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Synoptic Antarctic Shelf – Slope Interactions: an iAnZone project for IPY 2007-2008

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The huge ice sheets of Antarctica store much of the world's freshwater. It is isolated by a complex system of coastal, shelf and slope currents that drives shallow and deep modes of the meridional ocean circulation (MOC). These processes have a strong impact on global climate, both through the ocean (influencing the strength and the properties of the MOC) and through the atmosphere (influencing the heat released to the southern hemisphere atmosphere). In short the Antarctic continental margins present both physical and dynamical barriers that impact oceanic meridional fluxes to the Antarctic freshwater budget, and the moisture – freshwater budget is one of the greatest uncertainties in climate modeling, on time scales from months to centuries.

Despite this considerable scientific interest and significant role in global climate, the Antarctic margins are neither quantitatively well documented nor dynamically well understood. Our present understanding in fact is based on highly non-synoptic data obtained from widely separated regions and from different years. Due to the inter-annual variability observed at global scale, such as that associated with ENSO or SAM, this means that adjacent years can exhibit completely different ocean, ice and wind fields as well forcing fluxes. Again our documentation of seasonality is limited by available data collected during austral summers.

The Synoptic Antarctic Shelf–Slope Interactions (SASSI) project will conduct the first synoptic study of the Antarctic continental shelf and slope. Specific objectives will be to: a) obtain a circumpolar synoptic view of the oceanography of the Antarctic shelf and slope; b) assess the properties and variability of the amount of inflow of warm, saline deep water onto the continental shelf, the role of this onshore heat transport in melting sea ice and ice shelves; c) improve our knowledge as to where, when and how this oceanic inflow is transformed over the shelf domain into dense Shelf Water and

its subsequent derivative Antarctic Bottom Water, through net cooling and freshwater fluxes during the seasonal sea ice melting – freezing cycle; d) understand the dynamics of the interactions between coastal current and slope front systems and how they influence the exchanges between sea ice, glacial ice and deep ocean waters in order to identify the key Antarctic shelf – slope processes that should be included or parameterized in future climate models. Although these topics are considered here primarily from the climate physics perspective, the same strategy could be equally pertinent to studying the carbon cycle and ecosystems of the Southern Ocean. The SASSI project aims to implement and coordinate the southernmost parts of the CLIVAR Southern Ocean Panel's strategy for IPY which is described in the CASO (Climate of Antarctica and the Southern Ocean) project proposal.