CIRES

National Snow and Ice Data Center
Supporting Cryospheric Research Since 1976

CliC

Climate and Cryosphere

Understanding the changing cryosphere and its climate connections

Updates and new initiatives

+ data needs for seasonal outlooks

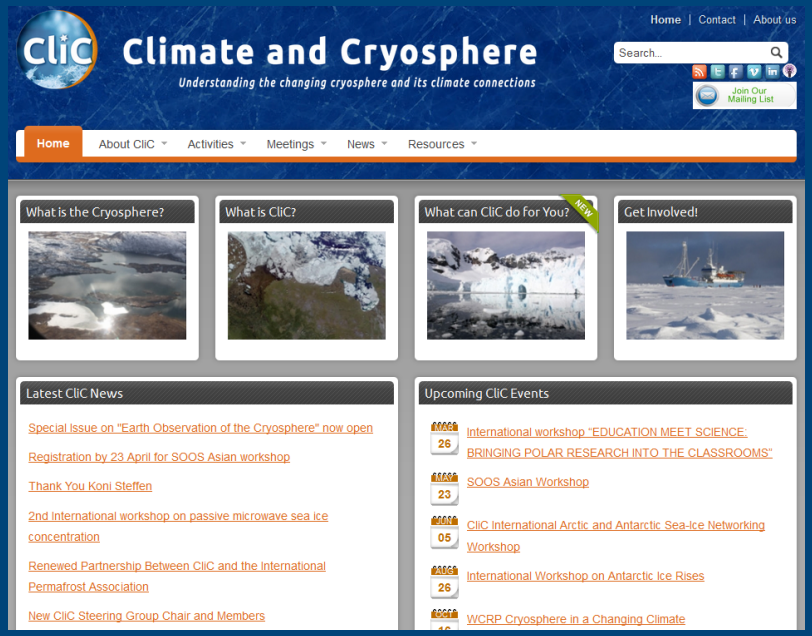
Walt Meier

WDAC Meeting, Darmstadt

5 March 2013

News

- New Chair: Greg Flato, Univ. of Victoria
- Director: Jenny Baeseman, Norwegian Polar Institute
- Project office had been dormant for 2 years
- Website redesigned, updated
- SSG meeting, February 4-7, Potsdam
  - Identify targeted activities
  - Focus on a few key initiatives



New steps forward

- Retain current working groups
  - Antarctic Sea-Ice Processes and Climate (ASPeCt), co-sponsered with SCAR
  - Arctic Sea Ice Working Group
  - CLIVAR/CLiC/SCAR Southern Ocean Panel
- Propose to co-sponsor ISMASS (Ice Sheet Mass Balance) with IASC and SCAR
- Establish a “Sea Ice and Climate Modeling Forum”
- Establish a “Permafrost Modeling Forum”
  - Continue support of Research Coordination Networks (RCNs)

New CliC Targeted Activities and Leads

1. Antarctic ice-shelf and ocean coupled modeling (D. Holland, E. Larour)
2. Understanding linkages between cryosphere elements (R. Massom)
3. Coordination of cryosphere observations for model evaluation and initialization (D. Dahl-Jensen, V. Romanovsky, M. Rafael, A. Jahn)
4. Arctic freshwater synthesis (T. Prowse, L. Hinzman, N. Koç)

Connections with international initiatives

- International Polar Initiative
- Global Cryosphere Watch
- WCRP Cryosphere Grand Challenge
  - Polar Climate Predictability Initiative
- Other prediction activities
  - Global Integrated Polar Prediction System
  - Polar Prediction Project

International Polar Initiative (IPI)

- Proposed follow-on from IPY
  - Originally discussed as Int'l Polar Decade
- Cooperative, thoroughly-planned, multi-agency program for high latitude (and high altitude regions, e.g., 3rd Pole?)
- Coordinate existing funding across nations and agencies (not new funding)
- Not just research, but also observations and services oriented
- Planned start 2017-2018

WMO Global Cryosphere Watch (GCW)

