



Study of Environmental Arctic Change (SEARCH)

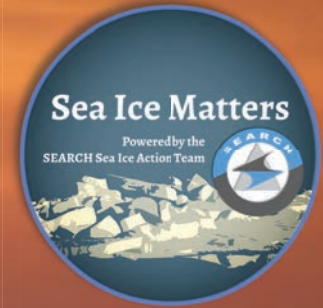
AGU Town Hall | 16 December 2015

-
- Brendan P. Kelly, SEARCH Executive Director (University of Alaska Fairbanks)
 - Jennifer Francis, Sea Ice Action Team Lead (Rutgers University)
 - Ted Schuur, Permafrost Action Team Lead (Northern Arizona University)
 - Ted Scambos, Land Ice Action Team Lead (National Snow & Ice Data Center)
 - Hajo Eicken, Science Steering Committee Past-Chair (University of Alaska Fairbanks)



SIAT

Sea Ice Action Team



Mission: To advance understanding and awareness of the impacts of Arctic sea-ice loss by enabling collaboration, community engagement, and communication.

The T in SIAT:

Henry Huntington (co-lead) – Huntington Consulting

Jennifer Francis (co-lead) – Rutgers University

Matt Druckenmiller (science communicator/enabler) – Rutgers & NSIDC

Larry Hamilton – University of New Hampshire

Bob Henson – Weather Underground

Marika Holland – NCAR

Martin Jeffries – Office of Naval Research

Brendan Kelly – SEARCH Program

Don Perovich – Cold Regions Research & Engineering Lab (CRREL)

The A in SIAT:

Inverting the communication pyramid

“Sea Ice Matters”

What

High-level basic info, key graphics, and one-pagers on major sea-ice impacts

“Hot topics,” key science papers, guest perspectives, science videos

Data, tools, technical resources

For whom

Media, public, high-schoolers, congressional staffers...

Science students and journalists, scientists in other fields.

Arctic physical scientists

Links to
resources and
deeper
understanding

Communication \Leftrightarrow Collaboration \Leftrightarrow Engagement

Sea Ice Matters

Powered by the
SEARCH Sea Ice Action Team



Sea Ice and...

Arctic Navigation
Ocean Currents
Climate Variability
Your Weather
Coastal Communities
Ecosystems
International Security
Natural Resources
Sea Level Rise
Forecasting and Prediction
Permafrost
Environmental Stewardship
International Relations

Permafrost Action Team Upcoming Activities

Dr. Ted Schuur
Dr. Christina Schädel
Northern Arizona University



SEARCH



(Study of Environmental Arctic Change)

