The AGAP Seismic Deployment: Solutions to Logistical and Technical Challenges.

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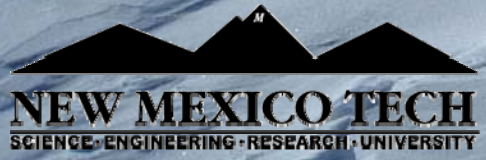
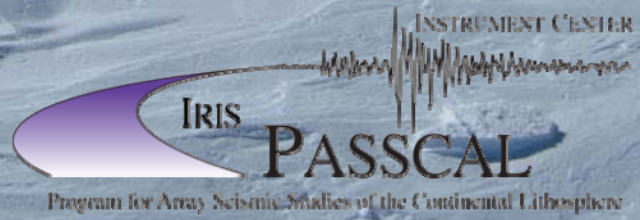
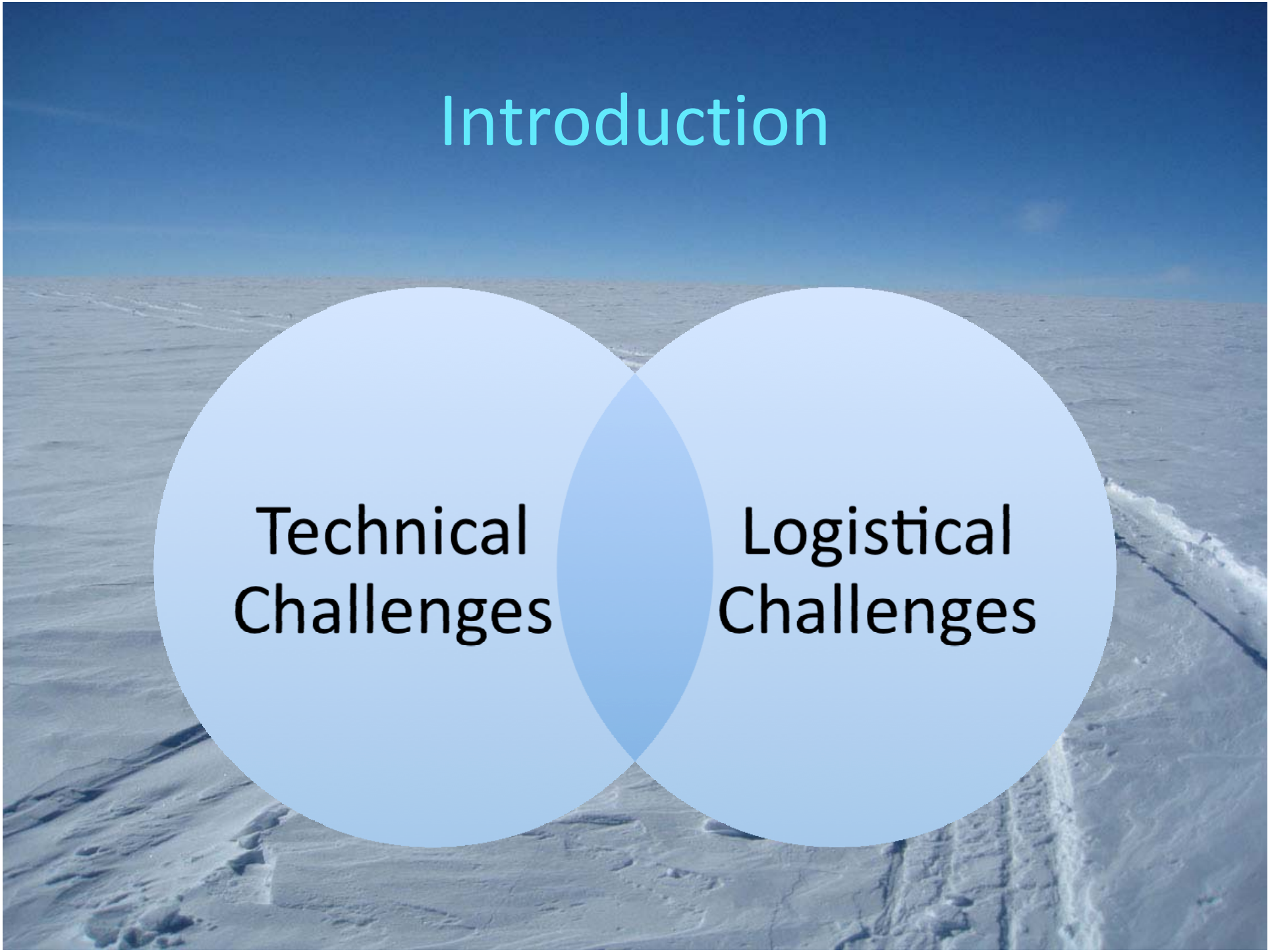