- Provide service-oriented information for decision-making and policy development
- Ensure comprehensive, coordinated and sustainable system of observations
  - Initiate “CryoNet” – network of reference sites and “super sites” in cold climate regions
  - Develop inventory of candidate satellite products for GCW
  - Establish best practices, guidelines and standards
  - Intercomparison of products
- Achievements to date:
  - Implementation plan approved
  - GCW data portal developed
  - Panels forming – “Snow Watch” (1st meeting in Jan 2013)

WCRP Cryosphere Grand Challenge

More coordinated focus on:

1. Seasonal, interannual, and long-term prediction and projection of polar climate; the role of the cryosphere in climate predictability
2. Analysis of model intercomparison results to understand and attribute model shortcomings
3. Improved representation of permafrost and high-latitude land surface in climate models
4. Develop/improve ice sheet models, especially dynamics and role in SLR

WCRP Polar Climate Predictability Initiative (PCPI)

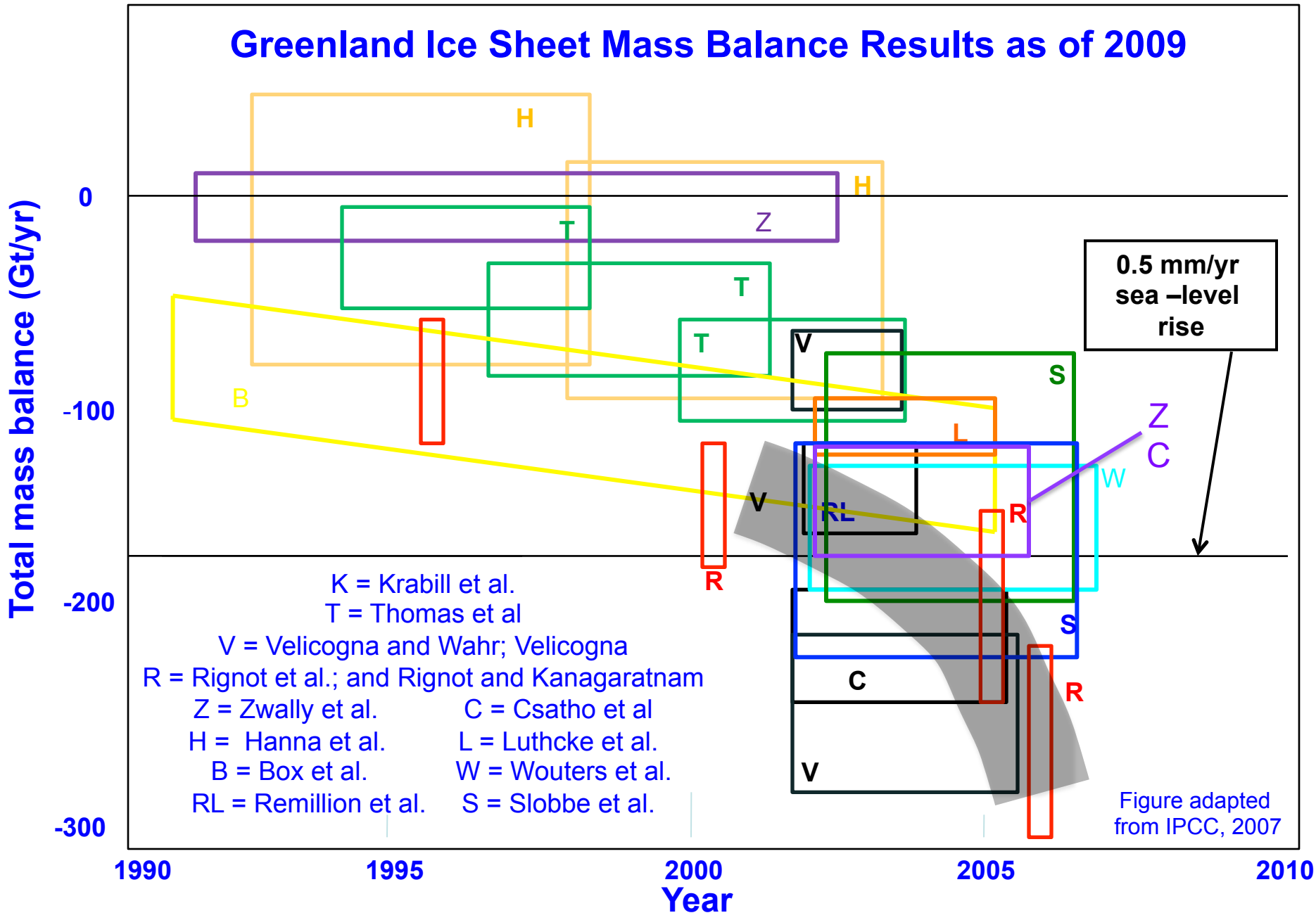
- Component of WCRP cryosphere grand challenge, but with a scope extending beyond the cryosphere
- Questions addressed:
  - How predictable is Arctic climate?
  - Why is polar climate changing unevenly between the two hemispheres?
  - How will extreme events in polar regions and their impacts change?

