Antarctic Circumpolar Interdisciplinary Survey - ACIS

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Constraining how fast sea levels will rise around the globe in the coming decade requires a vastly improved interdisciplinary understanding of how the heat from the warming circumpolar ocean waters will cause rapid change in the Antarctic ice sheets. Advancing our knowledge of the rates of change requires improved observations of the ice, the ocean and the solid earth and bringing together scientists from these disciplines to address the key questions: (i) How much ice passes over the Antarctic grounding line each year? (ii) How does ocean circulation influence ice flow over the grounding line, and how will it change? And (iii) How will changes in ice mass affect sea level around the world? Like many major problems facing humans, the constraining the future rate of change of the Antarctic ice sheets is a problem that must be addressed through shared resources and coordinated science –across nations and across disciplines.

Here we present the vision of the Antarctic Circumpolar Interdisciplinary Survey that will allow us to better project future sea level rise from Antarctica. To address the questions requires data from all around the Antarctic ice sheet on the thickness of the ice entering the global oceans across the grounding line, the bathymetry surrounding the ice sheets and the dynamics of the warming ocean. Key observations cannot be obtained from space and require collaborative work on the ice sheet and the circumpolar Antarctic ocean. Together the international community has the capacity to address this question. Ongoing international efforts and technological advances have developed a wide range of capabilities for direct and remote sensing of the ice, ocean and rock around Antarctica. Understanding how much ice is flowing across the grounding line can be measured with using small aircraft based at permanent bases or field camps around the continent, long range aircraft based off continent and from drones launched form ships. The water depth close to the ice sheet can be obtained with ground-based explorations, airborne observation submersibles or gliders. Salinity and temperature are measured from a broad span of instruments, with additional sensors measuring current velocity, tidal variation and biogeochemical markers also deployed. Most oceanographic work operates from ships, but coastal sites also provide platforms for ocean observations, and profiling floats can successfully be deployed from aircraft. Like the International Polar Years and other large collaborative project this effort can serve as a future focal point for Antarctic Science through SCAR and other international programs.

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