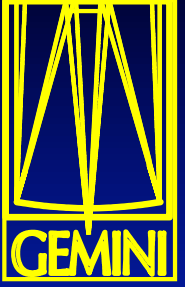
The “Missing Link”

- Gemini/CTIO Facilities La Serena **to**
- Local Provider POP La Serena **to**
- International POP Santiago **to**
- AMPATH POP Miami (FIU) **to**
- Abilene Atlanta **Most Likely at Present**
- STAR TAP Chicago Someday ?? **TBD**
- Completion Target: November



Closing Comments & Concerns

- AMPATH is Critical to US Gemini Science
Gemini's International Science Too, of Course
- AMPATH B/W from/to the South is > 600 Mbps
But, Miami to/from the US/World is Only 155 Mbps
A Problem in the (Near?) Future
- Costs Hard to Plan in 5-yr Budgets Until Recently
No H-P Hawai'i - Mainland Circuits Until Last Year
No H-P Southern Circuits Until A Few Months Ago
- NSF Start-Up Help to Bridge "Budget-Year Gap"
Very Effective Recently in Hawai'i and Chile
(THANKS!)



End