Other polar prediction initiatives

- WMO EC-PORS Global Integrated Polar Prediction System (GIPPS)
  - Executive Council Panel of Experts on Polar Observations, Research and Services
  - "Global" refers to global participation and effect of poles on global processes
  - Coordinate over three timescales:
    - Short-term: WWRP-THORPEX/WCRP Polar Prediction
    - Medium-term: WCRP "Seasonal to Multi-decadal Predictability of Polar Climate"
    - Long-term: ice sheet mass balance and SLR
  - Year of Polar Predictability (YOPP)
    - Tentatively planned for 2017-2018
    - Intensive observational and modeling period to advance polar prediction capabilities

Coordinated ice sheet initiative

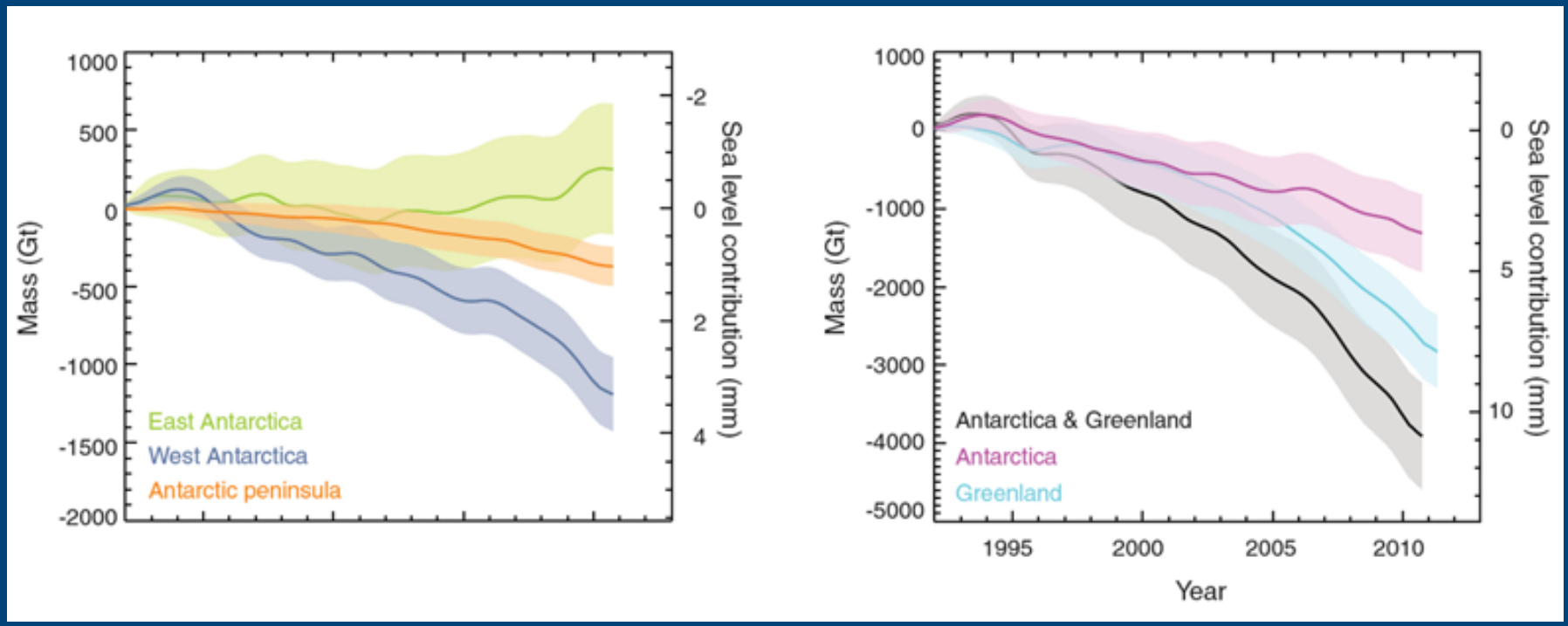
- Uncertainties in mass balance and contribution to sea level rise
  - Efforts have been undertaken (ISMASS Ice2sea, IMBIE), but need better coordination going forward
- Improved dynamics models
- Coupling of models – climate-to-ice sheets and ice sheets-to-climate
- International Ice Sheet Modeling Meeting?



