

ICAM VI

Proceedings of the International Conference on Arctic Margins VI Fairbanks, Alaska, May 2011

Edited by: David B. Stone, Garrik E. Grikurov, James G. Clough, Gordon N. Oakey, Dennis K. Thurston

INTRODUCTION

The Sixth International Conference on Arctic Margins was held at the University of Alaska, Fairbanks from May 30 to June 2, 2011. It was convened by Bernard Coakley together with David Stone, Garrik Grikurov, Harald Brekke, James Clough, Ruth Jackson, Paul Layer, Naja Mikkelsen, Victoria Pease, and Dennis Thurston. There were over 130 participants and 112 presentations. In addition there was ample time for discussion at the Student Union pub for lunch and poster sessions, and during the evening dinner excursions to the Pioneer Park outdoor Salmon Bake, and a Dinner cruise down the Chena River. (For photos of these activities a CD is available from the authors or can be downloaded from: <http://www2.gi.alaska.edu/ICAMVI>).

One highlight of the meeting was the wealth of new data on display, much of it collected to support Extended Continental Shelf (ECS) claims under Article 76 of the Law of the Sea. To establish the seaward limit of their ECS in accordance with the provisions of Article 76, it is necessary for each country to identify the 2500 meter isobath and the foot of slope from bathymetric data, and to collect seismic reflection and refraction data to estimate sediment thickness.

The circum-arctic countries, Denmark, Canada, Norway, Russia and the US have organized and executed Arctic Ocean cruises, airborne geophysics campaigns and ice island expeditions to collect the bathymetry, seismic reflection, seismic refraction and potential field data to support their ECS claims. The programs have also collected seafloor samples to support the geophysical interpretations.

These surveys were not planned to answer science questions, but to characterize the seafloor and sediments on a regional scale, typically with line spacing at about 100 km. Because of the regular nature of the surveys, they have visited places that would not be included under hypothesis-driven science-focused studies. As a result, we can glimpse

surprising and unexpected observations in the ECS data sets. The surprises are just starting to emerge into the wider scientific community, to be incorporated into the larger body of knowledge about the Arctic Ocean and to become the basis for planning future cruises to answer the questions these unexpected observations pose. These data are likely to be the basis for a new revolution in our understanding of the Arctic Ocean and its history.

Organization of this Volume

The papers submitted for this volume divide into three general categories, onshore geology, marine studies, large scale tectonics plus one paper that presents a framework for the whole region. This latter paper leads off followed by papers in the other three categories going more or less from east to west. The numbers for each of the areas shown on the map accompanying the Table of Contents are the Chapter numbers for each area.

In addition to this volume a CD containing power points and copies of posters from many of the presenters is available from David Stone (dstone@gi.alaska.edu) or the contents can be downloaded from <http://www2.gi.alaska.edu/ICAMVI>

ICAM Student Recognition Awards

These awards, sponsored by the Alaska Geological Society and University of Alaska Geophysical Institute, went to Anne Hegewald for the Outstanding Oral Presentation, *Sedimentary structures and horizon ages in the Amerasian Basin between the Chukchi Plateau and Mendeleev Ridge* and to Sonja Suckro for the Outstanding Poster Presentation, *Tectonic evolution of southern Baffin Bay: implications from a refraction survey*.

Field trips

Two Field Trips were offered, plus several informal ones.

Field Trip 1. *Friday and Saturday, June 3 and 4. Geology, tectonics and gold mineralization of the Fairbanks area.*

Day One focused on the broad geologic setting of the Fairbanks area, with eclogite facies rocks on top of amphibolite facies rocks on top of greenschist facies rocks. Igneous rocks include the within-plate early Tertiary basalt and the mid-Cretaceous subduction-related plutons. Day Two examined mining and mineralization in the Fairbanks area including a trip to Fort Knox, an open pit mine with 3.6 million troy ounces of proven and probable reserves. 2010 gold production at Fort Knox was 349,729 troy ounces of gold. The Fairbanks mining district is a northeast trending belt of lode and placer gold deposits that comprise one of the largest gold producing areas in the state of Alaska.

