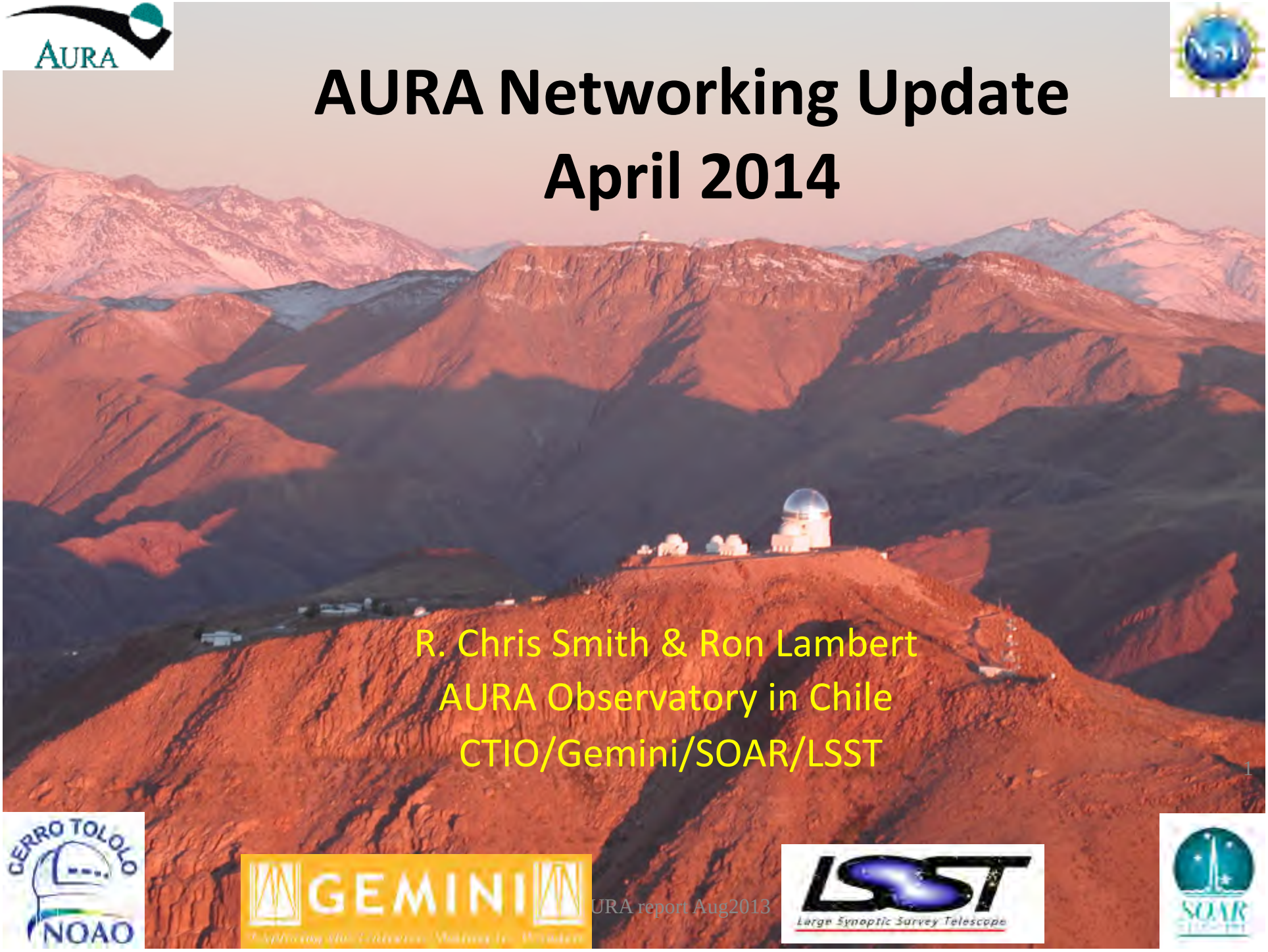
AURA Networking Update
April 2014



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AURA Observatory in Chile
CTIO/Gemini/SOAR/LSST

AURA Network Backbone

- Three segments
  - Summits (Tololo+Pachón) to Base (La Serena)
    - Currently: Microwave link @ 2 x 155 Mbps
  - La Serena to Santiago
    - Currently: REUNA @ 1Gbps
  - Santiago to U.S. RENs
    - Currently: AmLight+LAUREN @ 1Gbps

AURA Backbone Users

- Large users
  - NOAO/CTIO
  - Gemini
  - SOAR
  - KASI (Korean)
  - LSST (yes, already!)
  - Carnegie (La Serena)
  - NRAO/ALMA (Santiago)
- Smaller Users
  - SMARTS
  - PROMPT
  - GONG
  - ALO
  - WHAM
  - LCOGTN
  - Yale
- Coming Soon
  - mEarth (Harvard)
  - T80S (Brazil)

Users on Tololo: DECam

- Dark Energy Camera in Operations
  - Science: since November 2012
- 570 megapixel (largest in S. Hemisphere)
  - 1 GB images uncompressed,
  - on average, approx. 300-500 GB/night
  - record: 889 GB in one night, Jun 19 2013
  - Some observations need real-time data transfer
    - Forster et al. (Chilean) to NLHPC via REUNA

Users on Pachon+Tololo

- Gemini
  - Automatic data transfer to CADC in Canada
  - Remote observing capabilities under development
  - Remote control requirement soon
    - Requires very high quality of service, security

Users on Pachon+Tololo

- SOAR
  - Remote observing to U.S. regularly (UNC+MSU+…)
  - Remote observing to Brazil growing
- Robotic network telescopes: network critical
  - PROMPT, GONG, WHAM, LCOGTN, mEarth, T80S
- Common theme
  - Mix of time-critical control with non-time critical data

Planned Upgrades

- Short term
  - Additional backup La Serena:
    - ENTEL out of AURA Campus at 20Mbps
  - Mountain-base backup
    - New 200Mbps wireless systems being investigated
- Longer term (driven by LSST)
  - Mountain to Base: 10-100 Gbps fiber connection for both Pachón and Tololo facilities to La Serena
  - LS-Stgo and Stgo-US links at 10-100 Gbps

Key Elements for Future

- Quality of Service aspects looming more important than total volume
  - Remote operations needing higher QoS
  - Massive data transport needing lower QoS
  - Variety of users means variety of requirements
  - Need traffic segregation and prioritization

Evolution in Requirements

- Intermediate (~4-5 year timescale)
  - Local Partners
    - CTIO ~1Gbps
    - Gemini ~1Gbps
    - Other tenants ~1Gbps
  - WAN Partners
    - Las Campanas ~1Gbps
    - NRAO ~2.5Gbps
- ~8 year timescale: LSST…