



The Icebreaker

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Director's Message

It has been a very busy summer at the Center with a full schedule of summer short course lectures for undergraduate and graduate students, field experiments in Greenland, and student recruitment. Dr. Pannir Kanagaratnam decided to permanently return to Malaysia to be with his family. He contributed to the success of Center research programs and will definitely be missed. We wish him all the best in his future endeavors.

We are very pleased to have Susanne Buchardt, a visiting scholar and

Ph.D. student from the University of Copenhagen, in residence at CReSIS for the fall semester. We have also had several visitors in residence at CReSIS this summer including Lora Koenig, a graduate student from the University of Washington, and Dr. Gordon Oswald, a visiting scientist from the University of Maine. Their stories are included in this newsletter.

I am happy to introduce Mr. Stephen Ingalls, who joins us as the Administrative Director for the Center

and Ms. Ferdouz Vuillomenet has joined as a Program Assistant. Please join me in welcoming them to the Center.



-Prasad Gogineni



The Center for Remote Sensing of Ice Sheets is made possible by a five-year award from the National Science Foundation (#0424589), which began in June, 2005.

CReSIS Welcomes New Associate Director for Administration Stephen Ingalls



by Beth Ruhl

In September, CReSIS appointed a new Associate Director for Administration, Stephen Ingalls, to better organize the Center and to help spread its message about climate change.

"I would like to be able to tell people how climate change might affect their futures. It is something very important," said Ingalls about the mission of the Center.

Some goals Ingalls hopes to accomplish include organizing the staff, sharing the research of the Center with the public, increasing diversity, and educating students of all ages about science, technology, engineering and mathematics. "I want kids to grow up thinking it's cool to be a scientist, just like they might think it's cool to be a professional basketball

player," said Ingalls.

Team building and maximizing each person's potential are also very important to Ingalls. "I want us to take seriously the work we are doing here, but we should not take ourselves too seriously. It is also important to have fun."

Ingalls credits most of his administrative abilities to his 22 year career in the United States Army, from which he retired in 2004 as a Lieutenant Colonel. He received his BA in Science with an Aerospace Engineering concentration from West Point and then

went on to receive his MA in Aerospace Engineering from the Georgia Institute of Technology. He was an Assistant Professor at West Point, teaching senior-level aerospace engineering courses and he later taught military tactics at the Army's Command and General Staff College at Fort Leavenworth, Kansas.

Ingalls spent most of his time in the military flying attack helicopters on a variety of assignments, both within the United States and internationally.



CRISIS Scientist Laird and Technician Sundermeyer Travel to Greenland to Research Why Ice Dome is Growing

By Ashley Thompson and Beth Ruhl

Dr. Claude Laird and Dennis Sundermeyer traveled to Greenland in May under the NSF-funded project entitled "SGER: High Resolution Radar Mapping of Ice Thickness and Near-Surface Layers in Northeast Greenland" to investigate what is causing the Flade Isblink ice dome to grow. It is located at the northern reaches of Greenland.

Laird, a research associate at CRISIS, and Sundermeyer, a CRISIS technician, arrived at their station on May 16. They joined six Danish scientists and a researcher from the University of Colorado and began to prepare the radar equipment for field work.

The goals of the project were to map the deep internal layers of Flade Isblink using a radar depth sounder, and to map the recent accumulation history of the dome using an accumulation radar.

Polar scientists have determined that Flade Isblink is growing at a rate of about half a meter each year. "The data we gathered will help determine more precisely the growth rate and its causes. It could be partially due to global warming, as well as the coastal location," said Laird.

"It's unusual because it is contrary to what is happening elsewhere in Greenland," commented Laird. "However, as air warms, obviously it can hold more moisture, so the layers may be getting thicker over time."

Laird and Sundermeyer had both been to Greenland before. They were familiar with the harsh conditions, the desolation, and slight twinges of homesickness, but they knew the intricate workings of their radar systems inside and out. However, past experiences didn't quite measure up to the difficulties they faced during their three-week field excursion to Flade Isblink.

"We were basically socked in for eight of the first 11 days we were there," Sundermeyer said.

To compound the situation, all three of the camp's power generators failed for a day during the second week of their stay, forcing the frustrated crew to rely on a single gas-powered stove.

"We weren't afraid of survival, but we were afraid that we wouldn't be able to accomplish what we came here to do," Sundermeyer said. "If we had used up all of the diesel just to get by day to day, that would have left us with nothing to power the radars."

Despite these setbacks, they made it through and were able to collect the data they came for. Their mission was accomplished.

