

# The rough and the smooth: what the radar saw in Pine Island

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Over the 2004/05 austral summer the University of Texas (UT) and British Antarctic Survey (BAS) executed an airborne geophysical survey of the Amundsen Sea Embayment, Antarctica (the AGASEA project). The BAS component was to map the Pine Island Glacier drainage basin for which a total of 32,000 line kilometres were flown from a USAP supported field-depot. The BAS survey aircraft fit comprised gravity, magnetics and ice-radar instruments. The principle purpose of the ice sounding radar was to measure ice thickness and compute the basal topography. However, here we present an overview of the radar system and discuss specific features identified within the 5 Terabytes of radar data. Of note are:

- 'Lake like' reflectors that occur in the valleys of the sub-glacial topography near the Ellsworth Mountains.
- The remarkable smooth bed, akin to the echoes observed from an ice-shelf base, which marks the onset of the fast flowing tributaries of Pine Island Glacier.
- An extremely bright internal reflector in the vicinity of the Hudson Mountains.
- A Raymond bump observed beneath the Rutford/Pine Island ice divide.
- Internal layer fold anatomy.

Furthermore, although the BAS and UT radars have similar spatial and temporal resolutions they operate at different centre frequencies (150 MHz and 60 MHz respectably). From an overlapping transect we present a comparison of the data collected by the two radars.



**The BAS survey aircraft at PNE camp. Note the mag pods on the wingtips and the antennae array beneath the wings.**

**BAS radar parameters:** Single or full quad polarisation capability. Centre Frequency 150 MHz, transmit Power 4 kW, transmit and receive aerial gain 11 dBi. Transmit pulses: 4  $\mu$ S 10 MHz chirp interleaved with a 0.1  $\mu$ S conventional pulse. PRF 15,625 Hz. Effective PRF (after hardware stacking) for each pulse 312.5 Hz. Dual gain receiver channels. Baseband sampling frequency 22 MHz.