Antarctic ice sheet, the Ross Ice Shelf, and the eastern Ross Sea. These surfaces cover many thousands of square kilometers and are separated by bedrock troughs cut by the West Antarctic ice streams. Elevations of the plateaus vary from about 100-250 m below sea level (bsl) near the Edward VII Peninsula in the eastern Ross Sea to about 350 m bsl along the Siple Coast. Airborne geophysical surveys over a 350 by 450 kilometer area of western Marie Byrd Land (MBL) mapped one of the largest plateaus, a 300 km by 100 km level surface at about 250 meters bsl at the boundary between the Ross Embayment and MBL. We interpret these surfaces as remnants of a continental shelf formed by wave erosion when the coastal regions of Antarctica were relatively free of ice. The generally flat and level nature of the surfaces that are near the same depth over large distances supports an interpretation of an origin by marine rather than glacial erosion. Marine seismic reflection profiles over one of the plateau remnants in the Eastern Ross Sea west of Edward VII Peninsula show thin, flat-lying glacial marine sediments draped with angular unconformity over gently dipping RSS2 sediments of Early Miocene age. Combining this age constraint with ice sheet and global sea level histories suggests that the shallower plateaus were last eroded in the early Middle Miocene, about 15 Ma, prior to formation of the modern West Antarctic ice sheet, and when sea level was at least 30-50 m higher. The plateau surfaces might be correlated to Ross Sea unconformities including RSU5 and RSU4. One possible explanation of the present depths consistent with forming the plateaus near Miocene sea level is that a model for removal of extremely thick early Holocene ice, such as ICE-3G is approximately correct, and current bedrock depths are at least 200 m below isostatic equilibrium. Free Air gravity anomalies of about -30 milligals in the region are consistent with it being depressed below isostatic equilibrium by at least this amount. The plateaus along the Siple Coast, with depths around 350 m bsl, do not rebound to close to either present or Miocene sea level for simple models of removing the current and Holocene ice load. Another part of the explanation may be that the lithosphere was heated and at higher elevation in Oligocene time due to substantial extension or intense mantle plume activity. Subsequent cooling has caused a moderate amount of crustal subsidence since then so that rebound alone does not return the surfaces to sea level or above.

PP31B-0263 0830h POSTER

Environmental magnetism of late Cenozoic sediments from the East Antarctic continental rise (Site 1165, Prydz Bay)

Carl Richter[1] (337-482-5353; richter@louisiana.edu)

Detlef Warnke[2] (dwarnke@csuhayward.edu)

Fabio Florindo[3] (florindo@ingv.it)

[1]Department of Geology University of Louisiana at Lafayette, PO Box 44530, Lafayette, LA 70504, United States

[2]California State University, 25800 Carlos Bee Boulevard, Hayward, CA 94542, United States

[3]Istituto Nazionale di Geofisica e Vulcanologia, Via di Vigna Murata 605, Rome 00143, Italy

The objective of this study is to advance our understanding of the late Cenozoic environmental history of East Antarctica as part of a multiparameter interdisciplinary project. We analyzed a set of 500 samples taken at 10 k.y. resolution from the Plio-Pleistocene section at Ocean Drilling Program Site 1165. The site is located on Wild Drift, a thick contourite deposit on the continental rise off Prydz Bay, East Antarctica. The data set provides a 5 m.y.-old record of environmental change and ice-sheet history with the opportunity to link the histories of the Antarctic Ice sheet and the distal ocean-current and climate systems. As part of this project we investigated the sources of magnetic remanence and magnetic susceptibility variations by characterizing rock magnetic properties. Variations in grain size, mineralogy, and concentration of magnetic grains reflect pre- and post depositional environmental changes, yielding clues to fluctuations in climate, source material, and depositional environments. From the beginning of the record at about 5 Ma throughout the early Pliocene the concentration of magnetic material varies very little, while the magnetic mineralogy and the magnetic grain size (S-ratio, and ARM/k and ARM/IRM ratios) shows various large and small scale cycles. A remarkable change occurs at 34 mbsf in the lowermost, normal interval of the Gauss Chron, at about 3.4 Ma(?), where the magnetic grain size increases dramatically. This significant change is expressed in non-magnetic measurements as well, and may coincide with the beginning of ice rafting in the South Atlantic during MIS MG2, just above an interval without any IRD (Murphy et al., 2002). Another significant change in the magnetic properties occurs at 30-28.5 mbsf (around 3.3 Ma) where the magnetic concentrations drop to very low values and the magnetic properties are carried by a high-coercivity component. These changes may reflect climate variations or changes in the location of the source area within the Lambert-Graben drainage area.