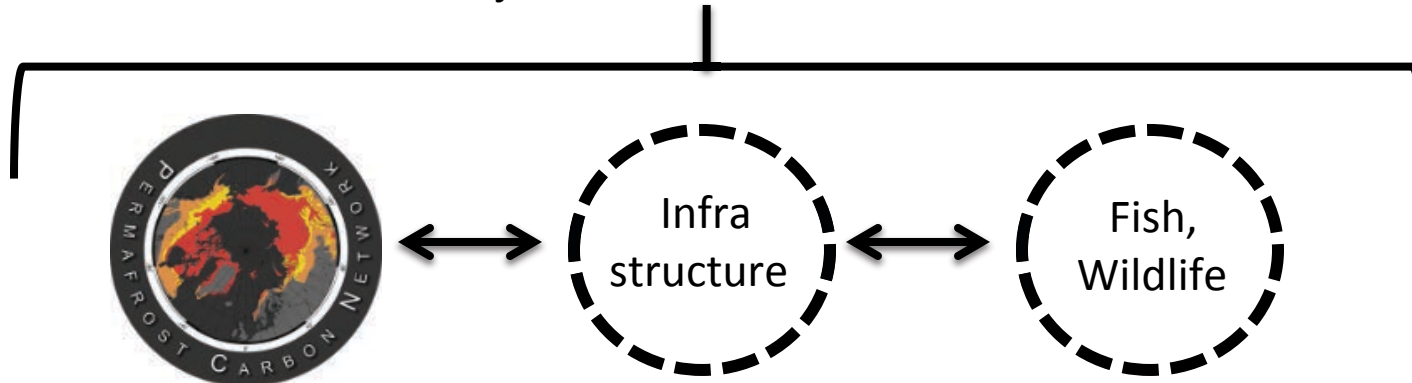


Sea Ice Action Team

Land Ice Action Team

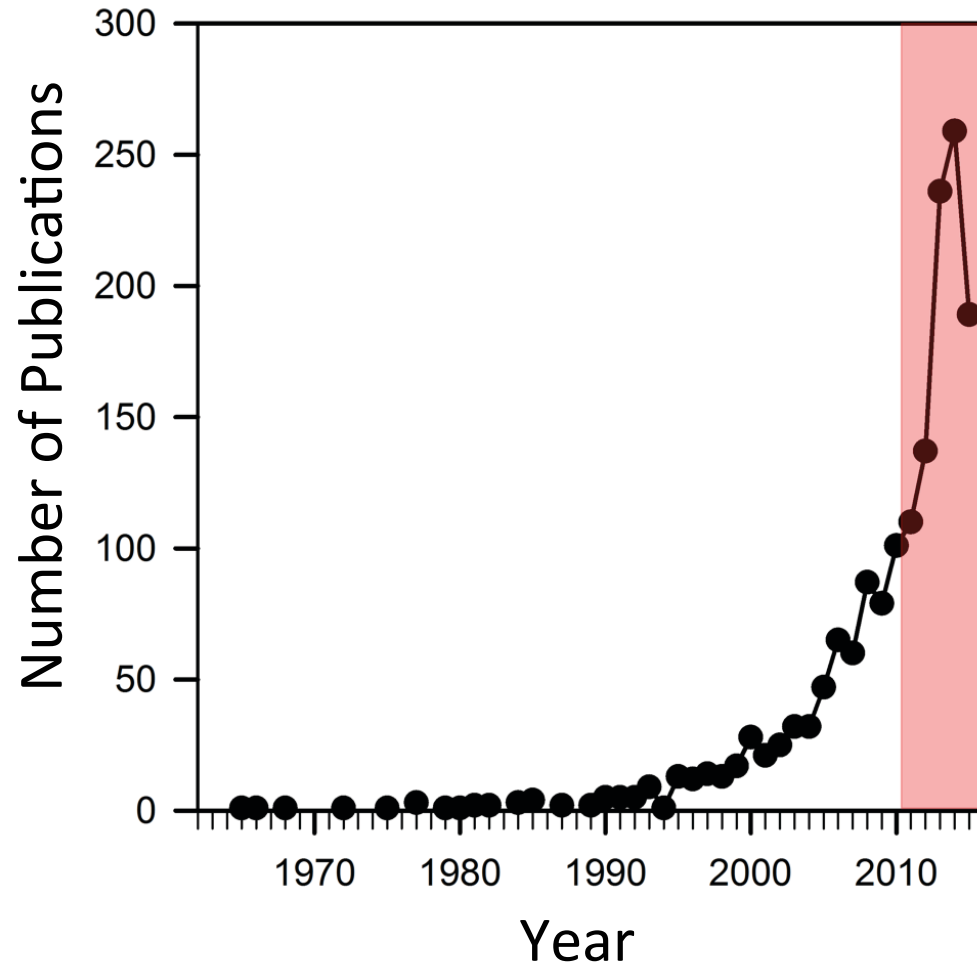
Permafrost Action Team

Document and Understand How Degradation of Near-Surface Permafrost Will Affect Arctic and Global Systems **USING SYNTHESIS SCIENCE**



Permafrost Carbon Published Literature

Search Terms in Science Citation Index at Web of Science (ISI)
Permafrost and Carbon in Full Text



Network Goal: Use synthesis science to integrate knowledge 'under the curve' and distill findings for decision makers and public

Permafrost Action Team

Network Development

- **Science and Action Steering Committee:**
 - *Cathy Wilson (DOE Los Alamos National Lab, NGEE Arctic)
 - *Erik Kasischke (NASA, ABoVE)
 - *Dave McGuire (UAF/USGS, PCN)
 - *Vladimir Romanovsky (UAF, GTN-P)
 - *Kevin Bjella (CRREL)
 - *Toni Lewkowicz (U Ottawa, IPA)
 - *Merritt Turetsky (U Guelph, PCN)
 - *Dave Schirokauer (Denali NPS)
 - *Michelle Walvoord (USGS Denver)
 - *Scott Rupp (UAF, SNAP, Alaska Climate Center)

2016 Teleconferences 2-4x per year to solicit input on new and emerging activities; AGU 2016 opportunity for in-person meeting

Permafrost Action Team

Network Development

- **Synthesis Postdoctoral Researcher**

Funded by USGS Climate Science Center for 2 years (Steve Gray).
Based at UA Fairbanks / IARC

Focused on Permafrost Impacts

Theme 2 Infrastructure, or

Theme 3 Fish/Wildlife/Ecosystem Services

Work with McGuire, Schuur, Eicken, others TBD.





Network: Synthesis Science

Upcoming Hosted Workshops:

- **6th Annual Open Science Meeting** of the Permafrost Carbon Network. Held prior to AGU (**Sunday Dec 13, 2015**). This network meeting draws in new participants and solicits feedback on upcoming synthesis products.
- **Methane Synthesis Workshop**. (Mar/April 2016, Fairbanks, AK?) This workshop will focus in more detail on four methane synthesis products outlined at Open Science PCN meeting.
- **Synthesis Lead Workshop**. Held in conjunction with Eleventh International Conference of Permafrost (ICOP), Potsdam, Germany (**June 2016**). This smaller workshop brings lead / co-lead scientists of synthesis products together for cross-cutting opportunities.