Greenland: A Geographers Perspective



*Note: Thomas Overly, pictured above, and Chandini Veeramachaneni, are both research assistants for CRISIS who visited Greenland on a radar mission in the spring of 2006.

by Thomas Overly

Participation in the Spring 2006 radar missions over Jakobshavn Isbrae in west Greenland exposed Chandini and me to the application of radars in the field and also afforded us the opportunity to experience the actual place that is Greenland.

The vast history of climate knowledge housed within Greenland's continental ice sheet often defines our understanding of Greenland. The wealth of scientific data derived from the ice sheet, as well as the saying "Iceland is green and Greenland is ice," lead us to perceive Greenland as uninhabitable.

Despite these perceptions, extreme winter temperatures, and 85% of its land being covered by ice, over 56,000 people make the country of Greenland their year-round home. Elements of nature, social relations, and meaning combine to form the complex place called Greenland.

The country's large landmass and north-south extent allow for huge variations in both humidity and temperature. The majority of Greenland has highly varied mountain vegetation, reminiscent of northern Scandinavia.

Wildlife consists of arctic hare, arctic fox, musk ox, reindeer, caribou, polar bear, and over 50 species of birds. The hunting industry is based on seals and whaling, while the fishing industry relies on prawn and halibut.

Because it is a former territory of Denmark, Greenland's political system, schools, and economy resemble the Danish system.



Visiting Scientist Dr. Gordon Oswald Researches Melting of Greenland Ice Sheet

by Beth Ruhl

Dr. Gordon Oswald, a visiting scientist from the University of Maine, came to CReSIS in August to continue research done by KU teams under NASA's Program for Regional Climate Assessment, PARCA, on the basal topography of the Greenland Ice Sheet.

His work with the PARCA data is beginning to identify areas where the ice, 2-3 kilometers thick, is melting at the base and therefore reducing the ice sheet's stability.

"CReSIS is where the relevant data are, and based on the earlier years of work, new data will soon become available," said Oswald. He is collaborating with Dr. Prasad Gogineni on this research.

Oswald is currently preparing two papers for publication. The first is called "Delineation of

Subglacial Water from PARCA Radar Data," and describes the method for deciding where the ice/bedrock interface is wet or frozen. The second is titled "Subglacial Water in Northern Greenland," and surveys the presence of water over a large area.

Oswald was born in York, England, in 1949. He studied physics at Oxford, and then went on to receive his PhD at the Scott Polar Research Institute in Cambridge, England.

He currently holds two positions within the research field. He is a Research Professor at the University of Maine's Climate Change Institute, and he is a Technology Director of Cambridge Consultants Ltd., in the UK, where he develops radar systems to prevent automobile accidents.

Buchardt's Life Revolves Around Ice

by Ashley Thompson

Susanne Buchardt, a Geosciences major from the University of Copenhagen, first became interested in glaciology in high school, and has since made it her career. She's participated in two five-week-long field studies in Greenland as a part of the North GRIP drilling project. She's working toward her Ph.D. in glaciology, and, not surprisingly, she loves to ice skate.

"Somehow, I just really like ice," said Buchardt, a visiting scholar from Denmark who is studying and conducting research for the fall semester at the University of Kansas. "I love the link it has to the climate. It contains so much information."

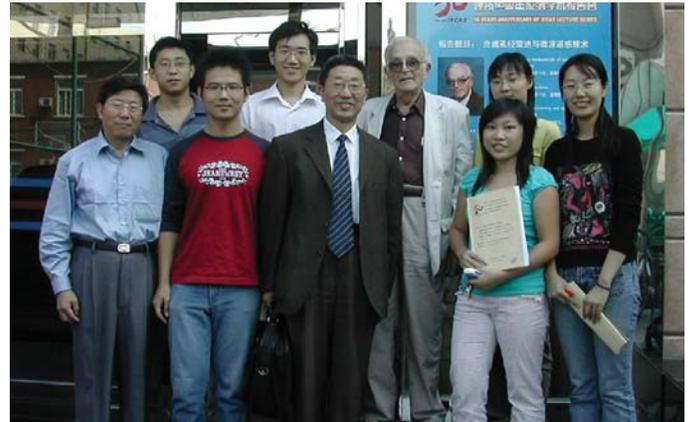
For someone with such a frigid fixation, stepping off the plane to the record-setting heat wave Kansas suffered in July was a daunting welcome. Temperatures

rocketed past the 100-degree mark for the first two weeks of Buchardt's stay in Lawrence.