PP31B-0264 0830h POSTER

Sedimentation Processes Along the Continental Margin of the Western Bellingshausen Sea, West Antarctica

Karsten Gohl[2] (kgohl@awi-bremerhaven.de)

Carsten Scheuer[1] (0049-471-4831-1234; cscheuer@awi-bremerhaven.de)

[1]Carsten Scheuer, Alfred Wegener Institute for Polar and Marine Research, Bremerhaven 27568, Germany

[2]Karsten Gohl, Alfred Wegener Institute for Polar and Marine Research, Bremerhaven 27568, Germany

Since the beginning of glaciation of West Antarctica, changes of glacial and interglacial periods affect the sediment supply across the shelf and onto the deep sea. Along the slope and rise of the continental margin of the Antarctic Peninsula, Cenozoic sediments were deposited which development was influenced by ice sheet fluctuation and mass transport processes. Thus, both the sediment stratigraphy and the physiography of the sea floor reflect the history of the West Antarctic ice sheet as well as processes that transport, erode and deposit sediment along the outer shelf, slope and rise of the continental margin. We present interpretations of multichannel seismic reflection data produced along and across the sparsely investigated continental rise of the western Bellingshausen Sea. This new seismic line links previously data sets of the eastern Bellingshausen Sea and the Amundsen Sea and contributes to a better understanding of the glacial-marine sedimentation processes along the West Antarctic margin. We could identify three sedimentary units, named Unit 1, 2 and 3. The lowermost Unit 3 is characterised as "Low-deposition Stage", representing the pre-glaciation stage. Unit 2 seems to reflects the onset of the glaciation on the continental shelf and can be termed as "Transition Stage". The uppermost Unit 1 is made of terrigenous sediment material transported by shelf ice across the shelf edge. The correlation with a profile orientated perpendicular to the slope shows that the boundary between the units 2 and 1 coincides with the base of a sediment wedge that consists of strong prograding shelf sequences, a strong evidence for shelf ice deposits. Thus, the boundary between units 2 and 1 indicates the advance of shelf ice up to the shelf edge, where transported sediment material was deposited. The onset of this advance along the margin of Antarctic Peninsula occurred approximately in the mid to late Miocene (about 5-8 Ma). However, an exact dating of the onset along this margin is difficult due to the far distance to the closest ODP Drill Sites 1095 and 1096.

PP31B-0265 0830h POSTER

Searching for Last Glacial Deep-Sea Polar Carbonates in the Ross Sea Continental slope and Their Relevance to Chronological Constraints

Antonio Brambati[1] (39 040 5582056; brambati@units.it)

Rosalba Bonaccorsi[1] (39 040 5582069; bonaccor@units.it)

Tullio Quaia[1] (39 040 5582048; quaiatu@units.it)

Martina Busetti[2] (+39-040-2140254; mbusetti@ogs.trieste.it)

[1]University of Trieste - Dipartimento di Scienze Geologiche, Ambientali e Marine (DiSGAM), Via Weisss, 2, Trieste 34127, Italy

[2]Istituto Nazionale di Oceanografia e Geofisica Sperimentale (OGS), Borgo Grotta Gigante 42/c Sgonico, Trieste 34010, Italy

Abstract Ice-proximal glacial marine sediments from the Antarctic continental margin retain ice rafting events as proxy record for change in the volume and extension of the Antarctic ice sheet throughout glacial-interglacial cycles. However, the sedimentary sequences from the Ross Sea continental margin remain relatively poorly understood and most research has been focused mainly on continental shelf sequences during the last past decades. We present a data set (i.e., X-ray lithology, Multi Sensor Core Logger physical data, and preservation of biogenic carbonates), obtained from six deep-sea cores (1991-1999 Italian Antarctic Research Programme, PNRA - Summer cruises). Specifically, the cores were collected from a) the central Eastern sector (i.e., Core ANTA95-89C, depth: 2056 m, length: 401 cm and Core ANTA99-c22, depth: 2650 m, length: 851 cm); b) the central Western sector (i.e., Core ANTA99-c23; water depth: 2158 m, length: 548 cm; and ANTA99-c24, water depth: 2750 m, length: 811 cm); and c) the North Western sector (i.e., Core ANTA91-08C, and ANTA91-02C) of the Ross Sea Continental slope. Well-preserved calcareous foraminifers (N. pachyderma, sx) in coarse-grained IRD materials sparsely occur and/or are concentrated in discrete layers (i.e., up to 22 cm-thick) of at least three cores (i.e., Cores ANTA91-08, ANTA91-02, and ANTA95-89C, e.g., at 217-238 cm-depth). Some carbonate layers were deposited during a period of time bracketing Stage3/Stage2. In Core 89C foraminifers are associated to multiple ice rafting episodes and likely occurred with oceanographic changes in the properties of slope water masses. The search of well-preserved, in situ-deposited, polar carbonates is demanded for a reliable C-14 AMS dating of late Pleistocene events in the Ross Sea.

