

Date: June 4-7, 2013

Location: Wiley Inn, Beverly MA <http://www.wyliecenter.com/>

Meeting Website: <http://www.usclivar.org/meetings/griso-workshop/>

Organizing Committee:

F. Straneo (WHOI, USA), P. Heimbach (MIT, USA), O. Sergienko (GFDL, USA)

Scientific Steering Committee*:

R. Bindshadler (NASA/GSFC); G. Catania (U. Texas, USA); A. Jenkins (BAS, UK); H. Johnson (Oxford U., UK); I. Joughin (APL-UW, USA); G. Hamilton (U. Maine, USA), D. Menemenlis (JPL/Caltech, USA); J. Mortensen (GINR, Greenland); R. Motyka (U. Alaska, USA); L. Padman (ESR, USA); S. Price (LANL, USA); D. Roberts (U. Durham, UK); A. Vieli (U. Durham, UK); D. van As (GEUS, DK)

* includes Organizing Committee Members

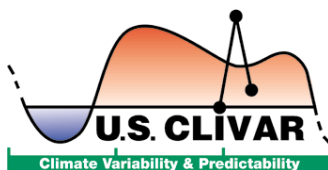
Description:

The widespread retreat and speedup of marine-terminating outlet glaciers in Greenland over the past two decades has led to a doubling of the ice sheet's contribution to sea level rise and increased the freshwater input to the North Atlantic. Its coincidence with a period of oceanic and atmospheric warming suggests a common climate driver. Yet the forcings and mechanisms behind these dynamic responses are poorly understood and either missing or crudely parameterized in climate and ice sheet models. Progress on this complex topic requires a collaborative, international, cross-disciplinary and multi-faceted approach. With this workshop, we seek to bring together oceanographers, glaciologists, atmospheric and climate scientists, including observationalists, modelers, and theoreticians, working on all aspects of this problem. A whitepaper initiated by the *U.S. CLIVAR Working Group on Greenland Ice Sheet Ocean interactions (GRISO)* serves as background to this workshop. It can be downloaded at <http://www.usclivar.org/working-groups/greenland-ice-sheet-ocean-interactions/>

Meeting Format:

This workshop seeks to promote a deeper understanding of the physical processes involved in ice/ocean/atmosphere interactions in Greenland including a better representation of these processes in climate models. It is structured around three elements:

- Review talks by invited speakers to summarize the state of knowledge in a specific area (especially for non-experts) laying the foundation for the scientific discussions;
- Science presentations by the participants -- consisting of a 3 – slide (3 min) introduction to the problem and a poster which will be on view during poster sessions and throughout the meeting;
- Discussion sessions throughout the meeting led by Steering Committee Members including two final discussion sessions on Friday when the prioritized agenda will be set.



TUESDAY June 4th

9:00 - 10:15 Session 1. Introduction and Big Picture Motivation

- F. Straneo - Introduction – Meeting Structure and Goals (20 min)
- B. Bindschadler – Staying Ahead of the Greenland Ice Sheet (20 min)
- I. Joughin – Recent Greenland Ice Sheet Variability (20 min)

10:15 - 10:45 Coffee Break

10:45 - 12:15 Session 2. Evidence of Glacier Variability (Chair: I. Joughin)

- T. Moon – Patterns of glacier variability in Greenland (20 min)
- L. Stearns – Observing Tidewater Glacier Variability: Progress and Challenges (20 min)
- M. Truffer – Lessons learned from Alaskan tidewater glaciers (20 min)

Science Presentations and Poster Introductions (3 min each)

- *G. Hamilton – Factors leading to the onset of tidewater glacier terminus retreat*
- *A. Ahlstrøm – Seasonal velocity variations of 11 outlet glaciers from in situ GPS*
- *M. Andersen – Dynamic mass loss of North West Greenland*
- *E. Enderlin – Re-examining the timing of recent dynamic changes in NW Greenland*
- *M. Truffer – Fjord /Glacier Ice Interactions: Nuup Kangerlua (Godthåbsfjord)*
- *V. Miles – Rapid changes in advance–retreat (co) variability of Sermilik fjord glaciers, SE Greenland*
- *S. Foga – Flow variability of Helheim Glacier and potential oceanic forcing*

12:15 - 1:30 Lunch

1:45 - 3:00 Session 3. What are the Proposed Mechanisms? (Chair: R. Bindschadler)

- A. Vieli – Modelling the dynamics of tidewater outlet glaciers: approaches, issues, perspectives (20 min)
- J. Amundson – In defense of ice mélange (20 min)
- R. Motyka – Submarine melting: drivers, measurement, and importance (20 min)

Discussion

3:00 - 3:30 Coffee Break

3:30 - 5:00 Session 4. What can the paleo record teach us? (Chairs: D. Roberts, A. Vieli)