"It was overwhelming," Buchardt said. "I won't lie." She eventually grew acclimated to her adopted culture and focused on something much more familiar to her – glacial research. Buchardt, in the middle of her Ph.D. thesis entitled "Mass Balance and Melt of the Greenland Ice Sheet: A Major Contributor to Sea-Level Change," hopes to extend her knowledge of radars and remote sensing technology by working closely with CReSIS engineering students. She is also auditing a course in microwave remote sensing.

"I have a strong glaciological background because of my work done in Greenland and Denmark, but I would really like to supplement that with a better understanding of radars and signal processing," Buchardt said. "Working

Professor Emeritus, Richard K. Moore gives lectures at China's IECAS



Professor Moore is pictured in the second row with professors and students from the Institute for Electronics of the Chinese Academy of Sciences in Beijing, China, where he gave a series of lectures on Microwave Remote Sensing, Sensing Wind Vectors, and Application of SAR and RAR in September. IECAS was the first institute which embarked on the study of microwave imaging Synthetic Aperture Radar (SAR) and its application technology in China.

While in Beijing, Prof. Moore also visited Prof. Jingshan Jiang, Director of the National Microwave Remote Sensing Laboratory, Center for Space Science & Applied Research, Chinese Academy of Sciences. Prof. Jiang was a visiting scholar at KU in the 1980s for 2 years.

with graduate students at KU will introduce me to that, which should certainly help me academically."

Buchardt has spoken English since her days in primary school, and this is her second visit to the United States however, delving into such a foreign culture, all the while attempting to fit in and acquire a sense of normalcy, has been a trying experience for her.

"I'm starting over somewhere completely new," Buchardt said. "But the people here are very accepting and friendly, much more so than at home. I think if there's anything I want to take back with me, culturally speaking, it's to let your guard down a little more easily with people."

The University of Copenhagen is one of four international partners with CReSIS in an exchange program funded by the National Science Foundation.

Lora Koenig Visits CReSIS to Conduct Research with 35 GHz FMCW Radar

by Beth Ruhl

Lora Koenig, a doctoral candidate at the University of Washington, came to CReSIS in August to learn how to use a 35-GHz Frequency-Modulated Continuous Wave (FMCW) Radar. She will use the radar to take extinction length measurements along the US ITASE traverse in Eastern Antarctica starting in November.

"Extinction length measurements are important because they determine how deeply the space-borne passive microwave sensors record information about firn properties on ice sheets," said Koenig.

"It tells us the extent to which snow properties such as temperature, density, and grain size need to be known in order to better model and understand passive microwave brightness temperature."

The 35GHz radar that Koenig is using operates at the same frequency as pas-

sive microwave satellites that are currently in orbit. It allows for a comparison between ground-based measurements and space-borne measurements from the satellites.

"I study snow and ice properties because I am interested in how changes in snow structure relate to changes in climate. Understanding how brightness temperatures change over time could produce a good climate data set over both ice sheets," said Koenig.

CReSIS was the only place Koenig knew of that had used a 35-GHz radar on ice sheets before.

"I chose to come to CReSIS because the people and the work that goes on at CReSIS are highly regarded within the ice sheet community," Koenig said of the Center.

Koenig was born in Eugene, OR, but

she has recently started to call Seattle, WA, home. She received her BA in Mathematics from Linfield College. She then went on to receive her MA in Geography from the University of Utah where she wrote her thesis on "The Evaluation and Development of Passive Microwave Snow Water Equivalent Algorithms in the Kuparuk River Watershed, Arctic Alaska, USA."

Koenig is currently working on her doctoral degree at the Department of Earth and Space Science at the University of Washington. Her proposed dissertation is tentatively titled "Ice Sheet Firn Properties from Passive Microwave Remote Sensing."

She is also a Graduate Research Assistant at the University of Washington.

June-August 2006 Talks and Events

Conferences Held

---06/19/06 – 06/22/06: Dan Wildcat, "Impact of Climate Change on Indigenous Peoples," Haskell Indian Nations University, Lawrence KS

Conferences Attended

--June 30, 2006; Simplified Coherent Detection Scheme for FM Chirped Laser Radar: Conference of the Optical Society of America, Whistler, BC Canada: Peter Adany, Rongqing Hui, Chris Allen
--July 27, 06: Robotic Formations, National Technical Association Conference, Chicago, IL: Cheniece Arthur and Bryce Carmichael
--July 30-August 4, 2006: IGARSS Conference, Denver, CO: William Blake, Cameron Lewis, Sahana Raghunandan