PP31B-0266 0830h POSTER

Sub-Ice Shelf Stratigraphy as Documented From Beneath the Larsen B Ice Shelf, Antarctica

Diana M. Duran[1] (205-246-3346; duran006@bama.ua.edu)

Eugene Domack[1] (315-859-4711; edomack@hamilton.edu)

Katherine McMullen[1] (kmcmulle@hamilton.edu)

Amy Leventer[2] (aleventer@mail.colgate.edu)

[1]Hamilton College, Department of Geology 198 College Hill Road, Clinton, NY 13323, United States

[2]Colgate University, Department of Geology 13 Oak Drive, Hamilton, NY 13346, United States

The final disintegration of the Larsen B Ice shelf (March 2002) was a significant event in the history of glaciology. During NBP01-07, the Larsen B Ice shelf area was surveyed as a continuation of a multi-year investigation of the sediment processes and paleohistory of the Larsen B. Six kasten cores (KC1-KC6) were recovered from the Larsen B inlet at depths ranging from 438 m to 676 m. These cores were sampled at 2 cm intervals for grain size analysis and water content. Ice rafted debris (IRD) content was obtained by observing x-rays and counting at 2.5 cm intervals. Magnetic susceptibility was measured every 2.5 cm using the Bartington MS2C 44 mm sensor. 14C-calcite dates were obtained from the top 20 cm in KC2 and KC5. Results from the data allowed for the construction of a general litho-stratigraphy of the Larsen B Ice shelf depositional environments prior to its collapse. KC1-KC6 consist of three main units (from top to bottom): (1) sandy silty clay, (2) stratified sandy mud and muddy sand with granules, and (3) structureless muddy-diamicton. Three different depositional environments are suggested based on the sedimentological features of these units: open-marine, transitional, and glacial. The gravel pavement (0-1 cm) on top of KC5 was deposited as a product of the Larsen B Ice Shelf calving event in 1999. This is significant to our interpretation of the Larsen B's sedimentary processes and paleohistory because the stratigraphy of the Larsen A (Pudsey et al. 1998) does not show these angular pebbles and cobbles on top of unit 1, but rather biosiliceous ooze in its silty clay unit . Furthermore, 14C-calcite dates from KC5 (2,300 +/-35 at 2 cm, 2,760+/-35 at 5 cm, and 9,210+/-45 at 20 cm) and KC2 (3,710+/-40 at 2cm, 9,760+/-45 at 15cm, and 10,600+/-55) help confirm that the Larsen B has not experienced a history of recession and reformation since the end of the last Ice Age. Instead the ice shelf seems to have been in place for some time while embayments to the north were experiencing open marine conditions (Domack et al., 2001 & Pudsey et al., 2001). Thus, our investigation illustrates that the disintegration of the Larsen B Ice Shelf was an unprecedented event in which its litho-stratigraphy indicates a sub-ice shelf environment formed during the entire Holocene.

PP31C MCC: Level 1 Wednesday 0830h

Evolution of the Antarctic Climate System: Modeling and Observation I

Posters *(joint with A, OS, C, GC)*

Presiding: **M J Siegert,** Bristol Glaciology Centre**; D Pollard,** Pennsylvania State University

PP31C-0267 0830h POSTER

Ocean Response to Possible Southern Meltwater Pulses During Eocene-Oligocene Cooling Climate Trend: A Sensitivity Ocean Modeling Study

Bernd J. Haupt[1] (814-865-8188; bjhaupt@psu.edu)

Dan Seidov[1] (814-865-1921; dseidov@psu.edu)

[1]Penn State University EMS Environment Institute, 2217 Earth & Engineering Science Bldg., University Park, PA 16802, United States

Understanding ocean circulation and sea level change in the past (and foreseeable future) is one of the focal points of paleoceanography. Sea level may change due to several primary causes, including the meltdown of the major ice sheets, sea ice melting, and changes in the thermohaline structure of the oceans. The sensitivity of the past ocean circulation to meltwater impacts may have been different from the present-day. We still have only a vague understanding of how ocean basin geography may influence the freshwater impacts in different oceans; the role of geography is important for reconstructing variability of past climates with substantially different land-sea distributions. As freshwater impacts in past geologic eras having different basins configurations may have been different from the present-day pattern, the sensitivity of the ocean circulation to sea surface density impacts and climate change could have been different as well. We use the Eocene-Oligocene geometry and climate to address the past ocean and sea level long-term internal variability because this time slice provides a substantially different geometry and for a strong sea ice impact that can be seen in the geologic record. The Eocene epoch is crucial as a transition from the warm Cretaceous ocean to cooler oceans that may have been subject to bipolar millennial-scale oscillations of the deep ocean circulation caused by freshwater pulses of the developing southern cryosphere. In a series of numerical experiments, sea ice melting and sea water freezing around Antarctica were simulated by superimposing freshwater layers over zonally-averaged sea surface salinity. Eocene sea surface temperature and sea surface salinity are specified based on the paleoclimatic record and modeling. In our simulations, the Eocene ocean circulation is indeed sensitive to freshwater impacts in the Southern Hemisphere. There are noticeable sea level changes caused by the restructuring of the deep ocean thermal and haline fields linked to the changes in deep ocean circulation.