Thanks to W. Abdalati, Earth Science and Obs. Center, Univ. Colorado

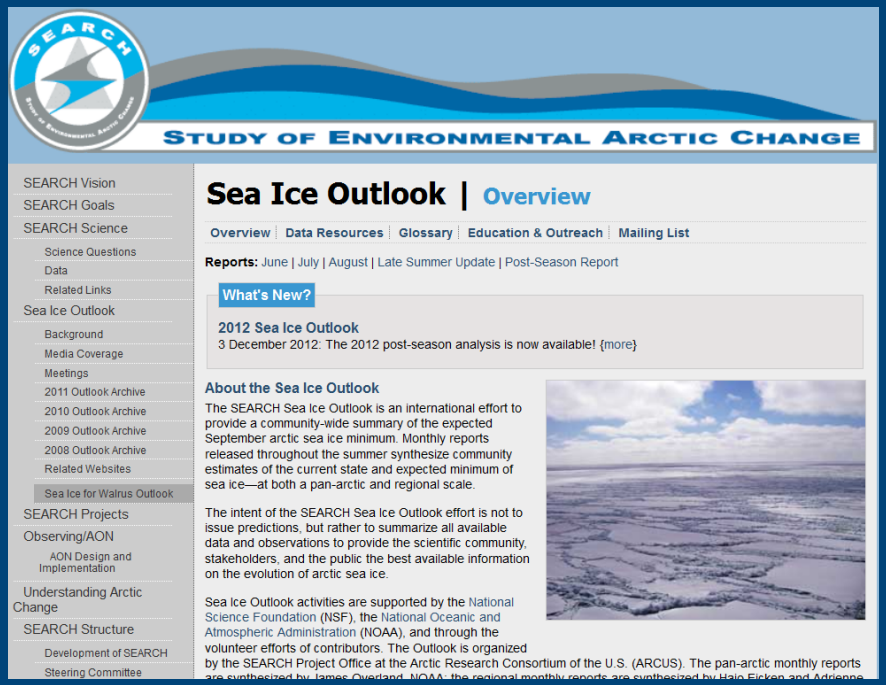
IMBIE – Ice Mass Balance Intercomparison Exper.

New coordinated estimates of ice sheet contributions to SLR for AR5



Sea Ice Outlook – a start at seasonal prediction

- Started in 2008
- Ad hoc, little funding
- Voluntary contribution
- Informal
- Plans to become more formalized include
  - Dedicated support from agencies
  - Central suite of data products for initialization
  - Evaluation products, development of metrics



