

ScITESEN – a scientific drilling traverse in West Antarctica investigating the influence of ice-ocean-lithosphere interaction on ice sheet stability, by direct means.

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The West Antarctic Ice Sheet (WAIS) contains enough ice to raise global sea level by 5m. Even a sea level rise of only a few ten's of centimeter over the course of a century poses a significant threat to coastal areas in the US and around the world. Therefore the question about the stability of the WAIS is a question of global importance. In general subglacial conditions play a key role for the dynamic and stability of all ice sheets. The conditions at the base of an ice sheet (the subglacial environment) are governed by a variety of processes and are determined by the complex interaction between the ice sheet and its underlying lithosphere/geology. Where an ice sheet drains into the ocean this interaction is complicated by the ice-ocean interaction, which not only influences the stability of the floating ice shelves but in a feedback loop also influences the outflow of ice far upstream of its grounding zone.

Here we present an initiative for the International Polar Year in 2007/08 to investigate this complex interaction and the influence of the subglacial environment (including sub-ice shelf) on the dynamic of West Antarctic ice streams and the stability of the WAIS by direct means. The Scientific International Traverse Exploring Subglacial ENvironments (ScITESEN) will utilize a new highly mobile fast-access drilling system; a soft coiled tubing hot water drilling system. The drilling system will allow rapid access to the subglacial environment, while being able to traverse several hundred kilometers in a single field season. The multi-year project proposes to drill access holes along a transect from the edge of the Ross Ice Shelf to the WAIS interior following the flow of ice of Kamb Ice Stream. While the fast motion of ice in this WAIS ice stream had stopped about 140 years ago, this ice stream has the potential to resume fast ice streaming within a few decades to century. Along this transect research conducted within ScITESEN will focus on:

- ice-ocean interaction and dynamics of ice shelves;
- ice sheet stability and evolution;
- ice stream mechanism;
- subglacial hydrology;
- subglacial geology and subglacial volcanism;
- life in extreme environments.

The interdisciplinary ScITESEN will not only conduct research at one of the last frontiers in Polar Sciences. Combining oceanographic, glaciological, hydrological and geological investigations ScITESEN will provide data desperately needed for a better assessment of the stability of the West-Antarctic Ice Sheet and will provide a first glimpse into life in these extreme environments.