Initial results from International Thwaites Glacier Collaboration cruise NBP20-02


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Thwaites Glacier (TG) is more vulnerable to unstable retreat than any other part of the West Antarctic Ice Sheet. This is due to its upstream-dipping bed, the absence of a large ice shelf buttressing its flow and the deep bathymetric troughs that route relatively warm Circumpolar Deep Water (CDW) to its margin. Over the past 30 years the mass balance of TG has become increasingly negative, suggesting that unstable retreat may have already begun. The International Thwaites Glacier Collaboration (ITGC) is an initiative jointly funded by the US National Science Foundation and the Natural Environment Research Council in the UK to improve knowledge of the boundary conditions and drivers of change at TG in order improve projections of its future contribution to sea level. The ITGC is funding a range of projects that are conducting on-ice and marine research, and applying numerical models to utilize results in order to predict how the glacier will change and contribute to sea level over coming decades to centuries.

RV Nathaniel B Palmer cruise NBP20-02, taking place from January to March 2020, will be the second ITGC multi-disciplinary research cruise, building on results from NBP19-02, which took place last year. Thwaites Offshore Research Project (THOR) aims during NBP20-02 include: extending the bathymetric survey in front of TG, collecting sediment cores at sites selected from the survey data, and acquiring high-resolution seismic profiles to determine the properties of the former bed of TG that is now exposed. The detailed bathymetric data will reveal the dimensions and routing of troughs that conduct CDW to the glacier front and will image seabed landforms that provide information about past ice flow and processes at the bed when TG was more extensive.
The sediment cores, together with ones collected recently beneath the ice shelf via hot-water drilled holes, will be analysed to establish a history of TG retreat, subglacial meltwater release, and CDW incursions extending back over decades, centuries and millennia before the short instrumental record. Thwaites-Amundsen Regional Survey and Network Project (TARSAN) researchers will reach islands and ice floes via zodiac boats to attach satellite data relay loggers to Elephant and Weddell seals. The loggers record ocean temperature and salinity during the seals’ dives, greatly increasing the spatial extent and time span of oceanographic observations. In addition to work that is part of the THOR and TARSAN projects, another cruise objective is to recover and redeploy long-term oceanographic moorings in the Amundsen Sea. We will present initial results from NBP20-02.

**NBP20-02 Shipboard Scientific Party:** Gui Bortolotto, Rachel Clark, Santiago Garcia, Rebecca Hopkins, Asmara Lehrmann, Allison Lepp, James Marschalek, Elaine Mawbey, Laura Taylor