http://www.arcusorg/search/seaiceoutlook/

Sea Ice Outlook 2012

Outlook from June

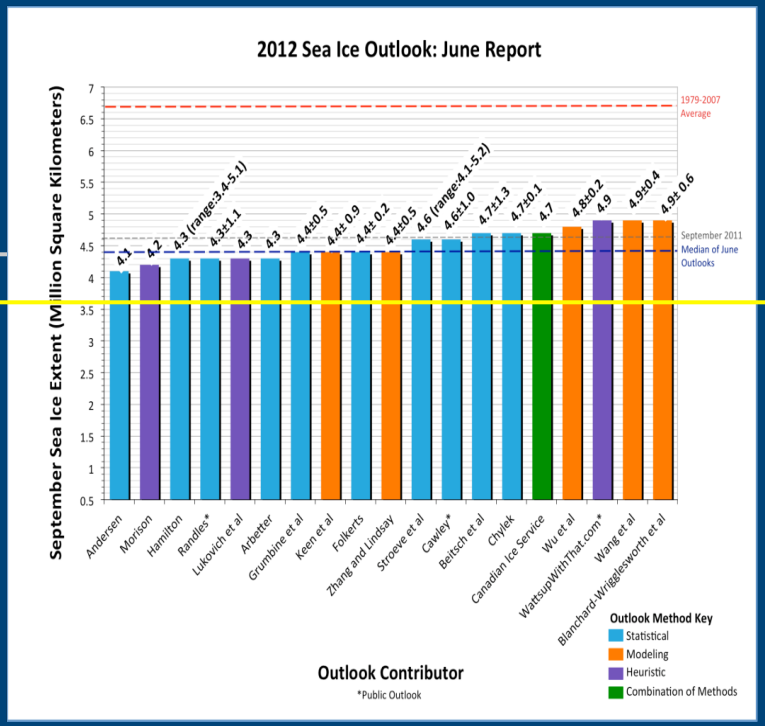
Outlook from July

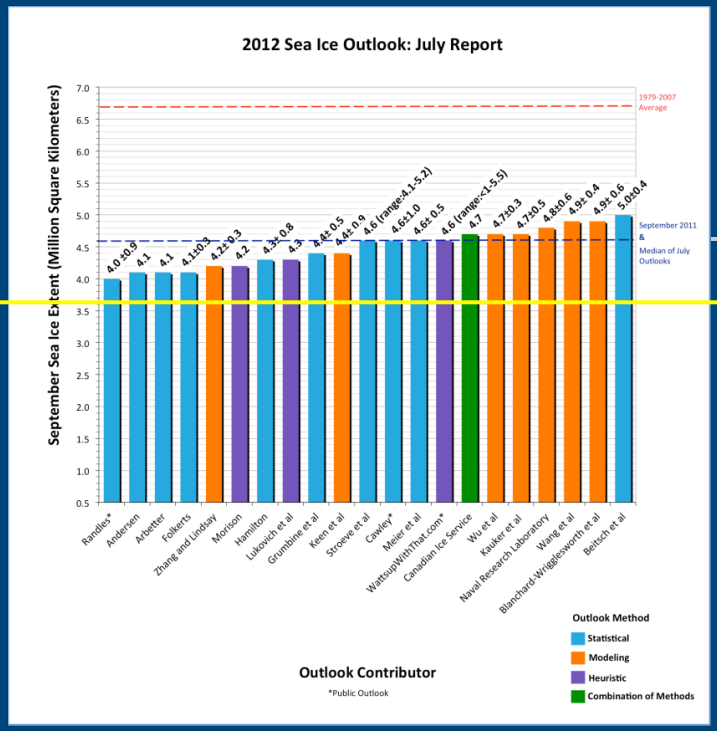