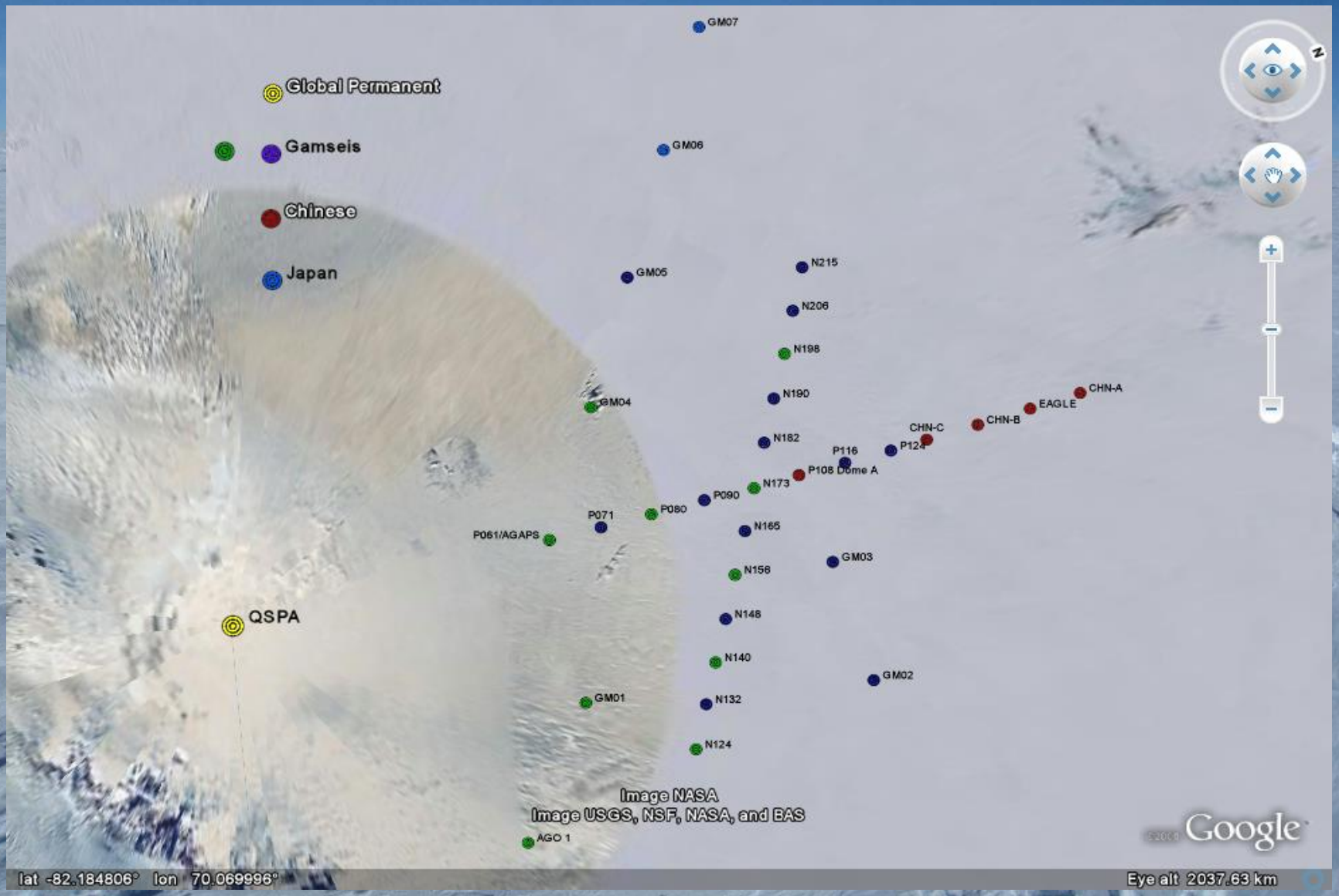
Introduction



Background: What is the AGAP Project?

- Study of the Gamburtsev Mountains
- GAMBIT: Aerial Geophysical Survey (Gravity, Radar, …)
- GAMSEIS: Seismic Network (Seismic Tomographic Study)