- C. Andresen – Linking glaciers, ocean and atmospheric variability – lessons from marine sediment archives (20 min)
- J. Lloyd – Long term variability of the ocean around Greenland (20 min)
- D. Roberts – West Greenland ice stream instability during the LGM/Holocene transition (20 min)

Science Presentations and Poster Introductions (3 min each)

- *A. Carlson – Paleo influence of ocean temperatures on southwest GIS margins*
- *A. Jennings – The Role of Ocean Warming in Central West Greenland Ice Stream Retreat: LGM through Deglaciation*
- *L. Levy – Constraints on the Holocene extents of the southwestern margin of the GIS*
- *T. Lowell – Late Holocene Expansion of the GIS and implications for Its Current Decay*
- *K. Nisancioglu – Melting of Northern Greenland during the last interglacial*
- *M. Kelly - Late glacial-early Holocene fluctuations of GIS outlet glaciers and adjacent local ice caps*
- *K. Kjeldsen – Mass loss of the southern half of the GIS since the Little Ice Age Max.*

5:00 - 6:00 End of Day Discussion (Moderators: L. Padman, G. Hamilton)

6:00 - 7:00 Poster Session I

7:30 Dinner at the SALEM Beerworks, Salem, MA

WEDNESDAY June 5th

8:30 - 10:00 Session 5. Dynamics at the Ice-Ocean Boundary (Chairs: R. Motyka, D. Menemenlis)

A. Jenkins – Ice-Ocean Boundary Dynamics (20 min)

K. Nicholls – Observations from the ice-ocean boundary (20 min)

Science Presentations and Poster Introductions (3 min each)

- S. Kimura – *An application of plume theory to assess impacts of subglacial discharge on glacier subaqueous melting*
- T. Millgate – *Effect of Basal Channels on Oceanic Ice-Shelf Melting*
- S. Hossainzadeh – *Effects of Greenland's Runoff in a Regional Arctic System Model*
- R. Sciascia – *Seasonal variability of submarine melting and circulation in an East Greenland fjord*
- A. Wells – *Melting-driven evolution of an ice shelf coupled to a buoyant meltwater plume*
- Y. Xu – *Subaqueous melting of Store Glacier, W Greenland from 3D numerical modeling and ocean observations*

Discussion

10:00 - 10:30 Coffee Break

10:30 - 12:15 Session 6. Role of (sub) Glacial Hydrology (Chairs: O. Sergienko, D. van As)

I. Hewitt – Modeling glacial hydrology: implications for submarine melt water discharge (20 min)

T. Creyts – Seeing what condition the condition is in: Characteristics of Greenland drainage in englacial and subglacial systems (20 min)

Science Presentations and Poster Introductions (3 min each)

- T. Creyts – *Fast or slow?: Englacial drainage in the Greenland Ice Sheet?*
- K. Schild – *Understanding the Subglacial Hydrological Environment of a Greenland Tidewater Glacier*
- W. Chu – *Role of subglacial hydrology and basal topography in driving ice flow of Greenland glaciers*
- D. Lampkin – *A Fuel Injected Ice Stream? Melt Water Drainage from Saturated Crevasses, Jakobshavn*
- D. van As – *Increasing meltwater discharge from the Nuuk (SW) region*

Summary/Discussion

12:15 - 1:30 Lunch

1:45 - 3:30 Session 7. Oceanic Forcing at the Glaciers' Edge (Chairs: F. Straneo, J. Mortensen)

D. Sutherland – Connections between continental shelf circulation and fjord circulation (20 min)

F. Straneo – Observations at the margins of Greenland Glaciers (20 min)

Science Presentations and Poster Introductions (3 min each)

- P. Budgell – *A Nested High-Resolution Simulation of Circulation in Sermilik Fjord*
- R. Jackson – *Shelf-forced fjord circulation and heat transport at the terminus of a major outlet glacier*
- C. Gladish – *Sub-annual renewal of a Greenland glacial fjord driven by subglacial fresh water discharge*
- L. Padman – *Decadal Variability of Petermann Gletscher, NW Greenland - Ice, Ocean, and Atmosphere*
- J. Mortensen – *Circulation and heat sources for glacial melt in a subarctic sill fjord (Godthabsfjord)*
- J. Bentsen – *Modeling of intermediate water mass formation and heat transport in Godthabsfjord*
- R. Motyka – *LeConte Glacier, Alaska: Submarine Melting and Proglacial Fjord Dynamics in Sep. 2012*

Summary/Discussion

3:30 - 4:00 Coffee Break

4:00 - 5:00 End of Day Discussion (Moderators: R. Hallberg, O. Sergienko)