June Avg. Outlook

Actual Extent

July Avg. Outlook

Actual Extent

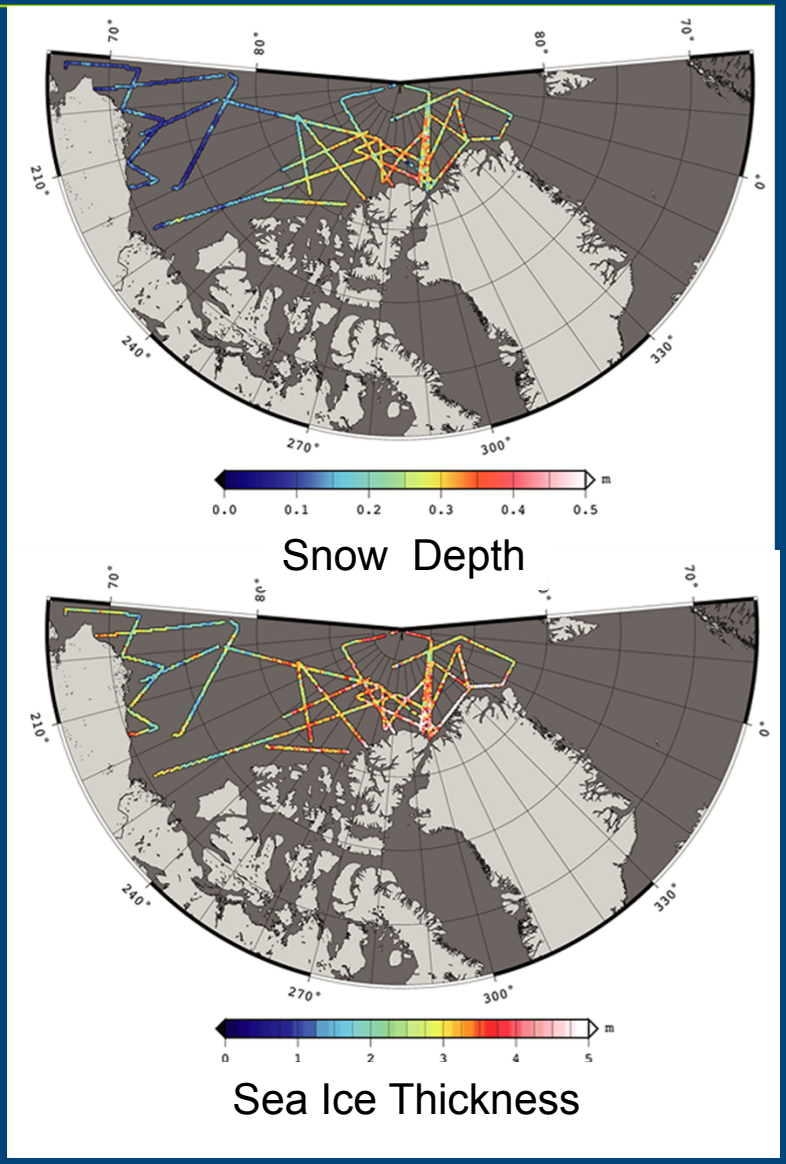




Predictions got slightly worse over the summer!