URL: http://www.personal.psu.edu/bjh18

PP31C-0268 0830h POSTER

Melting history of the Enderby Land and the Dronning Maud Land of East Antarctic Ice Sheet during the Marine isotope stage 3 and Holocene.

Yusuke Yokoyama[1] (+81-3-5841-4313; yokoyama@eps.s.u-tokyo.ac.jp); Hideki Miura[2] (miura@nipr.ac.jp); Daniel P Zwartz[3] (D.Zwartz@phys.uu.nl); Masashi Takada[4] (takada@cc.nara-wu.ac.jp); Robert C Finkel[5] (Finkel1@llnl.gov); Hideaki Maemoku[6] (maemoku@hiroshima-u.ac.jp); Kiichi Moriwaki[2] (moriwaki@nipr.ac.jp)

[1]Department of Earth and Planetary Sciences, University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

[2]National Institute of Polar Research, 9-10 Kaga, Itabashi-ku, Tokyo 173-8515, Japan

[3]Department of Earth Science, Victoria University of Wellington, PO Box600, Wellington 6001, New Zealand

[4]Department of Geography, Nara Women's University, Kita Uoya Nishi-machi, Nara 630-8506, Japan

[5]CAMS, Lawrence Livermore National Laboratory, 7000 East Avenue, Livermore, CA 94550, United States

[6]Department of Geography, Hiroshima University, Higashi Hiroshimashi, Higashi Hiroshima 739, Japan

The Antarctic Ice Sheet has been played important role in the global climate system throughout the last glacial. The ice sheet carrying large quantity of freshwater masses has been anticipated its impact on global sea-level changes, though the estimated total amount of meltwater since the LGM expressed as eustatic sea-level are scattered among the studies. As part, this is because of lacking of geologic data sets due to the difficulties underlain for sampling. Therefore collecting reliable spatial and temporal records of the ice sheet to constrain the sea-level history are being desired and which is in turn a key to improve our understanding the climate system. We have studied the Soya coast of Antarctica as well as the Mt. Riiser-Larsen to study the melting history of East Antarctic Ice Sheet (EAIS). Distinct geomorphologic features of raised beach sediments formed during the sea-level highstands in the past were observed and several trenches were made to investigate the internal structure. More than 80 AMS radiocarbon measurements on in-situ fossil mollusks were conducted to constrain the timing of the past highstands. Radiocarbon dating results were clustered in 2 groups showing 2 major highstands during the Holocene and OIS3. Reliability of the dating results is ensuring the quality of the samples including the nature of the tests that are free from secondary younger carbon contamination. We applied step-wise dissolution experiments on those mollusks and successfully replicated the earlier dating results indicating that the samples were free from contamination. Glacial erratics as well as bedrock samples from Mt. Riiser-Larsen were collected for Cosmogenic Radio Nuclides (CRN) dating. Mt. Riiser-Larsen is useful to study melting history of the ice sheet since it is located near the coast so that the temporal variation in ice thicknesses of the ice margin can be reconstructed using CRN dated glacial deposits obtained from different altitudes. The results of the CRN dating (altitudes between 300 and 700m) are approximately 50ka that is consistent with the TL and radiocarbon age results from the lake sediments in the coastal site. The lake sediments contained till layers separated by lake sediment indicated that the ice sheet was retreated from this area and thus the lake sediment was deposited. The lowest glacial erratics recovered from 290m in altitude show the minimum CRN age of 24ka indicating the timing of the final melting of the ice sheet in this area. Given that the trimline at the Mt. Riiser-Larsen indicates the maximum height of the most recent episode of expansion of the ice sheet, EAIS in this area experienced 2 distinct events of retreat since about 50ka to the Holocene. This finding is consistent with earlier glacio-hydro-isostastic modeling study using available relative sea-level datasets around the Antarctic continent.

