**ANDRILL – Drilling into Antarctica's dynamic past**

**Press conference: Wednesday 16 April, 09:00-10:00**
**Oral session: CL31 Wednesday 16 April, 10:30-12:00, programme >>**

**More than 2 kilometres of deep drill holes in Antarctica tell a fascinating and very complete story of advancing and retreating ice, rising mountain chains and emerging rifts. One project drilled into the sea floor beneath 85 m-thick shelf ice and nearly 900 metres of water. Together the two deepest drillholes on the Antarctic continent give an unprecedented detailed picture of the last 17.5 million years of Antarctica's geological history.**

The ANtarctic geological DRILLing Program (ANDRILL), an international collaboration between scientists, drillers, engineers, educators, and technicians from Germany, Italy, New Zealand and the United States – working together in the spirit of the 4th International Polar Year (IPY) – successfully completed the drilling phase of its second project in early December 2007.

The primary objectives of ANDRILL were to recover and examine stratigraphic records of sedimentary rock from the Antarctic continental margin that document key steps in Antarctica's Cenozoic climatic and glacial history, and reveal events in the development of the Transantarctic Mountains and West Antarctic Rift System (http://www.andrill.org). ANDRILL's two new long stratigraphic sections are guiding our understanding of how fast, how large, and how frequent glacial and interglacial changes were in the Antarctic region. This will help establish, through correlation to existing records and integration with climate and ice sheet models, how these local changes relate to regional and global events.

ANDRILL's key operational and technological achievements during the Program's first two drilling projects include: the two deepest drillholes on the Antarctic continent, high-quality rock core with recovery of more than 98%, and the first hydrofracture experiment and associated *in-situ* stress measurements in Antarctica. The sedimentary record at the selected Southern McMurdo Sound (SMS) Project drill site is influenced by three elements of the Antarctic cryosphere system: East Antarctic Ice Sheet (EAIS), Ross Ice Sheet/West Antarctic Ice Sheet/Shelf, and Ross Embayment sea-ice (see figure).

The main goal of the SMS Project was to recover sediment from the middle Miocene, which has long been held as one of the fundamental time intervals in development of the modern Antarctic ice sheets [*Flower and Kennett, 1994; Zachos et al., 2001; Shevenell et al., 2004*]. Interpretations of deep-sea isotope records and observations from geologic data from around the world suggest that the middle Miocene encompassed a change from a period of warm climatic optima, approximately 17.5 to 14.5 Ma, to the onset of major cooling between ca. 14.5 to 13.5 Ma, and the formation of a quasi-permanent ice sheet on East Antarctica [*Lewis et al., 2007*]. The AND-2A drillcore (obtained during the SMS Project) recovered several distinct stratigraphic intervals within the lower Miocene to Pleistocene that are separated by disconformities.

This new stratigraphic section from a setting proximal to ice sheet influence and sea-level change will be instrumental in guiding and constraining interpretations from the deep-sea chemostratigraphic records of $\delta^{18}O$, Mg/Ca, etc., and coastal sequence stratigraphic records of glacio-eustasy. New ANDRILL results are vital to the Scientific Committee on Antarctic Research (SCAR) scientific research program Antarctic Climate Evolution (ACE, http://www.ace.scar.org/) whose objective is the integration of new Antarctic geological and paleoclimatic data into climate and ice sheet models.

Empirical data generated from study of ANDRILL cores will help calibrate these numerical models, enabling new constraint to be placed on estimates of ice volume variability, terrestrial and marine paleotemperature, and the timing of development and paleodistribution of Antarctica's terrestrial, marine and sea-ice biota.

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ANDRILL planning documents, background information, and education and outreach resources are available at the web site: http://www.andrill.org/.

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