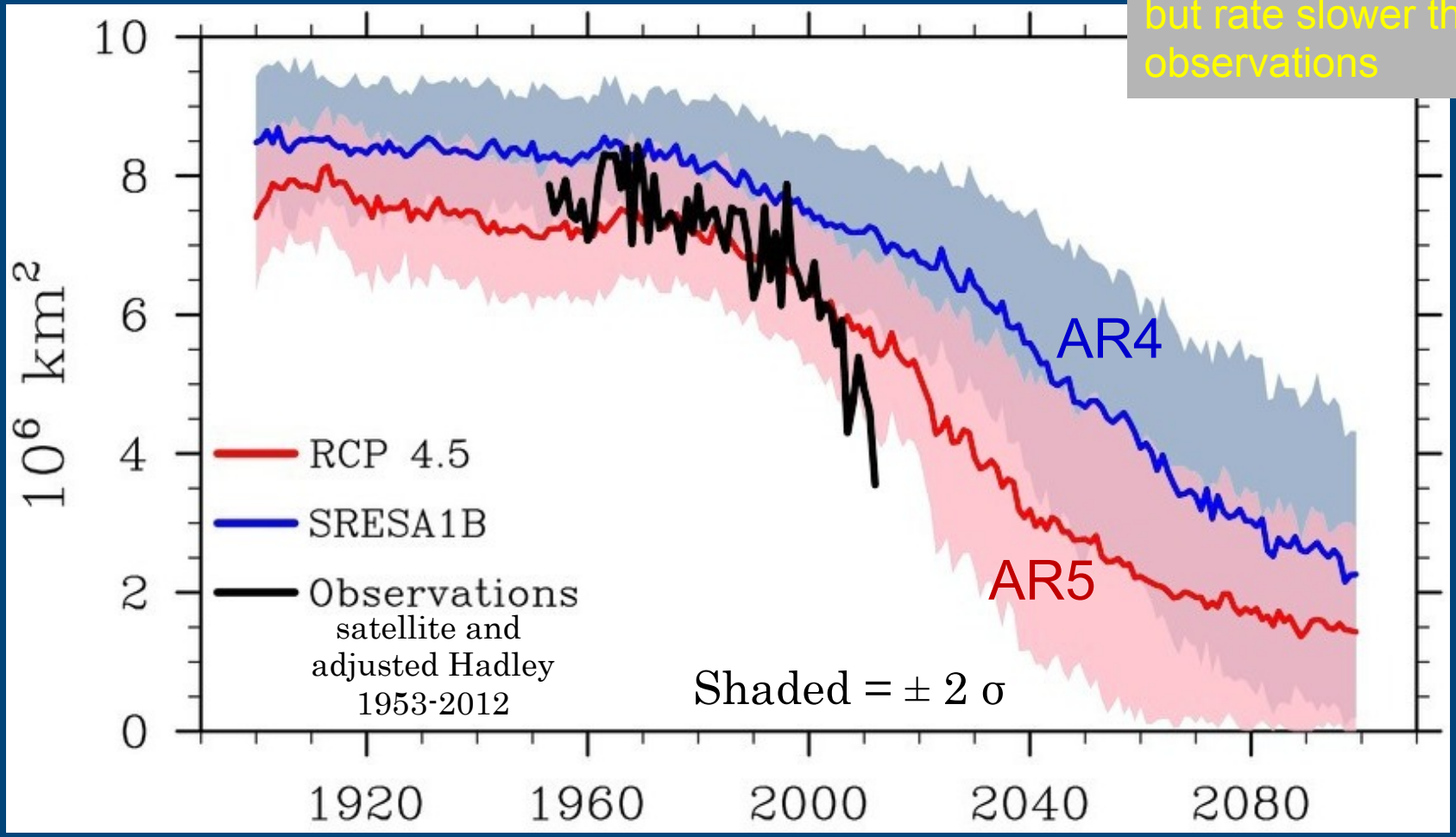
Initialization data for Sea Ice Outlook

- NASA IceBridge “quick look” products
  - Ice thickness & snow depth
  - Available ~6 weeks after collection, in time for June Outlook projections
  - Data archived and distributed at NSIDC
- Limited use in first year
  - Potential for more users
  - More data?
    - CryoSat-2?



Multi-decadal projections

AR5 models closer to historical conditions, but rate slower than observations



Stroeve et al., GRL, 2012; Meier et al., The Cryosphere, 2013

Key data needs for seasonal ice outlooks

- Sea ice extent/concentration
- Sea ice thickness
  - Some locations more important than others?
  - Research to find optimal locations for targeted observations
- Atmospheric reanalysis
  - Winds, temperatures, fluxes
- Ocean surface and near-surface properties
  - Halocline thickness, subsurface heat fluxes

Key data needs for seasonal ice outlooks

- Provide as much uncertainty info as possible (e.g., grid cell errors)
- Central archive location for data products
  - At least a data portal for access
- Products on same grid and in same (or similar) formats; targeted subsets
- Timespan requirements (for synoptic, seasonal)
  - Concentration/thickness – single initialization
  - Ocean/atmosphere – want several weeks or months prior to start of projection period
  - Data need to be made available in timely manner