PP31C-0269 0830h POSTER

Nutrient Utilization During the Last Glacial Maximum, Evidence From a New Diatom-bound N Isotope Method

Rebecca S. Robinson[1] (609 258 7437; rebeccar@princeton.edu)

Brigitte Brunelle[1] (brunelle@princeton.edu)

Daniel M. Sigman[1] (sigman@princeton.edu)

[1]Department of Geosciences, Guyot Hall Princeton University, Princeton, NJ 08544, United States

Bulk sedimentary and diatom-bound N isotope data from the Southern Ocean are widely held as a key piece of evidence for a change in nutrient status in the Antarctic across the glacial-interglacial transition. Previously published sedimentary N isotope results, showing a decrease in nitrate utilization into the Holocene (Francois et al., 1997; Sigman et al., 1999; Crosta and Shemesh, 2002), are considered a potential indication of the high latitude ocean's role in glacial-interglacial CO_2 cycles. Microfossil-bound organic material, by virtue of its physical protection from the environment, is likely to be less vulnerable to isotopic alteration by diagenesis during sinking and burial. A new method for diatom-bound N isotopic analysis, which combines a wet chemical oxidation with the "denitrifier method" for nitrate isotopic analysis (Sigman et al., 2001), was developed in an attempt to reduce sample size so as to expand the utility of the diatom-bound proxy beyond opal-rich sedimentary settings. However, new results from Antarctic sediment cores contrast with those that have been published previously (Sigman et al., 1999; Crosta and Shemesh, 2002). There is no change in the diatom-bound N isotopes between the last glacial and the Holocene in the Atlantic and a $2^{o}/_{oo}$ change in the Indian Ocean, $\sim 2^{o}/_{oo}$ less than the shift documented by Sigman et al., (1999). These data suggest no change in the degree of nitrate utilization in the Atlantic sector and a small increase in the Indian sector of the Antarctic. The significance of these results and the role for the biological pump in glacial-interglacial CO_2 change will be discussed.

PP31C-0270 0830h POSTER

Late Miocene (?) expansion of the East Antarctic Ice Sheet across Mawson Bank, North basin Ross Sea

Sophie Warny[1] (225 578 3080; swarny@lsu.edu)

Philip J. Bart[1] (225 578 3109; pbart@geol.lsu.edu)

[1]Louisiana State University Department of Geology and Geophysics, E235 Howe-Russell, Baton Rouge, LA 70803, United States

Subglacially-erupted volcanics on Coulman Island and Hasslett Peninsula led Hamilton (1972) to conclude that an inflated East Antarctic Ice Sheet (EAIS) advanced over the Transantarctic Mountains and grounded on the North Basin outer continental shelf during the late Miocene, i.e., at 5.4 Ma. A large depocenter located on the North Basin outer shelf (ANTOSTRAT, 1995) contains several toplap unconformities presumably eroded by the EAIS (ANTOSTRAT, 1995; Bart et al., 2000). One of the unconformities (unconformity 10 from Bart et al., 2000) is unusual in that it deeply erodes into the underlying strata. Furthermore, toplap termination extends to the shelf edge suggesting an anomalous advance with respect to subsequent EAIS advances. Unfortunately, seismic correlation to DSPD Site 273 only constrains the unconformity to be younger than middle Miocene (i.e., <14.7 Ma according to Savage and Cielsielski, 1983) and thus it is not possible to determine if this unsual erosional horizon is indeed correlative with the EAIS over-riding event proposed by Hamilton (1972). During the past field season (2003), we acquired a grid a piston cores across the outer part of Mawson Bank where unconformity 10 has not been buried and thus, upper-Miocene strata are presumably exposed at the sea floor. In our ongoing study of these cores, we are conducting palynological analyses to determine if indeed the samples are from strata of upper-Miocene age.

PP31C-0271 0830h POSTER

New seismic stratigraphic mapping suggests that the late Miocene/early Pliocene glacial regime did not include cross-shelf ice streams comparable with those existing during recent glacial maxima

David C Egan[1] (225-284-8827; degan@geol.lsu.edu)

Philip J. Bart[1] (225 578 3109; pbart@geol.lsu.edu)

[1]Louisiana State University Department of Geology and Geophysics, E235 Howe-Russell, Baton Rouge, LA 70803, United States

A grid containing several regional strike-oriented seismic profiles on the Pacific margin of the Antarctic Peninsula outer continental shelf were acquired in 2002 to evaluate the glacial unconformity interpretation of Package 3 strata (Bart and Anderson, 1995). These (NBP02) and previously acquired seismic data (PD88 and PD90) were used to create time-structure contour maps of the Package 3 stratal surfaces. Although ODP Leg 178 drill results demonstrate that the outer continental shelf probably experienced numerous episodes of ice-sheet advance and retreat during this timeframe, it is not clear whether the glacial conditions were similar to those in the Quaternary, during which large and robust, cross-shelf ice streams drained the mainland peninsula. Our mapping results show that there are indeed numerous cross-cutting relationships within Package 3 that result in an extremely patchy distribution of units and stratal surfaces. The patchy distribution of Package 3 surfaces seriously hampers our ability to make regional correlations and map large-scale features, but the largest patches have extents that exceed the dimension of modern banks and troughs. The surfaces show convex and concave topography similar to the bases of troughs and crests of banks of the modern seafloor. However, detailed comparison of the relief variations of Package 3 surfaces to that of the modern bathymetry shows that subsurface horizons do not exhibit dip-oriented deep troughs and high banks indicative of cross-shelf drainage. Although we favor a glacial-unconformity interpretation of Package-3 stratal surfaces, we propose that there were no large, cross-shelf ice streams separated by broad banks during this time (i.e. late Miocene/early Pliocene). We tentatively suggest that uplift on the middle shelf (associated with diachronous ridge-trench collision during this timeframe) may have created sub aerial exposure, precluding the existence of cross-shelf ice streams but providing a source of outer-shelf grounded ice of a much different scale.