Organized Sessions:

- **American Geophysical Union 2015, San Francisco, CA**
Vulnerability of Permafrost Carbon to Climate Change
(3 oral sessions, 1 poster session, 1 special session)
Special session a panel discussion with the Permafrost Carbon Network, DOE NCEE Arctic, NASA CARVE, NASA ABoVE
- **XI. International Conference on Permafrost 2016, Potsdam, Germany**
Climate Change and the Permafrost Carbon Feedback: Past, Present and Future



***Greenland Ice Sheet-Ocean
Observing System
(GrIOOS) Workshop –
December 13-14,
Fort Mason, San Francisco***

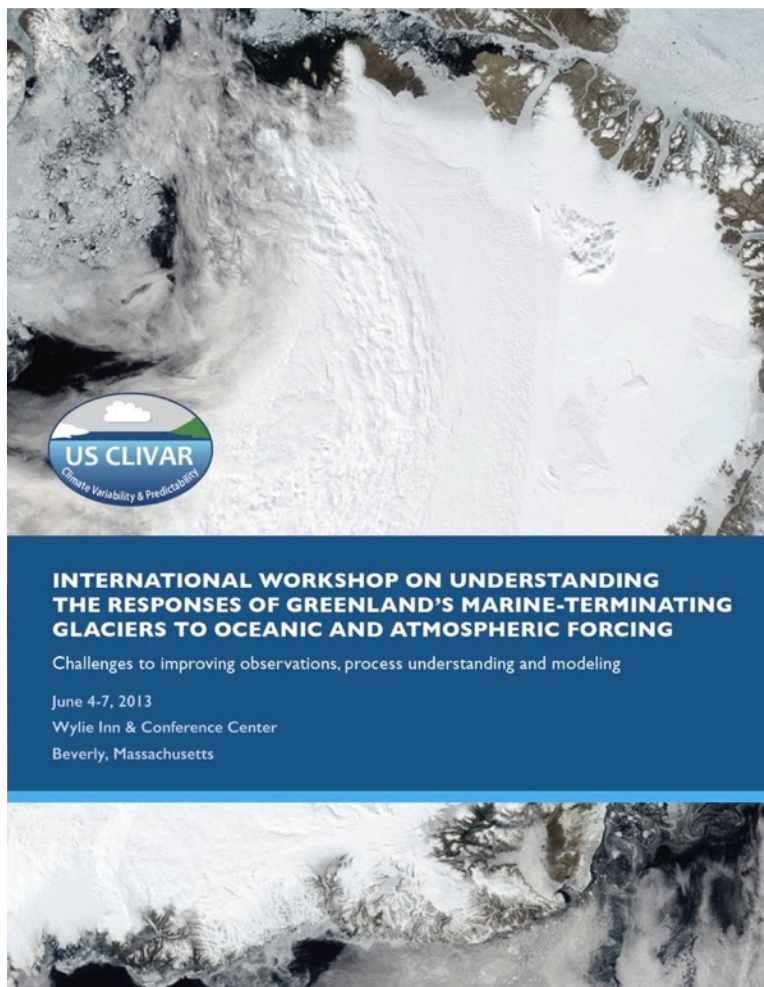


Ocean/Ice Sheet Interactions in Greenland

Impact of the ocean on the ice sheet and of the ice sheet on the ocean and its marine ecosystem