Talks

--06/05/06: William Blake, "Matlab Tutorial: Introduction: User Interface," CReSIS at KU, Lawrence, KS
--06/06/06: Peter Adany, "Matlab Tutorial: Variables and Functions," CReSIS at KU, Lawrence, KS
--06/07/06: Jilu Li, "Matlab Tutorial: Data Input and Output, Files," CReSIS at KU, Lawrence, KS
--06/09/06: Victor Jara Olivares, "Matlab Tutorial: Plots and Graphs," CReSIS at KU, Lawrence, KS
--06/12/06-06/17/06: Carol Landis, "GS 850 Course," Byrd Polar Research Center at Ohio State University, Columbus, OH
--06/13/06: Ellen Mosely-Thompson, "Climate Change, Past, Present and Future," and "Climate Change as Seen in the Cryosphere," Ohio State University, Columbus, OH
--06/19/06: David Braaten, "Climate and Snowfall," CReSIS at KU, Lawrence, KS
--06/19/06: David Braaten, "PRISM and CReSIS: Ice Sheet Remote Sensing from Top to Bottom," Haskell

Indian Nations University, Lawrence KS

--06/20/06: Cornelis van der Veen, "Glacier Motion and Mass Balance," CReSIS at KU, Lawrence, KS
--06/21/06: David Braaten, "Fieldwork in Antarctica," Schiefelbusch Institute for Communication Camp for 4-12 year-old children, Lawrence, KS
--06/21/06: Ellen Mosely-Thompson, "Panel Discussion on Al Gore's film An Inconvenient Truth," Drexel Gateway Theater, Columbus, OH
--06/20/06: Sridhar Anandakrishnan, "Seismic Methods of Glacier Research," CReSIS at KU, Lawrence, KS
--06/23/06: Terrance Hughes, "Holistic Ice Sheet Modeling," CReSIS at KU, Lawrence, KS
--06/23/06: Carol Landis, "Tour Group for 12 Teachers from Ohio Dominican," Byrd Polar Research Center at Ohio State University, Columbus, OH
--06/28/06: Chris Allen: "Principles of Radar," CReSIS at KU, Lawrence, KS
--06/28/06: Chris Allen: "Introduction to Pulse Radar Compression," CReSIS at KU, Lawrence, KS
--06/28/06: Pannirselvam Kanagaratnam, "FM Radar," CReSIS at KU, Lawrence, KS
--06/28/06: William Bake, "Digital Signal Processing for Radar," CReSIS at KU, Lawrence, KS
--06/28/06: Prasad Gogineni, John Paden, "SAR," CReSIS at KU, Lawrence, KS
--06/28/06: Prasad Gogineni, "INSAR," CReSIS at KU, Lawrence, KS
--06/29/06: Rick Willyard, "RF System requirements, design and simulation," CReSIS at KU, Lawrence, KS
--06/29/06: Torry Akins, "Digital hardware and software (wave form generation, data acquisition, and timing generation)," CReSIS at KU, Lawrence, KS
--06/29/06: Adam Lohofener, "Circuit Board Design, manufacturing, housing and population," CReSIS at KU, Lawrence, KS
--06/29/06: Torry Akins, "Radar demonstration," CReSIS at KU, Lawrence, KS

--06/30/06: Peter Adany, "Simplified Coherent Detection Scheme for FM Chirped Laser Radar," Topical Meeting on Coherent Optical Technologies and Applications," Whistler, BC, Canada
--07/06: Eric Akers, "Robotic deployment and retrieval of seismic sensors for polar environments," International Conference on Computing, Communications and Control Technologies," Orlando, FL
--07/06: Eric Akers, "Long-term survival of polar mobile robots," International Conference on Computing, Communications and Control Technologies," Orlando, FL
--07/06: Arvin Agah, "Mobile robots for harsh environments: lessons learned from field experiments," International Symposium on Robotics and Applications," Budapest, Hungary
--07/11/06: Carol Landis, "Lesson Development for CReSIS Datasets," Byrd Polar Research Center at Ohio State University, Columbus, OH
--07/12/06: David Braaten, "Writing Abstracts," CReSIS at KU, Lawrence, KS
--07/18/06: Ellen Mosely-Thompson, "Climate Change: How to Read the Evidence?" Saint John's Episcopal Church, Columbus, OH
--07/27/06: Cheniece Arthur and Bryce Carmichael, "Robotic Formations," National Technical Association Conference, Chicago, IL
--08/01/06: Dr. Richard Colgren, "CReSIS UAV Activities," Aero Institute, Palmdale, CA
--08/25/06: Chris Gifford, "Robotic Seismic Sensors for Polar Environments," CReSIS at KU, Lawrence, KS
--08/31/06: David Braaten, "Issues and Impacts of Global Warming," KU Business School, Lawrence, KS

Field Journals

--05/06: Claude Laird, "Greenland 2006"; http://cresis.ku.edu/knowledge/journals_2006/

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