PP31C-0272 0830h POSTER

The Antarctic Master Directory – the Electronic Card Catalog of Antarctic Data

Greg Scharfen[1] (303 492 6197; scharfen@nsidc.org)

Rob Bauer[1] (303 492 2378; bauerr@kryos.colorado.edu)

[1]National Snow and Ice Data Center, University of Colorado CIRES 449 UCB, Boulder, CO 80309, United States

The Antarctic Master Directory (AMD) is a Web-based, searchable record of thousands of Antarctic data descriptions. These data descriptions contain information about what data were collected, where they were collected, when they were collected, who the scientists are, who the point of contact is, how to get the data, and information about the format of the data and what documentation and bibliographic information exists. With this basic descriptive information about content and access for thousands of Antarctic scientific data sets, the AMD is a resource for scientists to advertise the data they have collected and to search for data they need. The AMD has been created by more than twenty nations which conduct research in the Antarctic under the auspices of the Antarctic Treaty. It is a part of the International Directory Network/Global Change Master Directory (IDN/GCMD). Using the AMD is easy. Users can search on subject matter key words, data types, geographic place-names, temporal or spatial ranges, or conduct free-text searches. To search the AMD go to:

P
P

http://gcmd.nasa.gov/Data/portals/amd/. Contributing your own data descriptions for Antarctic data that you have collected is also easy. Scientists can start by submitting a short data description first (as a placeholder in the AMD, and to satisfy National Science Foundation (NSF) reporting requirements), and then add to, modify or update their record whenever it is appropriate. An easy to use on-line tool and a simple tutorial are available at: http://nsidc.org/usadcc. With NSF Office of Polar Programs (OPP) funding, the National Snow and Ice Data Center (NSIDC) operates the U.S. Antarctic Data Coordination Center (USADCC), partly to assist scientists in using and contributing to the AMD. The USADCC website is at http://nsidc.org/usadcc.

URL: http://nsidc.org/usadcc

PP31C-0273 0830h POSTER

Antarctic Glaciological Data at NSIDC: field data, temperature, and ice velocity

Rob Bauer[1] (303 492 2378; bauerr@kryos.colorado.edu); Jenn Bohlander[1] (303 492 5710; jennb@nsidc.org); Ted Scambos[1] (303 492 1113; teds@kryos.colorado.edu); Etienne Berthier[2] (berthier@notos.cst.cnes.fr); Bruce Raup[1] (braup@nsidc.org); Greg Scharfen[1] (scharfen@nsidc.org)

[1]National Snow and Ice Data Center, University of Colorado CIRES 449 UCB, Boulder, CO 80309, United States

[2]Laboratoire d'Etudes en Geophysique et Oceanographie Spatiales, 18, av. Edouard Belin, Toulouse 31401, France

An extensive collection of many Antarctic glaciological parameters is available for the polar science community upon request. The National Science Foundation's Office of Polar Programs funds the Antarctic Glaciological Data Center (AGDC) at the National Snow and Ice Data Center (NSIDC) to archive and distribute Antarctic glaciological and cryospheric system data collected by the U.S. Antarctic Program. AGDC facilitates data exchange among Principal Investigators, preserves recently collected data useful to future research, gathers data sets from past research, and compiles continent-wide information useful for modeling and field work planning. Data sets are available via our web site, http://nsidc.org/agdc/. From here, users can access extensive documentation, citation information, locator maps, derived images and references, and the numerical data. More than 50 Antarctic scientists have contributed data to the archive. Among the compiled products distributed by AGDC are VELMAP and THERMAP. THERMAP is a compilation of over 600 shallow firn temperature measurements ('10-meter temperatures') collected since 1950. These data provide a record of mean annual temperature, and potentially hold a record of climate change on the continent. The data are represented with maps showing the traverse route, and include data sources, measurement technique, and additional measurements made at each site, i.e., snow density and accumulation. VELMAP is an archive of surface ice velocity measurements for the Antarctic Ice Sheet. The primary objective of VELMAP is to assemble a historic record of outlet glaciers and ice shelf ice motion over the Antarctic. The collection includes both PI-contributed measurements and data generated at NSIDC using Landsat and SPOT satellite imagery. Tabular data contain position, speed, bearing, and data quality information, and related references. Two new VELMAP data sets are highlighted: the Mertz Glacier and the Institute Ice Stream. Mertz Glacier ice velocity provides an upper limit for change in velocity for this glacier over the past decade. Two pairs of Landsat images were used to compare velocities from 2000-2001 to 1989-2000. No significant change in velocity is observed. A new ice discharge flux of 17.8 km3a-1 was determined, and basal melting at the grounding line was re-calculated at 11 m per year (Berthier et al., 2003, in press). Velocity data for the Institute Ice Stream was compiled at NSIDC using a Landsat images from 1986, 1989, and 1997. The data were recently used in a study outlining the velocity, mass balance, and morphology of the Institute ice stream and nearby Ronne ice shelf area. (Scambos et al., 2003, in review). The study indicates the Institute has regions with flow and morphology characteristics similar to the Ross Embayment ice streams. Ice velocity research contributes to understanding the mass balance and overall stability of the Antarctic Ice Sheet. The archiving of velocity data has proven to be a useful tool to the Antarctic science community, and VELMAP continues to grow as a valuable resource through PI contributions. If you have velocity data that you would like to contribute to the VELMAP archive please contact agdc@nsidc.org. The velocity data used in the two studies presented here can be accessed on the VELMAP web site at http://nsidc.org/data/velmap.