Map of the GAMSEIS Array

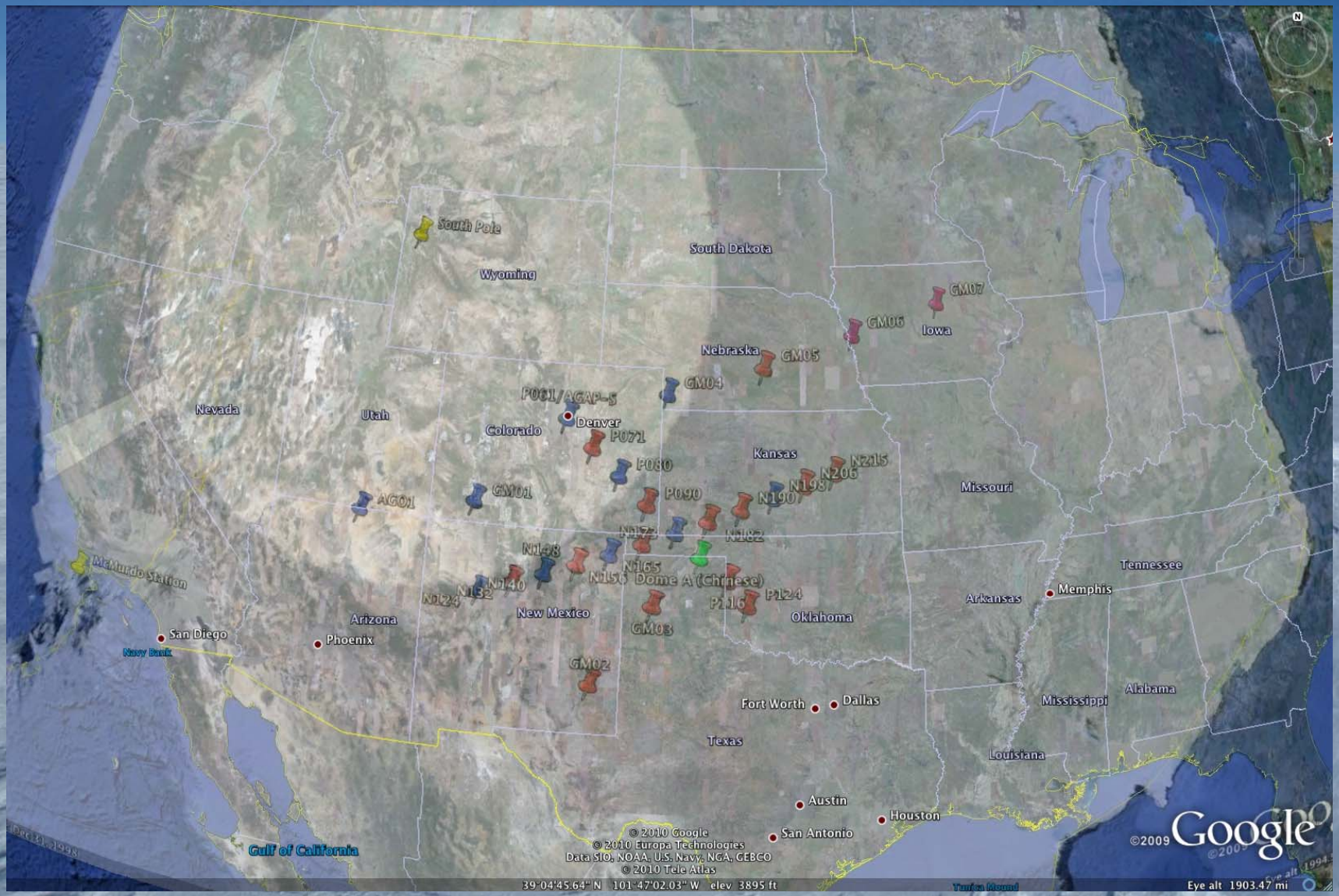


A Typical Station in the Array

Logistic Challenges:

- ✧ Accessibility:
  - Limited opportunity to access site
  - Large distances to cover
  - Problems in case of Emergency
- ✧ Temperature:
  - Hard on personnel
  - Hard on equipment
  - Good for ACL
- ✧ Altitude:
  - Mostly hard on personnel (fatigue)
  - Bad for ACL (loose all the gains from Temperature ☹)
  - Need for Oxygen

AGAP Array size compared to US



Logistic Challenges (cont'd):

- ✧ Length of season:
  - Only very limited time window to do the work. Everything has to happen fast.
- ✧ Weather:
  - Usually good on the Plateau, but aircraft minima are pretty high.
  - Sastrugis can be a problem. Thank goodness for KBA pilots!
- ✧ Cost! : ~90hrs of Twin Otter for 26 sites, with 8 personnel + extra help.

Technical Challenges:

- ✧ (Extreme) Temperature:
  - De-rating of batteries.
  - Electronic stop working.
  - Makes everything brittle.
  - Need for very large amount of insulation.
- ✧ Power:
  - Big problem in winter, not in summer.
  - Strive for low power → low heat → T problem and vice-versa