International Workshop June 2013, Beverly, MA



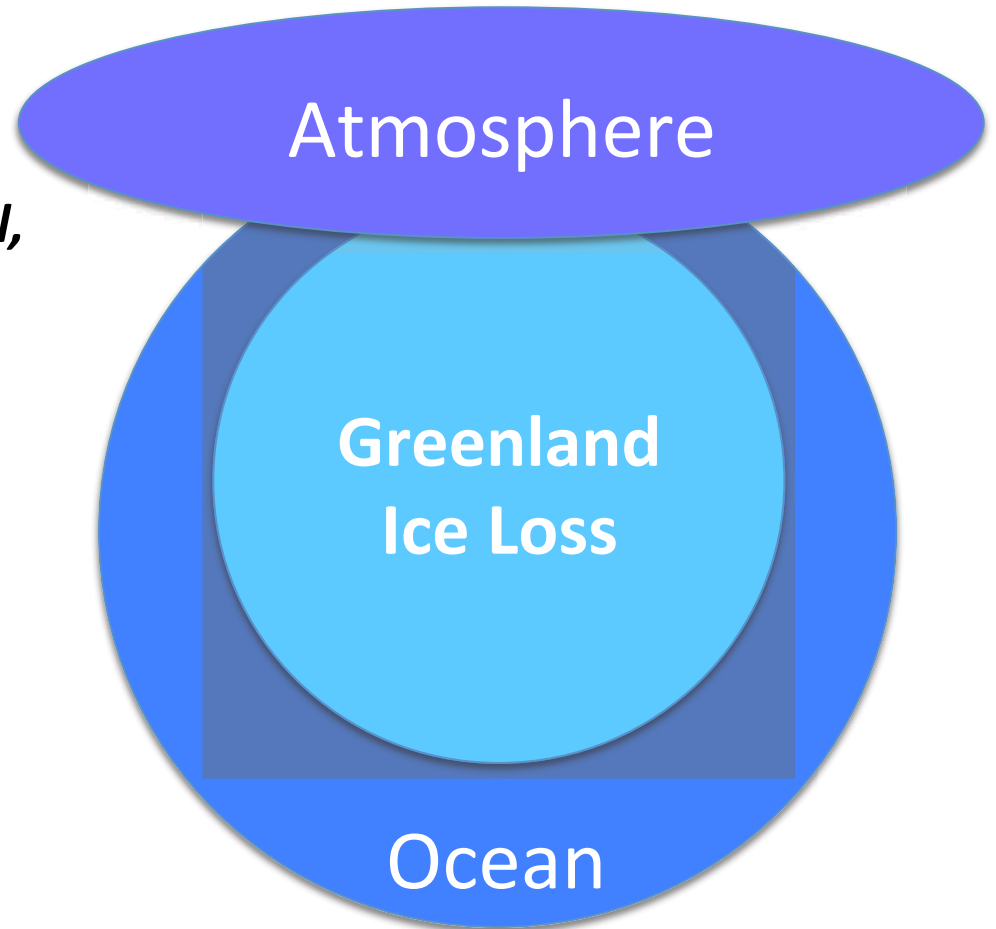
Scientific Priorities

- **Greenland Ice Ocean Observing System (GrIOOS)**
- Data Compilation and Sharing
- Targeted process studies
- Megasites experiment

Heimbach et al. 2014

Greenland Ice Sheet/Ocean Observing System GrIOOS

Coordinated long-term glaciological, oceanic and atmospheric data to improve our understanding of, and ability to predict, Greenland Ice Sheet changes and their relation to the ocean, including the marine ecosystem, and the atmosphere.



GrIOOS – Workshop Dec 12-13th San Francisco

Define the design and implementation plan for GrIOOS including description of key measurements, identification of sites and instrumentation; integration with existing networks.

ACTION TEAM/Steering Committee

J. Abermann (Asiaq, Greenland),
A. Ahlstrøm (GEUS, DK),
G. Hamilton (U Maine, USA),
P. Heimbach (UT Austin & MIT, USA),
R. Mottram (DMI, DK),
S. Nowicki (NASA Goddard, USA),
T. Scambos (NSIDC, USA),
F. Straneo (WHOI, USA),
D. Sutherland (U Oregon, USA),
M. Truffer (U Alaska, USA)
Bob Bindschadler – SEARCH SSC

