NSF Airborne Oceanography Activities

Outline

• SCARGO update
• AMELiA GV proposal
• How to request NSF aircraft
Southern Ocean Carbon Gas Observatory (SCARGO)

- NSF Polar Programs funded project
- “Roll-on / roll-off” rack and inlet
- Measuring CO₂, CH₄, CO, and H₂O
- NYANG LC-130s operating between Christchurch, McMurdo Station, and the South Pole, Nov-Feb
- Primary goal to quantify large-scale air-sea CO₂ exchange

Modeled summertime CO₂ anomalies

B. Stephens, M. Long, K. McKain NSF OPP proposal, 2018
SCARGO integration and test flights completed in March, 2022
SCARGO test flight vertical profiles
SCARGO Plans

• Initial “test” season, Nov. 2022 – Feb. 2023
• Four field staff deploying from U.S. plus local NIWA support in Christchurch
• No dedicated flights
• Limited profiling
• Significant uncertainty in number of USAP supported flights
A new concept for small-scale tomographic GV deployments repeated two times per year for four years

A well-tested payload for measuring atmospheric CO₂, O₂, CH₄, H₂O, their isotope ratios, VOCs, and related tracers

Interdisciplinary Science Team:
NCAR: Britton Stephens (lead PI), Matt Long (co-PI), Adriana Bailey, Dan Amrhein
University of Colorado / NOAA: Kathryn McKain, Colm Sweeney
Scripps Institution of Oceanography: Ralph Keeling, Eric Morgan
University of Washington: Abby Swann
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Atmospheric Potential Oxygen

\[ \text{APO} = \text{O}_2 + 1.1 \times \text{CO}_2 \]

ATom-4 Southbound (27 Apr – 9 May, 2018)

Stephens et al., AMT, 2021
HIPPO and ATom derived northern extratropical air-sea $O_2$ exchange

- Observed seasonal net outgassing = 283 Tmol $O_2$
- Modeled = 210 - 305 Tmol $O_2$
AMELiA Proposal

- NSF/NCAR GV sampling over 100 species
- Continuous profiling between 500 feet AGL and 28,000 feet, from the North Pole to Equator
- Two deployments per year 2024-2027
- NSF Growing Convergence Research, declined 2021
- NSF Atmospheric Chemistry, pending 2022
### Lower Atmosphere Observing Facilities (LAOF) Program

**Requestable Facilities (NCAR & U. of Wyoming)**

- **Research Aircraft**
  - NSF/NCAR C-130
  - NSF/NCAR HIAPER Gulfstream V (GV)
  - University of Wyoming King Air

- **Airborne Instrumentation**
  - NCAR Airborne Vertical Atmospheric Profiling System (AVAPS)
  - NCAR HIAPER Cloud Radar (HCR)
  - NCAR GV-High Spectral Resolution Lidar (HSRL)
  - UWYO Cloud Radar (WCR)
  - UWYO Cloud Lidar (WCL)

- **Ground-based Systems**
  - NCAR Integrated Surface Flux Facilities (ISFS)
  - NCAR Integrated Sounding System (ISS)
  - NCAR S-band Dual Polarization Doppler Radar (S-Pol)
  - NCAR MicroPulse DIAL (MPD)

**Requestable Support Services**

- Project management
- Data management
- Data archival
- Field Catalog & Catalog Maps
- Operations Center
- Design & fabrication
- Forecasting & nowcasting

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**NCAR | EARTH OBSERVING LABORATORY**
LAOF Request Process

NSF’s Facility and Instrumentation Request Process (FIRP) [NSF 21-611]

- Three NSF FIRP Tracks with different documentation requirements and submission deadlines
  - Track 1 | Education & Outreach Requests
  - Track 2 | Single Facility Requests
  - Track 3 | Field Campaigns

- NSF FIRP Track 1 & 2 proposals have rolling submission deadlines, Track 3 proposals can be submitted twice annually on 15 January and 15 July, depending on complexity and campaign start date. [https://www.nsf.gov/pubs/2021/nsf21611/nsf21611.htm]

Lower Atmosphere Observing Facilities (LAOF) Requests

- LAOF requests are submitted to EOL’s PRESTO system in advance of the FIRP proposal, based on FIRP Track submission deadlines. Track 3 facility request submission deadlines are 1 December and 1 June, six weeks before the FIRP proposal submission.
- The LAOF request & ROM cost estimate are required PI-submitted documents for the FIRP proposal.
- Visit [www.eol.ucar.edu/requestfacilities](http://www.eol.ucar.edu/requestfacilities) for LAOF request documentation requirements and submission deadlines.
For LAOF request questions, please contact
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