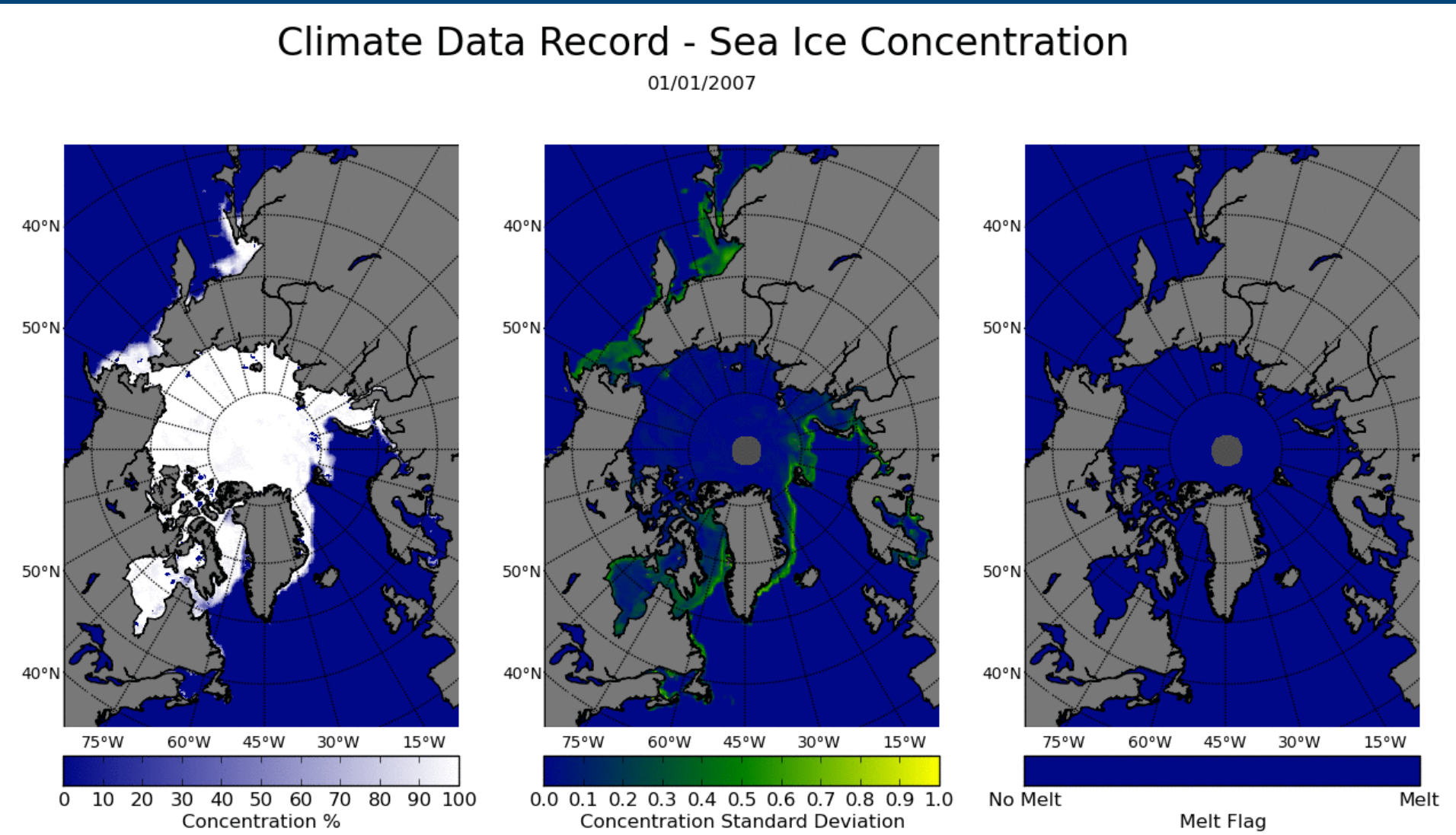
Relevant recent and upcoming workshops

- 2nd satellite sea ice products workshop
  - 17-18 Feb 2013, Copenhagen
  - Sponsered by ESA Climate Change Initiative (CCI), CliC co-sponsor (CliC supported first workshop, Wash. DC., March 2010)
  - Passive microwave focus
  - 22 algorithms (!)
  - Validation data set being created for evaluation
- CliC sea ice working group meeting
  - 5-7 Jun 2013, Tromso
  - Connections between modeling, in situ and satellite observations
  - Determine observation needs for models
  - Fill gaps and improve sea ice modeling capabilities to predict future sea ice states
  - Antarctic community connection

CDR/ECV level sea ice concentration products

- NOAA/NSIDC Climate data record
  - http://nsidc.org/data/g02202
- EUMETSAT Sea Ice ECV
  - http://osisaf.met.no/
- NetCDF format with CF metadata
- Grid cell level QA
- Documentation including:
  - Processing software
  - Maturity matrix

NOAA/NSIDC CDR Daily Arctic sea ice 2007



Thank you!

walt@nsidc.org