URL: http://nsidc.org/agdc

PP31C-0274 0830h POSTER

Past Ice Flow in Pine Island Bay, West Antarctica, From Marine Geophysical Evidence

Julian A Dowdeswell[1] (44-1223-336541; jd16@cam.ac.uk)

Jeffrey Evans[1] (44-1223-336570; je10007@cam.ac.uk)

Colm O'Cofaigh[1] (44-1223-336570; co232@cam.ac.uk)

John B Anderson[2] (johna@rice.edu)

[1]Scott Polar Research Institute, University of Cambridge, Cambridge CB2 1ER, United Kingdom

[2]Dept. of Earth Science, Rice University, Houston, TX 77005, United States

Marine geophysical and geological data from two recent cruises allow us to investigate the past extent and flow of a late Quaternary ice sheet in Pine Island Bay (PIB). Swath bathymetric data show that the shelf deepens inshore, and that cross-shelf troughs are present on both the inner and outer shelf. Three main types of sea-floor bedform were observed on the shelf. (a) Bedrock, with associated drumlinoid features probably formed by glacial erosion of the inner shelf. (b) Streamlined, elongate bedforms formed in soft sediments, found mainly in troughs on the mid and outer shelf and extending to the shelf edge. These features are interpreted as glacial lineations, inferred to be a product of soft-sediment deformation beneath former ice streams. They allow reconstruction of past ice-flow direction, and may also define former ice streams. Their presence at the shelf edge confirms that ice filled PIB at the last glacial maximum. Sub-bottom profiler records confirm that the sea floor is sedimentary and that there are in some places reflectors at a few metres depth defining an upper unit in whose surface the lineations are formed. Sometimes several reflectors appear to cross-cut one another, each with a similar acoustic unit above, suggesting shifting paleo-ice stream margins. (c) A highly irregular pattern of linear scour marks found in water depths <450-500 m, representing sediment reworking by iceberg keels produced from the 500 m or so thick floating tongues of the modern Pine Island and Thwaites glaciers. Geophysical evidence from the continental slope beyond PIB between 107° to 115°W shows several sets of gullies or channels, up to about 100 m deep and 30 km long. The gullies are found mainly in two 50 km-wide groups at 113°20'W and 108°40'W. On the mid-slope and beyond, in over 2000 m of water, there is some evidence of wider channels, indicating that downslope transfer of glacier-derived sediments has taken place from the continental slope to the Amundsen Sea abyssal plain. During full-glacial conditions, sediments and meltwater would have been delivered from the ice front directly at the shelf break, leading to downslope mass-wasting, probably as turbidity currents and debris flows. It is likely that the gully or channel systems were formed by mass-flow activity, driven by either sediment-laden glacial meltwater or cold and saline water associated with sea-ice formation in a semi-permanent polynya at the former ice-sheet margin.

PP31D MCC: 3004 Wednesday 1020h

The Last Interglacial I *(joint with A, OS, C, GC)*

Presiding: **G H Miller,** University of Colorado**; B L Otto-Bliesner,** National Center for Atmospheric Research

PP31D-01 1020h INVITED

The Eem Interglacial Strata in the Deep Greenland ice Cores. New Compelling Evidence From the NorthGRIP ice Core for the 5e/5d Transition.