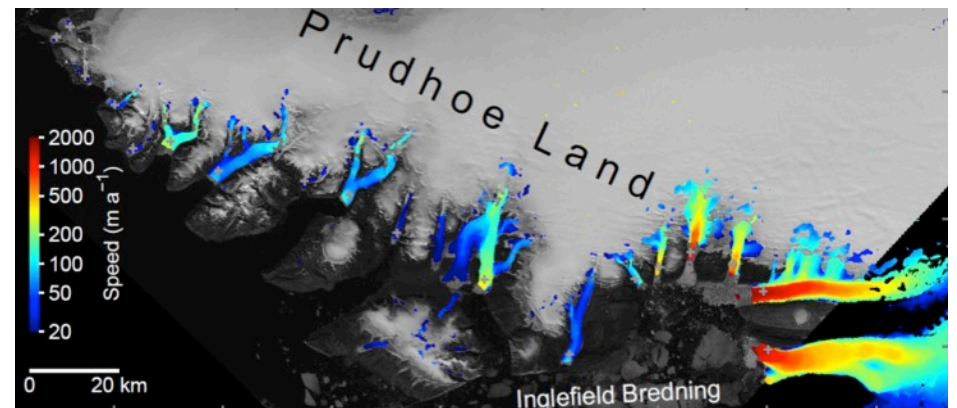
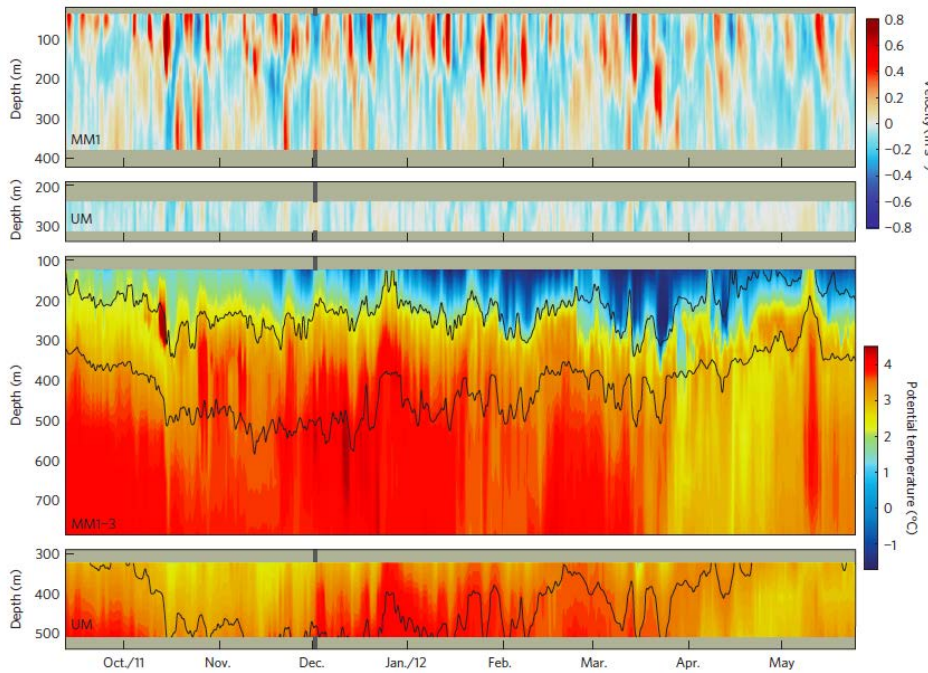
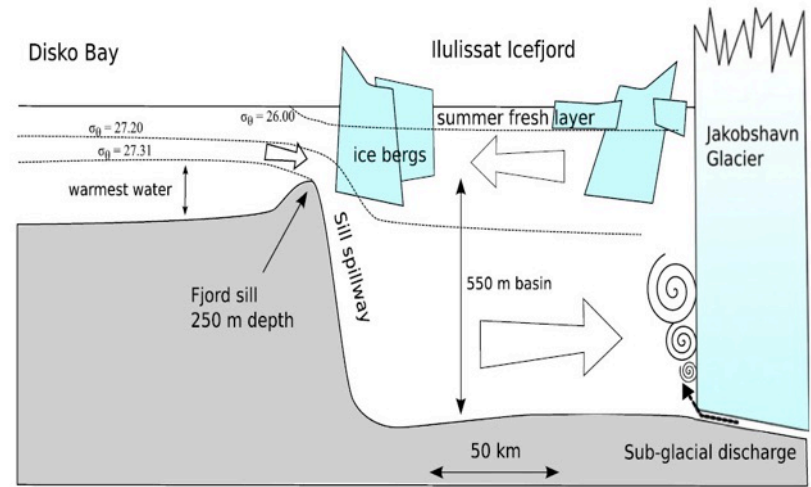
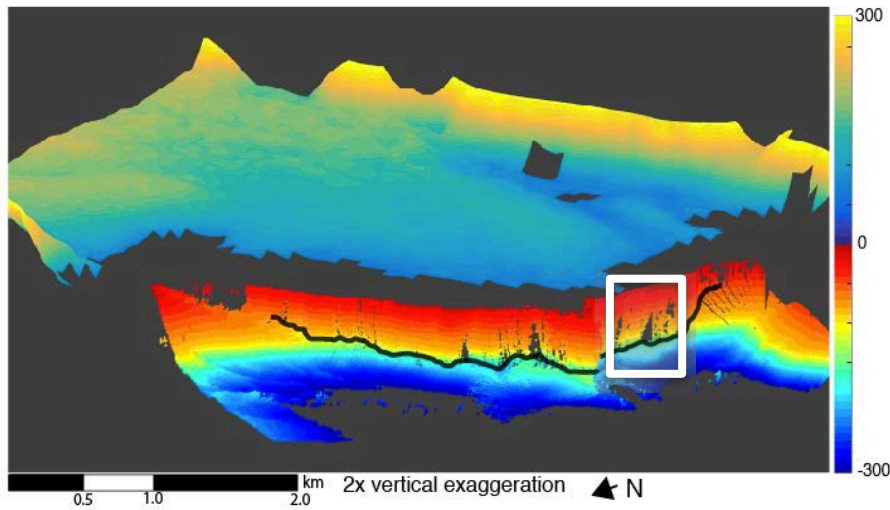




Participants:

- ~50 attendees from 7 countries selected by steering committee based on expressions of interests (oceanographers, glaciologists, climate modelers, ice sheet modelers, marine biologists, 1/3 early career)
- NASA and NSF Program Managers
- Greenlandic scientists and government representative
- Co-located with Ice Sheet Modeling Intercomparison Project 6

What have we learned so far?

