



# LOGISTICAL CHALLENGES AND CONSTRAINTS

- US Antarctic Program faces three major constraints:
  - Aging fleet of LC-130's
  - Facilities renewal projects
  - Increased science demand for major deep field camps and South Pole facilities upgrades
- Short term this means field campaigns must be nimble with fewer boots on the ground with simplified, tractable field and retro plans
- Long term these constraints open opportunities for:
  - More international coordination and collaboration with other national programs (last season's success of bilateral Thwaites Glacier initiative is example)
  - Developing and implementing new technologies to enhance science (success of SOCCOM floats across Southern Ocean speaks to the power of technology enhancing science with a small logistics footprint)

# SCIENCE DEMAND AND TECHNOLOGY GAPS

- Science community is the driver of large initiatives, for example large field campaigns are born from decadal surveys, workshop reports, or other community publications.
- US Antarctic Program has technology gaps and is supportive any technology that will:
  - EXPAND REACH, REDUCE FOOTPRINT
    - Reduces our footprint in Antarctica (sample data reuse, remote sensing)
    - Allows us to expand our reach without increasing our footprint (such as robotics, UAV's, AUV's, moorings) and smart ARGO-type floats that measure air-sea exchange properties
    - enhancing sensing capability
  - IMPROVE TRANSPORTATION REACH AND RELIABILITY
    - Reduce our dependency on LC130's
    - Improve our deep field capabilities, such as extended traverse capabilities and deep field mobility
    - Reduces our dependence on fossil fuel

- **ENHANCE OPERATIONAL EFFICIENCY**
  - Improve communications on continent and off
  - Improves power/battery efficiency
- **ENHANCE OUR SENSING CAPABILITIES**
  - Access novel environments such as ice shelf (such as below shelf, grounding line, sediments below)
  - Explore and exploit technology developed from the Arctic and International programs
  - Create platforms for multidisciplinary sensor networks
  - Enhance sensors 1) miniature and rugged, 2) greater resolution, sensitivity, spatial coverage, etc.
  - Enhance weather prediction
  - New approaches for sample analysis including technology repurposed from industry/medical fields
- **INTEGRATION WITH ENGINEERING COMMUNITY**
  - NSF sees opportunity in the engineering community to help solve pressing technology gaps, but also as a way to broaden participation in the US Antarctic Program through an increased in diversity of researchers and developing scientific platforms and tools that will allow more researchers to access the Antarctic.

# NSF OPPORTUNITIES

- Instrumentation development through OPP-ANT Solicitation outlines the type of proposals considered
- NSF Office of Polar Programs is interfacing with NSF Office of Advanced Cyberinfrastructure to overcome some US Antarctic Program's technological challenges.
- The NSF-wide opportunities for funding technology development.
- Major Research Infrastructure (MRI) solicitation
- Small Business Innovation Research (SBIR) and Science Technology Center (STC) are funding programs at NSF that couple science and business innovation.