5:00 - 6:00 Poster Session II

6:00 Reception at the Wiley

THURSDAY June 6th

8:30 - 10:30 Session 8. Large Scale Ocean/Continental Shelves (Chairs: F. Straneo, P. Heimbach)

I. Fenty - Ocean Variability around Greenland: Insights from Observations and a Coupled Ocean-Sea Ice Model (20 min)

R. Curry - Variability in the North Atlantic Ocean 1950-2010 (20 min)

T. Haine - Modeling the large-scale ocean circulation around Greenland (20 min)

Science Presentations and Poster introduction (3 min each)

- *I. Koszalka - Oceanic variability on the SE Greenland shelf near the Helheim-Sermilik glacier-fjord system*
- *W. Maslowski - Modeling of Ocean Dynamics and Variability near Greenland's Marine Terminating Glaciers*
- *U. Schauer - Decadal warming in the West Spitsbergen Current in Fram Strait*
- *P. Dodd - The Supply of Warm Atlantic Water to Nioghalvfjærdsbræen in North East Greenland*
- *P. Myers - Oceanographic processes in Baffin Bay impacting or being impacted by Greenland*
- *B. Harden - Shelf variability and the forcing of hydrographic changes within Sermilik fjord*

Summary/Discussion

10:30 - 11:00 Coffee Break

11:00 - 12:15 Session 9. Calving and Ice Melange (Chairs: I. Joughin, J. Hamilton)

J. Bassis - Granular model of ice (partially) explains diverse calving patterns from grounded and floating glaciers (20 min)

Science Presentations and Poster Introductions (3 min each)

- *A. Taylor - A physically-based crevasse-depth calving model applied 2D to marine outlet glaciers:*
- *T. Bartholomäus - Does calving matter? Evidence for significant submarine melt*
- *R. Cassotto - Observations of tidal and calving impacts on near-terminus ice flow and terminus stability?*
- *M. Dennin - Jamming of Ice Melange: Modeling Ice Melange Dynamics with Particle Rafts*
- *W. Sneed - Norske Oer Ice Barrier: permanent, semi-permanent, or not*
- *C. Richards - Timing and characterization of calving events from surface waves*
- *M. Oltmanns - Forcing of the ice by Katabatic winds - Ammassalik, SE Greenland*

Discussion

12:15 - 1:30 Lunch

1:45 - 3:30 Session 10. Modeling Glaciers, Ice sheets and Climate (Chairs: A. Vieli, S. Price)

H. Seroussi - Modeling of Greenland dynamics (20 min)

S. Price - Land Ice Modeling in Earth System Models (20 min)

Science Presentations and Poster Introductions (3 min each)

- *O. Sergienko - Basal conditions of fast-flowing outlet glaciers and ice streams from 3D inversions*
- *F. Nick - Future sea-level rise from Greenland's major outlet glaciers in a warming climate*
- *A. Humbert - Modelling concepts of the Jakobshavn Isbrae and the Greenland Ice Sheet*
- *R. Hallberg - Adding Coupling between Oceans and Ice-sheet Dynamics to Coupled Climate Models*
- *N. Schlegel - Sensitivity of flow in Greenland glaciers to errors in surface mass balance forcing*
- *C. Rodehacke - Fully coupled ice sheet-earth system simulations: GIS response to CO2*
- *C. Little - Uncertainty in 21st century oceanic heat content near Greenland*

Discussion

3:30 - 4:00 Coffee Break

continued...

THURSDAY June 6th (continued)

4:00 - 5:00 Session 11. Bathymetry (Chairs: J. Mortensen, R. Motyka)

R. Bell – Airborne Measurements of Glaciers and Fjords (20 min)

Science Presentations and Poster Introductions (3 min each)

- K. Tinto – *Bathymetry in fjords of Northwestern Greenland from Operation IceBridge aerogravity*
- D. Porter – *Fjord bathymetry controls on basal melt and glacier retreat in Greenland*

Summary/Discussion

5:00 – 6:00 End of Day Discussion (Moderators: L. Stearns and D. Menemenlis)

6:00 – 7:00 Poster Session III

FRIDAY June 7th

Session timing to be announced soon.

Session 12. A programmatic perspective – opportunities and challenges

Moderators: NSF, NASA, IceBridge Program/Project Managers

DISCUSSION SESSIONS: (How) Can this workshop make a difference for making substantial progress towards achieving the stated goals?

Session 13. Discussion I – What are the prioritized questions?

Leaders: B. Bindschadler, P. Heimbach, R. Motyka

10:00-10:30 Coffee Break

Session 14. Discussion II – What are the key modeling needs?

Leaders: S. Price, A. Vieli

Session 15. Discussion III – What are the key observations and how do we get them?

Leaders: A. Jenkins, G. Hamilton, F. Straneo

12:30 pm Lunch (included)