

The ANtarctic Gravity Wave Instrument Network (ANGWIN)



Principal Investigator: Prof. Mike Taylor, Physics Department/CASS, Utah State University

The Antarctic Gravity Wave Imaging Network (ANGWIN) is a cooperative effort of six international Antarctic programs to collect continent-wide gravity wave (GW) measurements (Figure 1). The network capitalizes on existing optical and radar measurement capabilities at McMurdo, South Pole, and several other research stations: Syowa (Japan), Davis (Australia), Rothera (UK), Ferraz (Brazil), Jang Bogo and King Sejong (South Korea). Infrared (IR) all-sky mesospheric OH (hydroxyl) imagers, and Advanced Mesospheric Temperature Mapper (AMTM) instruments are operated to create an unprecedented capability for studying gravity wave properties on a continental scale. ANGWIN represents a novel opportunity for the international Antarctic research community to work together producing "high impact" science well above that which can be achieved individually. The network quantifies the properties, variability and momentum fluxes of short-period (less than one hour) mesospheric gravity waves and their dominant sources and effects over the Antarctic continent.

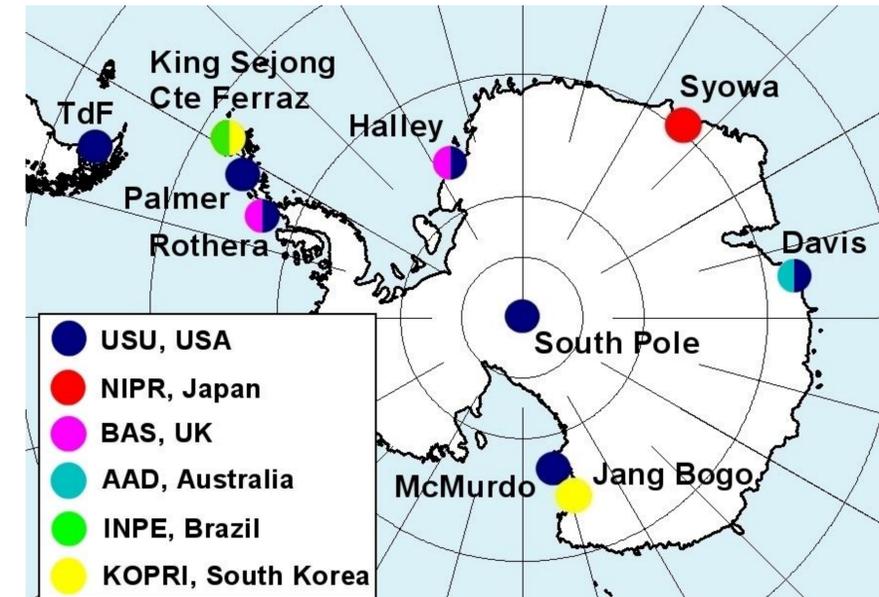


Figure 1: ANGWIN institutions and observations sites



Figure 2: Advanced Mesospheric Temperature Mapper (AMTM) imager at the South Pole station

Science Objectives

- Further investigate the characteristics, sources and regional variability of GWs and quantify their impacts (fluxes) over Antarctica,
- Investigate the occurrence, global structure and variability of prominent mesospheric PWs and their effects on GWs over Antarctica,
- Continue and enhance our international ANGWIN collaboration by involving other institutions and measurement capabilities to advance Antarctic mesospheric research.

ANGWIN is an NSF-funded 5-year project (2021-2026)

Graduate student's work will involve:

- Image data processing using techniques such as machine learning or spectral analysis (M-transform, see Matsuda et al., 2014),
- Investigation of GW characteristics and effects on the upper atmosphere,
- Maintenance of instrumentation on site,
- Biennial ANGWIN workshops,
- Possibility of student exchange with other ANGWIN international institutions.



Figure 3: USU graduate student Jonathan Pugmire at the South Pole station