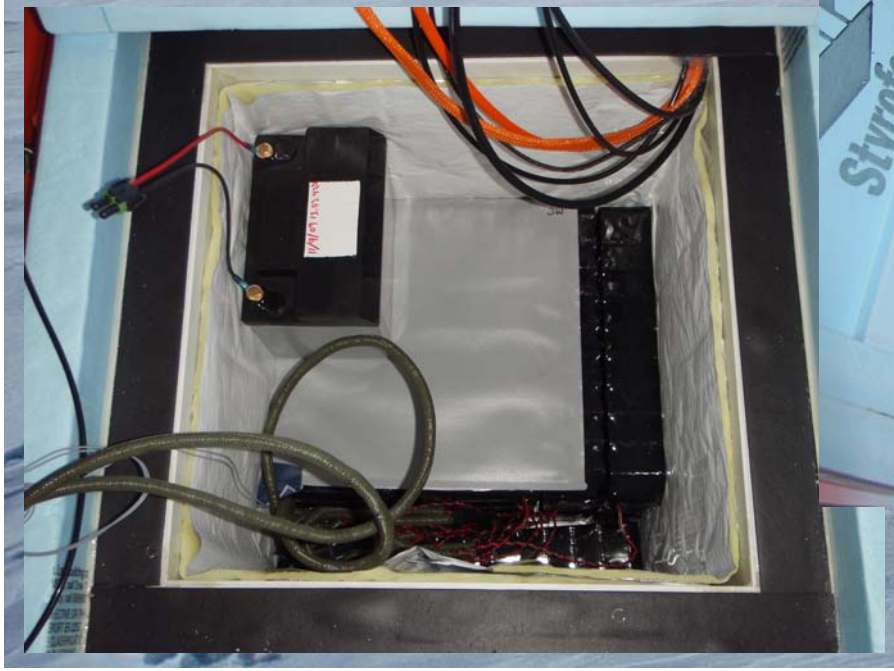
Speaking of Power

Technical Challenges (cont'd):

- ✧ Reliability:
  - Particularly necessary because of the inaccessibility.
- ✧ Near real time data vs long term storage:
  - Can be an issue with PI (No data for a long time)
  - Law of diminishing returns: cost of additional expensive Lithium batteries to run real time telemetry versus cost of visit to the site.
  - Is it really necessary to get data real time?


Solutions to Most Challenges
Small
Light
Fast

Small & Light



Small & Light

- Less ACL limits and volume limits
  → Can service/install more than one site per mission
- More personnel can join forces for the service/install run
  → Operation goes faster…

… which brings us to the next point

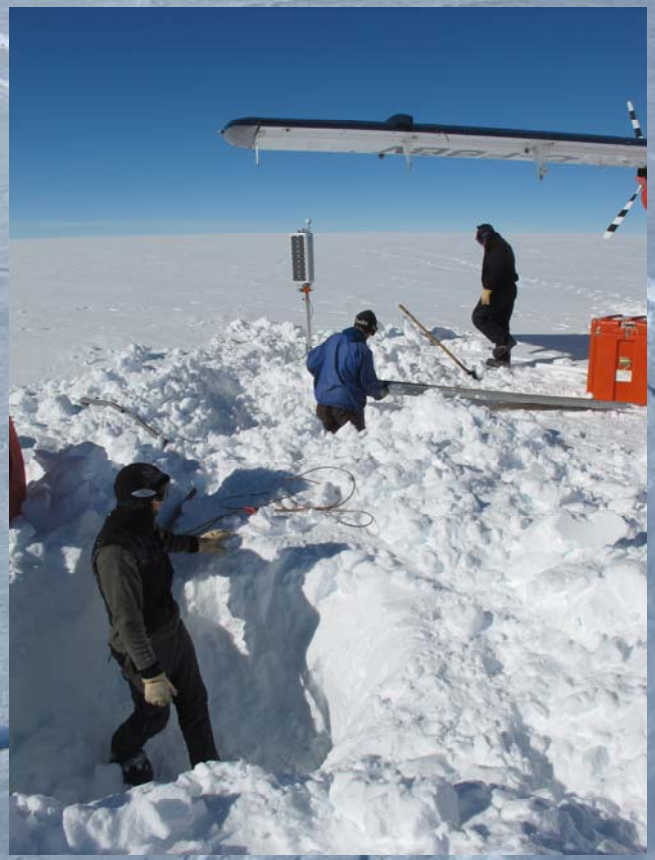
Fast

- Simple install or service means that we spend less time at the site, which means we can go through the array faster.
- This allows for more down time (if needed) and weather days.
- This makes it easier on the personnel, especially concerning altitude issues
- One advantage of working at very high latitude: Light 24/7. We were able to work with day and night crews.

Fast (cont'd)

- To achieve this:
  The system is designed with minimum assembly on site.
  All that need to be done on site is:
  - Burry sensor
  - Burry electronic box
  - Install solar panels
- The whole operation takes < 1hr with a crew of 4.

Fast



Conclusion:

- Year around seismic data recording on the Antarctic Plateau offer lots of challenges.
- Solutions involve simple designs that involve small and light equipment.
- Solutions also involve equipment that can be deployed rapidly.

- Questions?