Led by Rainer Newberry, Professor, Department of Geology and Geophysics, University of Alaska Fairbanks.

Field Trip 2. *Stratigraphy, sedimentology and paleoenvironment of the Cantwell Formation, Denali National Park, Alaska.*

The Cantwell Formation of central Alaska comprises a late Cretaceous plant fossil, and dinosaur and bird track-bearing fluvial-alluvial fan sequence and an overlying Paleocene to Eocene predominantly volcanic succession. The formation is located between two fault strands forming the northern bend of the arcuate transcontinental Denali strike-slip fault. The sediments were deposited following the accretion of the Wrangellia Terrane.

The trip led into canyons and steep drainages cut into mountains composed entirely of overlying Cantwell Formation and a thick section of volcanic flows pierced by numerous mafic and felsic subvolcanic intrusions. We stopped at a particularly fossiliferous section showing facies distributions, plant fossils, invertebrate traces and vertebrate tracks.

The rocks of the sedimentary Cantwell Formation are interpreted as having been deposited in a variety of closely spaced ancient river, lake,

alluvial plain and alluvial fan floodplain sedimentary environments. The boundaries between finest-grained and coarser-grained sedimentary facies commonly preserve vertebrate and invertebrate tracks and plant fossils plus numerous large theropod and hadrosaur footprints. The finer-grained facies preserve delicate invertebrate traces and angiosperm leaf, fern frond, and conifer shoot, cone, seed and wood impressions.

Led by Paul McCarthy (Professor) and Suzanne Tomsich (PhD candidate), Department of Geology and Geophysics, University of Alaska Fairbanks.

Thanks

The local organizers headed by Bernard Coakley would like to thank the university staff and students for their part, and particularly the Pub staff who helped oil the wheels of communication.

The editors would also like to thank the external reviewers, listed below, for their sometimes thankless task of carefully reading early versions of the papers presented here: Vyacheslav Akinin, Jeff Amato, Arthur Banet, Robert Blodgett, Kelley Brumley, Douglas Christensen, Bernard Coakley, Sonya A. Dehler, George Dellagiarrino, Dieter Franke, Carmen Gaina, Chris Harrison, Larry Lane, Lotte Melchior Larsen, Keith Meekins, Elizabeth Miller, Anne Pasch, Kirk Sherwood.

Special thanks are due to Federal Agency for Mineral Resources of the Russian Federation (ROSNEDRA) and the A.P. Karpinsky All-Russia Geological Institute (VSEGEI) for active participation in the work of the conference and assistance in printing this proceedings volume.

HISTORY OF ICAM

The International Conference on Arctic Margins (ICAM) was founded by the U.S. Department of the Interior Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE), formerly the Minerals Management Service, in 1991 with the underlying two-point theme of 1) Arctic understanding, 2) international cooperation in Arctic research. To these ends, the ICAM meetings have provided a forum for the exchange of information and presentation of research and a platform to explore collaborative programs. For more information see <http://boem.gov/ICAM/>



The core! Participants who attended all six ICAM meetings. From left to right, Back row: Larry Lawver, Tom Buntzen, Paul Layer, David Stone, Larry Lane, Warren Nokleberg, Jim Clough, Mikhail Kos'ko. Front row: Andrei Prokopiev, Dennis Thurston, Jan Inge Faleide, Tom Moore, Gordon Oakey, Garrik Griukurov.



Almost all of the participants at ICAM VI

Meeting Summaries

ICAM I—*convened in September, 2-4, 1992, Anchorage, Alaska*

- Over 400 participants from 12 countries,
- 198 presentations (90 by US; 40 Russian; 32 Canada; 25 from Scandinavia; 8 from the rest of Europe and 6 from Australia)
- 6 workshops
- 5 invited symposia
- 11 general oral sessions
- 12 poster sessions
- 5 geological field trips
- Hosted by the Alaska Geological Society
- Sponsored by BOEMRE, formerly MMS

An abstract volume containing over 250 abstracts was published in limited supply and given to all participants. The proceedings were published in 1994 as: 1992 proceedings International Conference on Arctic Margins : Anchorage, Alaska, September 1992, Thurston D.K., Fujita, K., OCS Study MMS 94-0040, 1994. <http://boem.gov/ICAM/>

