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Thwaites Glacier and the Amundson Sea Embayment: The TARSAN Project

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Thwaites and neighboring glaciers in the Amundsen Sea Embayment (ASE) are rapidly losing mass in response to recent climate warming and related changes in ocean circulation. Ice-sheet models suggest that the mass loss from the ASE will accelerate in the near future, initiating an eventual collapse of the West Antarctic Ice Sheet (WAIS) and raising the global sea level by up to 2.5 meters in as short as 500 years. Such model predictions, however, still lack understanding of the dominant processes within ice shelves and near grounding zones, particularly the spatial and temporal variability of these processes and their atmospheric and oceanic drivers. TARSAN (Thwaites-Amundsen Regional Survey and Network Integrating Atmosphere-Ice-Ocean Processes Affecting the Sub-Ice-Shelf Environment) is funded by US and UK funding agencies through the International Thwaites Glacier Collaboration (ITGC) to study these processes for the Thwaites and Dotson Ice Shelves.

Specific objectives are to: 1) install atmosphere-ice-ocean multi-sensor remote autonomous stations (AMIGOS) on the ice shelves for two years to provide sub-daily continuous observations of concurrent oceanic, glaciologic, and atmospheric conditions; 2) measure ocean properties on the continental shelf adjacent to ice-shelf fronts (seal tagging, glider-based and ship-based surveys and existing moored and CTD-cast data) and into sub-ice-shelf cavities (Autonomous Underwater Vehicles AUVs) to detail ocean transports and heat fluxes; and 3) constrain current ice-shelf and sub-ice-shelf cavity geometry, ice flow, and firn properties for the ice-shelves (using radar, active-source seismic and gravimetric methods) to better understand the impact of ocean and atmosphere on the ice-sheet change.

This poster will introduce the TARSAN project and present preliminary results from the first TARSAN research cruise on the RV Nathaniel B Palmer to the Amundsen Sea in January-March 2019.