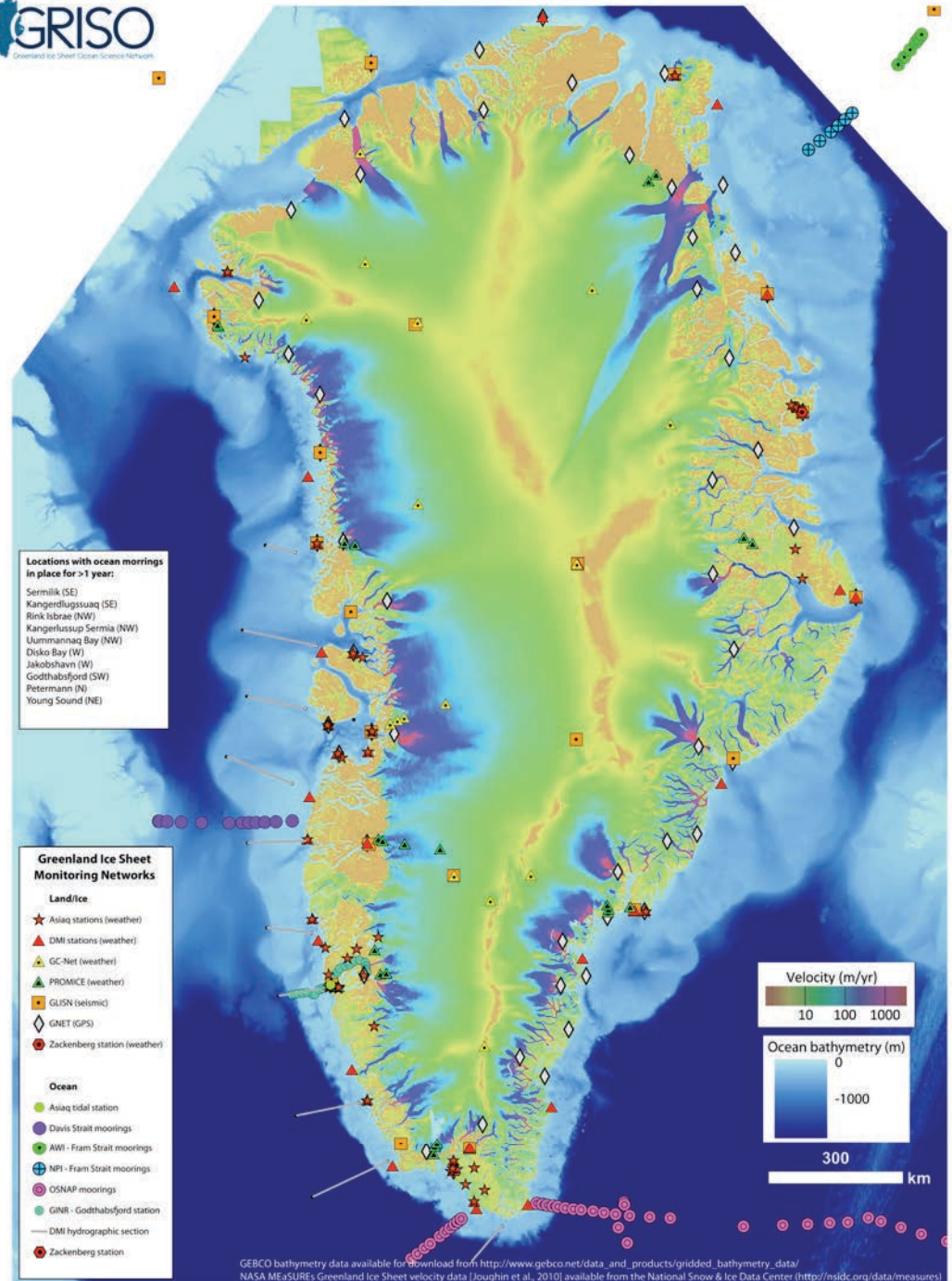


Measurement, Techniques, Technologies





What data sets exist already?