Sigfus J Johnsen[1] (+45-35320558; sigfus@gfy.ku.dk); Dorthe Dahl-Jensen[1]; Jorgen P Steffensen[1]; Henrik B Clausen[1]; Jean Jouzel[2]; Jim White[3]; Arny E Sveinbjornsdottir[4]; Valerie Masson-Delmotte[2]; Heinz Miller[5]; Yoshiyuki Fujii[6]

[1]Niels Bohr Institute, Department of Geophysics, Juliane Maries Vej 30, Copenhagen DK-2100, Denmark

[2]LSCE UMR CEA/CNRS 1572 Bat 709, L'Orme des Merisiers CEA Saclay, Gif s/ Yvette F-91191, France

[3]Institute of Arctic and Alpine Research, University of Colorado, Boulder 1560 30th St., Boulder, Co 80309-0450, United States

[4]Science Institute, University of Iceland, Dunhaga 3, Reykjavik IS-107, Iceland

[5]Alfred Wegener Institute, Columbusstrasse, Bremerhaven D-27515, Germany

[6]National Institute of Polar Research, 9-10, Kaga 1-Chome Itabashi-ku, Tokyo 173, Japan

While most Antarctic deep ice cores have Eem strata with high stratification integrity, Eem strata found in most Greenland deep ice cores show disrupted layering. In contrast, the order of magnitude higher accumulation rates in Greenland move these layers close to bedrock where they can be badly disrupted by ice flow over bedrock undulations. A perfect example is found in the GRIP and GISP2 ice cores. The isotope profiles are almost identical back to MIS 5c and uncorrelated below the onset of 5c. In this near bottom ice several layers with 3 per mille higher oxygen isotope ratios are found in both cores pointing to ice of warm Eem origin. In other deep cores like Camp Century, Renland and Dye-3, Eemian like ice is found in the very lowest strata boosting 4 to 5 per mille higher oxygen isotope ratios than the corresponding present day values. This implies that there was ample ice in NW Greenland and on South Dome during the Eem interglacial. The NorthGRIP core has suffered strong bottom melting due to high geothermal heat fluxes south of the drill site. This has, combined with the flat bedrock, helped to preserve the stratification all the way to bedrock while estimated 7 ka of the early Eem strata together with all older ice has been melted away. The warmest and deepest ice from the NorthGRIP Eem has the same isotopic values as the GRIP and GISP2 layers that we have assigned to the Eem period. Correlation with the planktonic isotopes of the Iberian margin core MD95-2042 for the Eem/last glacial transition shows that known cold pollen events like Montaigue and Melisey I make a definit imprint on the NorthGRIP isotope profile. A new Greenland isotope interstadial IS25 is found at the very end of the Eem interglacial.

PP31D-02 1035h

Estimating peak last-interglacial warmth in the Eastern Canadian Arctic

Gifford H Miller[1] (303.492.6962; gmiller@colorado.edu)

Donna Francis[2] (dfrancis@geo.umass.edu)

Matthew Wooller[3] (ffmjw@uaf.edu)

Marilyn Fogel[4] (fogel@gl.ciw.edu)

Alexander P wolfe[5] (awolfe@ualberta.ca)

[1]INSTAAR/Geological Sciences, University of Colorado, Boulder, CO 80309-0450, United States

[2]Geosciences, University of Massachusetts, Amherst, MA 01003, United States

[3]Alaska Stable Isotope Facility, University of Alaska, Fairbanks, AK 99775, United States

[4]Geophysical Lab/CIW, Broadbranch Road, Washington,, DC 20015, United States

[5]Earth & Atmospheric Sciences, University of Alberta, Edmonton, AB T6G 2E3, Canada

The last interglacial is represented by stratified lake sediments and buried soils across much of Baffin Island, Arctic Canada. Seven lakes situated distal to the limits of the last glacial maximum Laurentide Ice Sheet outlet glaciers preserve undisturbed interglacial sediments, and one lake just inside this limit yielded stratified interglacial sediment beneath a thin till. Macrofossil remains from all of the interglacial units yield radiocarbon dates in excess of 40 ka. Two of the sites have been dated by luminescence methods to more than 90 ka. All exhibit evidence of terrestrial summers warmer than at any time in the Holocene. Pollen assemblages are dominated by exotic taxa, mostly Alnus and Betula that do not currently live at these sites. Pollen percentages and absolute concentrations are much higher than at any time in the Holocene, but difficulties in separating exotic influxes from locally produced pollen limit quantitative summer paleotemperature estimates. Chironomid assemblages provide a second summer-temperature proxy, and because they live where they are found, are less susceptible to the uncertainties characteristic of palynology at high latitudes. Chironomid transfer functions are based on 40 modern surface samples from Baffin Island, and additional sites from eastern North America and Greenland. One third of the interglacial chironomid taxa are extralimital; collectively the interglacial taxa from two lakes suggest summer temperatures 3 to 10°C higher than in the Holocene. An alternative method for quantifying summer temperatures is reconstructing d18O of precipitation from the d18O of chironomid larvae chitin. Assuming similar basic circulation patterns in the last and present interglacials, we can estimate mean annual temperatures from the reconstructed d18O of precipitation. These independently derived estimates (one lake) suggest peak last interglacial warmth 2°C higher than the mid Holocene.