ICAM II—*convened in September, 6-10, 1994, Magadan, Russia*

- 130 people participated representing 45 different organizations from 10 countries (60 non-Russian participants)
- 7 technical sessions, involving many scientific, industrial and public organizations and private companies of Magadan
- 4 symposia and a round-table session
- 103 oral and 43 poster presentations
- Hosted by the Russian Academy of Sciences, Far East Branch and the University of Alaska Geophysical Institute, Fairbanks
- Field trip “Golden Ring of Kolyma” was conducted on September 9-20, and its participants were 11 representatives of mining industry of Canada, U.S., Australia and Japan.

An abstract volume containing over 280 abstracts was published in limited supply and given to all participants.

The 1994 ICAM Proceedings was published in 1995 by the Russian Academy of Sciences Far East Branch, Northeast Science Center, Magadan: *ICAM 1994: Summary of Conference, Magadan, Russia*, and is available at <http://boem.gov/ICAM/>.

ICAM III—*convened in October 12-16, 1998, Celle, Germany*

- 200 participants from 14 countries
- 15 Technical Sessions
- 142 oral presentations and 70 posters
- Hosted by the Federal Institute for Geosciences and Natural Resources (BGR), the German Society for Polar Research, and the Alfred Wegener Institute for Polar and Marine Research
- Supported by the Russian Academy of Sciences, the University of Alaska Geophysical Institute, and MMS.
- 220 Abstracts received

The ICAM III Proceedings were published as two special volumes of the Journal *Polarforschung* (*Polarforschung 68, 1998 (printed 2000) and Polarforschung 69, 1998 (printed 2002)*) by the German Society for Polar Research and Alfred Wegener Institute for Polar and Marine Research.

ICAM IV—*September 30-October 3, 2003, Dartmouth, Nova Scotia*

A special event in the form of Hurricane Juan inflicted considerable damage to Halifax and Dartmouth the day before the meeting started. The organizing committee managed to find space for the meeting and food and hotels for the attendees. A remarkable achievement in the light of power and transportation outages and delays.

- 130 participants
- Featuring 9 technical sessions
- Workshops
- Hosted by Natural Resources Canada through Geological Survey of Canada (Atlantic)
- Supported by the Canadian Polar Commission and MMS
- A special meeting of the Nansen Arctic Drilling Program was held
- Field Trip: Marine Geophysical Tour of Halifax Harbour aboard the Harbour Queen

Proceedings edited by Robert Scott of Cambridge Arctic Shelf Program and Dennis Thurston, BOEMRE and published through BOEMRE-Alaska as Study MMS 2006-003. <http://boem.gov/ICAM/>

ICAM V—September 3-5, 2007, Tromsø, Norway.

- More than 300 participants
- 106 Oral presentations
- 86 Posters
- 9 Thematic Sessions
- Sponsored by the Geological Society of Norway (NGF) in cooperation with the European Association of Geoscientists and Engineers (EAGE).

ICAM V was held in conjunction with “Arctic Conference Days 2007” which included The Arctic Geology, Resources and Environment Conference (AGReE) and The Shelf Edge and Shoreline Trajectories Conference (SEST).

The Proceedings contained 11 invited papers published by the Norwegian Journal of Geology as *ICAM V Special Volume NJG 2008 Volume 88 Nr. 4*.

ICAM VI—May 31-June 2, 2010 in Fairbanks, Alaska, USA

Hosted by the Geophysical Institute and the College of Natural Sciences and Mathematics of the University of Alaska, Fairbanks.

- More than 130 participants
- 77 Oral presentations
- 45 Posters
- 5 Thematic Sessions
- Sponsored by BP Alaska, Shell, ConocoPhillips and the Alaska Division of Geological and Geophysical Survey.

The program can be obtained from www.gi.alaska.edu/icam6

Outlines of talks and posters submitted by their authors can be obtained from: <http://www2.gi.alaska.edu/ICAMVI>

We are planning to have this volume available on the internet through both the University of Alaska and VSEGEI following the printed version.