KIND & NAMES OF SYSTEMS	
A. EXISTING DATA/SERIES	1) KANGERDUGSSUAQ KG
B. ACCESSIBILITY	2) HELHEIM (BOTH??)
C. SHALLOW GLACIER	3) GÖTHALBSFJORD
	4) KNS
D. DEED	5) JAKOBHAVN (JH)
• CATCHMENT/MELT KG	6) 79°N
• FLOATING ICE TONGUE (PETERMAN + 79°)	7) NW. GROUPS OF SMALLER FJORDS
• DEPTH OF SILL	8) PETERMAN
• GEOMETRIC COMPLEXITY	9) LUMMANAQ UMMANNAQ
• DISTANCE FROM SB KG (FAM) (OCEAN INFLUENCE)	10) QANNAQ QANNAQ
• SENSITIVITY (TIME) ('ABOUT TO GO') 'STATIC'	
• N/SEW SECTORAL COVERAGE	

What are the essential measurements?

1) MINIMUM SET OF MEASUREMENTS SYNTHESIS PRO

DMG → • BATHY (~10s m) BED ELEV → TOPO NEEDS IMP

LANDSAT & SENTINEL → • ICE VEL. & SURFACE ELEV (DEM) TERMINUS POSITION + ICE THICK.

• SGD (HOW?) NOTHING DIRECT

DAVIS ST. ARGO OSUR? FROM STRAIT. DO • T/S(z) SHELF + FJORD Bp (BOTTOM P.) NO FILLING TIME SERIES

DMI • Meteo SOME GEOGRAPHIC GAPS LOCALISED WAVE etc

SOME • PALAEO - SED. CORES NOT ENOUGH

TIME BASE MEASUREMENT SURENCY • MELANGE & SEA ICE COVER / THICKNESS INC. BERGS → f(z) 3D HIGH RES. (SPACE & TIME)

✓ • SATELLITE SST, COLOUR, SSS, SSH (SURF. GEO VEL)

AUTM - TIDES ... ?

