



## **Beneath the Larsen B Ice Shelf system: a marine perspective on a rapidly changing cryosphere**

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Two marine geologic surveys have now been completed within the last two years from the region of the Larsen B Ice Shelf. Data collected from aboard the USAP LM Gould and NB Palmer includes swath mapping, high resolution seismic profiling, sediment core collection, bottom photography, and video imagery. In addition, we have made observations on the physical and biological oceanography of the region and await the recovery of sediment trap moorings and time series instrumentation for temperature and salinity characteristics. The resulting data set substantiates the claim that the Larsen B Ice Shelf was a stable component for the entire Holocene epoch, as we have found no evidence of open marine conditions over this time frame from within sediment cores. The sediment cores record 10 ka of ice shelf stability and a stable benthic habitat dominated (in places) by chemoautotrophy (cold seep conditions). This situation was dramatically altered in 2002 by the break up of the ice shelf which resulted in: (1) rapid sediment flux to the broad shelf setting via ice rafting (2) rapid (~10 m/yr) fine-grained hemipelagic sedimentation within deglaciated fjords, (3) burial of former benthic communities by increased sediment flux, and (4) increases in the flux of phytoplankton detritus (frustules and organic carbon) to the seafloor. Oceanographic data indicate an isothermal water column punctuated in places by Ice Shelf Water derived from residual portions of the Larsen B Ice Shelf (i.e. SCAR Inlet) and cold water tongues that emanate from the calving terminus of tidewater glaciers (i.e. Crane Glacier). Observations of iceberg character from within the embayment are useful in understanding the nature of ice shelf decay, as observed from firn stratigraphy, internal structure, and debris content. Swath mapping of the seafloor reveals a complex pattern of grounding line features related to initial recession of the ice sheet from the inner continental shelf (small recessional ridges) and the construction of a more substantial morainal bank near the historic grounding line of the Larsen B Ice Shelf. Extensive over deepening (in excess of 1200 m) of the inner shelf, landward of this later feature, most certainly contributed to accelerated glacier flow following ice shelf collapse.