Site selection vote

Winners –

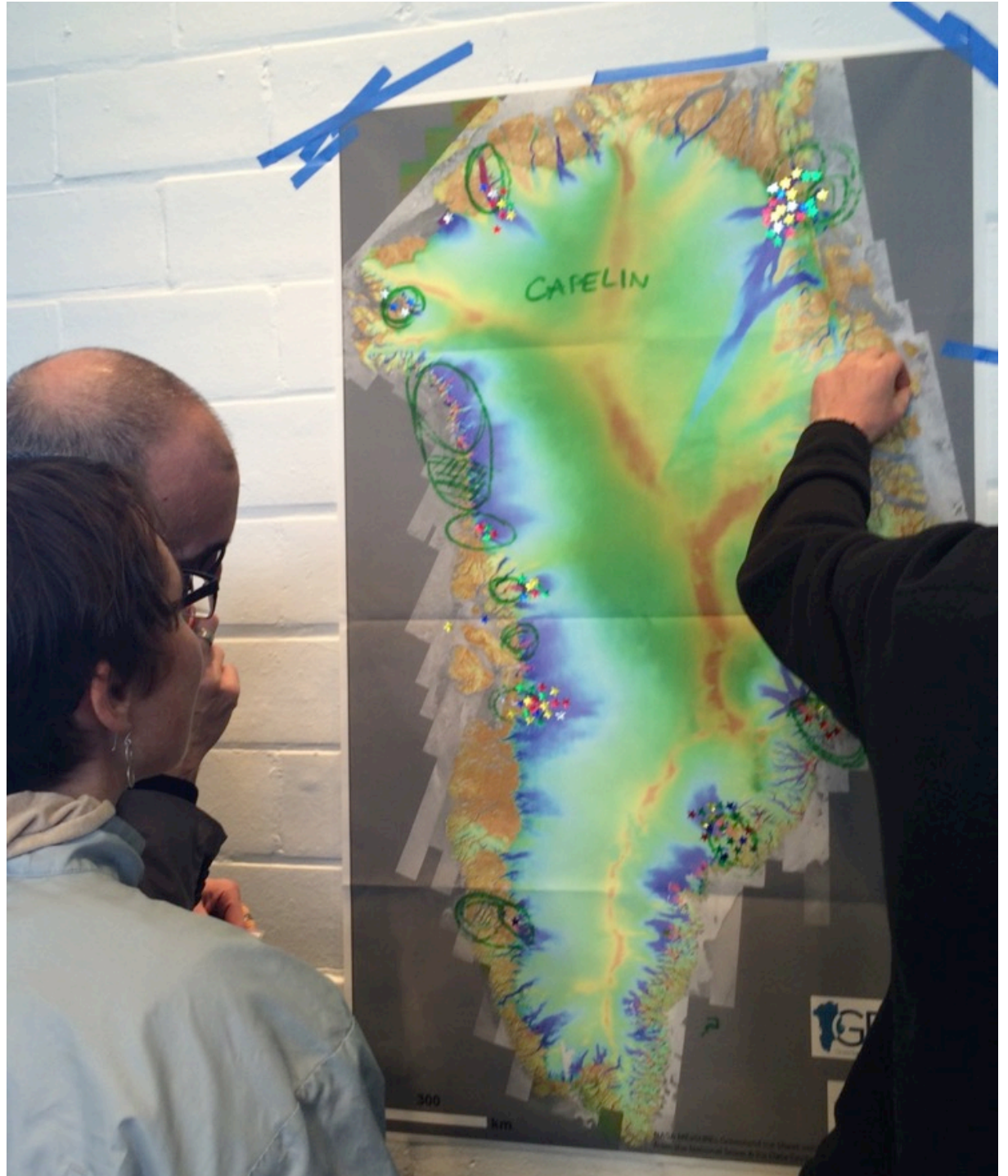
Jacobshavn

Helheim

79N/Zachariasen

Peterman

Rink or Upernavik



Helheim VF | stabilizing ^{replace}
 experience, ^{complex 5/10/15}
 SE logistics, value added
 Jakobshavn N-pool
 - copy lighter ice, but ocean access
 - SAB - history - methane
 - gemelby - obstacles/difficulties
 - still
 79N/ZI ME - floating
 - plankton - creating ice
 - ice stream - existing
 - ice core - new from SF
 - remnant - logistics hard
 - no towns - unusual geology
 "SLR" access
 - advance
 - gemelby
 - complex
 - 79N
 N Petermann - impact
 - existing
 - not broken
 - needed
 DW?
 NW Rink - value added
 (third) why stable? existing
 NNW Qanaaq - Japan
 future town
 (KNS) GINRA ocean, needs ice
 SE KG
 NW Upernavik - many outlets/fjord



Report

End Jan.: Initial draft by Steering Committee/Chairs

Early Feb.: Circulate to Participants & receive feedback

Early Mar.: 2nd draft circulated to community

End April: Final Publication



Observing Arctic Change

- (1) Ongoing process to define & implement a US interagency Arctic observing system
- (2) SEARCH perspective summarized in white papers available at SEARCH website:
www.arcus.org/search-program/aon/products
- (3) Arctic Observing Open Science Meeting, Nov 2015
- (4) Arctic Observing Summit 15-18 March 2016



Arctic Observing Open Science Mtg: Seattle, 17-19 November 2015

- Co-chairs: Craig Lee (UW), Matthew Shupe (CU/NOAA), Cathy Wilson (DOE)
- State of observing science and important findings from NSF-supported AON and other work
- Preliminary conclusions:
 - Bottom-up approach has advanced Arctic observing and synthesis knowledge
 - Need to improve exploitation of research – Transition from results to product development & operations
 - Improved communication & coordination across boundaries happens through grass-roots connections
 - Advances in autonomous observing technologies have transformed approaches to sustained observations
 - International Arctic Observing coordination requires attention

Potential elements of a joint coordination & leveraging approach

- (1) Identifying common interests in observational data
- (2) Develop framework for defining, prioritizing and parsing of observation activities
- (3) Coordinate to delineate roles and responsibilities, increasing efficiency and impacts
- (4) Add value to individual observations through systems perspective, optimizing investments
- (5) Develop protocol for updating of sustained observation network
- (6) Data standards to advance interoperability for data exchange integration

Arctic Observing Summit

Fairbanks, AK – 15-18 March 2016



- Provide **community-driven, science-based** guidance for the **design, implementation, coordination** and **sustained** long-term (decades) operation of an international network of Arctic observing systems that serves a wide spectrum of needs
- **Forum** for coordination and exchange between **academia, government agencies, local communities, industry, non-governmental organizations and other Arctic stakeholders** involved in or in need of long-term observing activities
- 6 Thematic Working Groups and overarching themes; combination of plenary and breakout group presentations and work sessions
- Roughly 80 white papers from international research community will be posted online in January 2016 in preparation for Summit
- www.arcticobservingsummit.org & assw2016.org



ARCTIC SCIENCE SUMMIT WEEK 12-18 MARCH 2016

SUBSCRIBE

SPONSOR



WELCOME TO FAIRBANKS, ALASKA

Arctic Science Summit Week (ASSW) is an annual gathering of international scientists and policymakers who advance Arctic research. ASSW provides opportunities for international coordination, collaboration and cooperation in all fields of Arctic science.

9-14 MARCH: MODEL ARCTIC COUNCIL

12-15 MARCH: ARCTIC SCIENCE SUMMIT WEEK

15-17 MARCH: ARCTIC COUNCIL/SENIOR ARCTIC OFFICIALS

15-18 MARCH: ARCTIC OBSERVING SUMMIT



SCHEDULE A
MEETING



FOR EARLY-CAREER
SCIENTISTS



FOR THE
PUBLIC



FOR THE
MEDIA

Visit ASSW 2016
online!

ASSW2016.ORG



facebook.com/
assw2016



twitter.com/
Arctic2016

Use the hashtag:
#ASSW2016