Arctic System Synthesis Workshop: New Perspectives through Data Discovery and Modeling

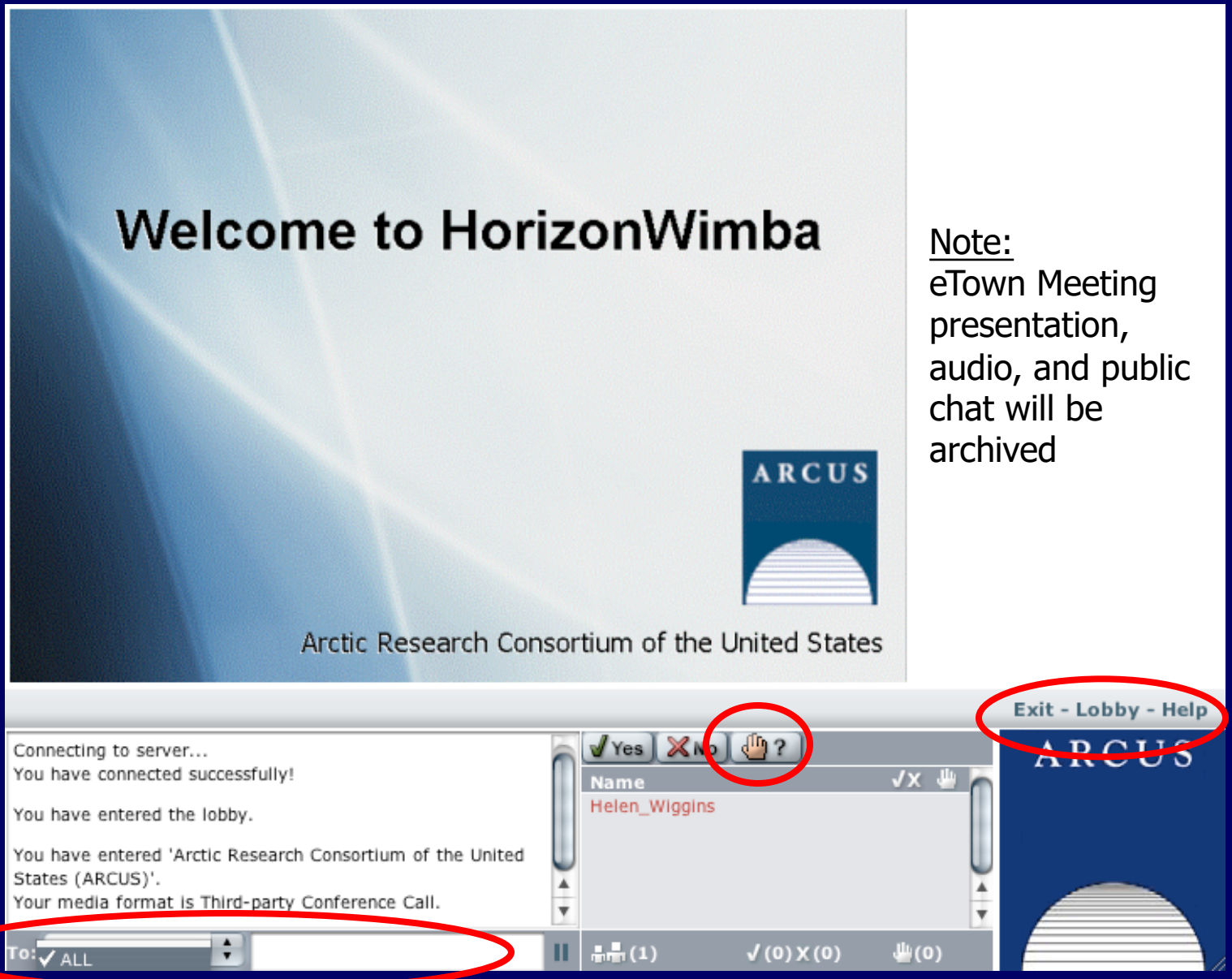
Workshop Organizing Committee:

Charles J. Vörösmarty & Dave McGuire (Co-Chairs), Janet Intrieri, Larry Hinzman, Marika Holland, Maribeth Murray, Josh Schimel, John Weatherly

eTown Meeting of the Arctic Science Community

26 March 2007

Horizon Wimba Interface



Note:
eTown Meeting presentation, audio, and public chat will be archived

Welcome & Introductions

- Community Participants (40 as of 25 March 2007)
  http://www.arcus.org/arcss/etm/march_07/p_list.html
- Organizing Committee (OC) Members
  (* Also ARCSS Committee Member)
  - Charles Vörösmarty*
  - Marika Holland*
  - Maribeth Murray*
  - Janet Intrieri (NSF ARCSS)
  - Larry Hinzman
  - John Weatherly
    - *OC Members unable to attend: Josh Schimel, A. David McGuire*
- Additional ARCSS Committee (AC) Members
  - Mark Serreze
  - Michael Steele
- Additional NSF
  - Kelly Falkner, Program Director, Antarctic Sciences
- ARCSS Science Management Office (ARCUS) staff

eTown Meeting Outline

1. Rationale for community discussion on data and modeling
2. Overview of "ARCSS Synthesis Workshop: New Perspectives through Data Discovery and Modeling"
3. Discussion of workshop break-out group approach: "worked science examples" to stimulate discussion on innovative approaches for data management
4. Input on "worked science examples"
5. Input on broader workshop topics
6. Any other ideas, issues, concerns

ARCSS Move Toward Synthesis

- Aim is improved understanding of the Arctic as a system and of its particular role in the larger Earth system and its response to change

- Aim also is to engage decision-makers and the public on the importance of these issues

Motivation to Think about Data: Situation Today

- Project-specific, discipline-specific models/data sets employ highly specialized structures, resolutions, time/space domains
- Data restrictions/data policy places barriers to full access (e.g. human/social science data sets)

Motivation to Think about Data: Situation Today *(continued)*

- Arguably, the typical PI focuses on his/her science; frameworks for wide data & model dissemination generally lacking
- Opportunities on the horizon….IT, new analysis tools: models, instrumentation, remote sensing…IPY, AON challenges looming

ARCSS Synthesis Workshop: New Perspectives through Data Discovery and Modeling

2-4 April 2007, Bell Harbor Center, Seattle WA

GOAL: Bring together data provider & data user communities to identify innovative approaches on data management and assimilation, recent developments in technology, and modeling that will advance arctic system synthesis

PARTICIPANTS (>50): Data Providers, Technology and Information Technology Experts, Data Consumers, Knowledge Brokers

-more than IT, archiving, metadata standards, data management

-eParticipation: plenary sessions video-streamed with online bulletin board

MODE OF EXECUTION: Plenary sessions, and breakout teams focusing on "worked" science examples and broad integrative topics

MAJOR OUTPUT: Report on key issues, opportunities, challenges w/ recommendations to NSF on investments

Workshop Break-out Topics

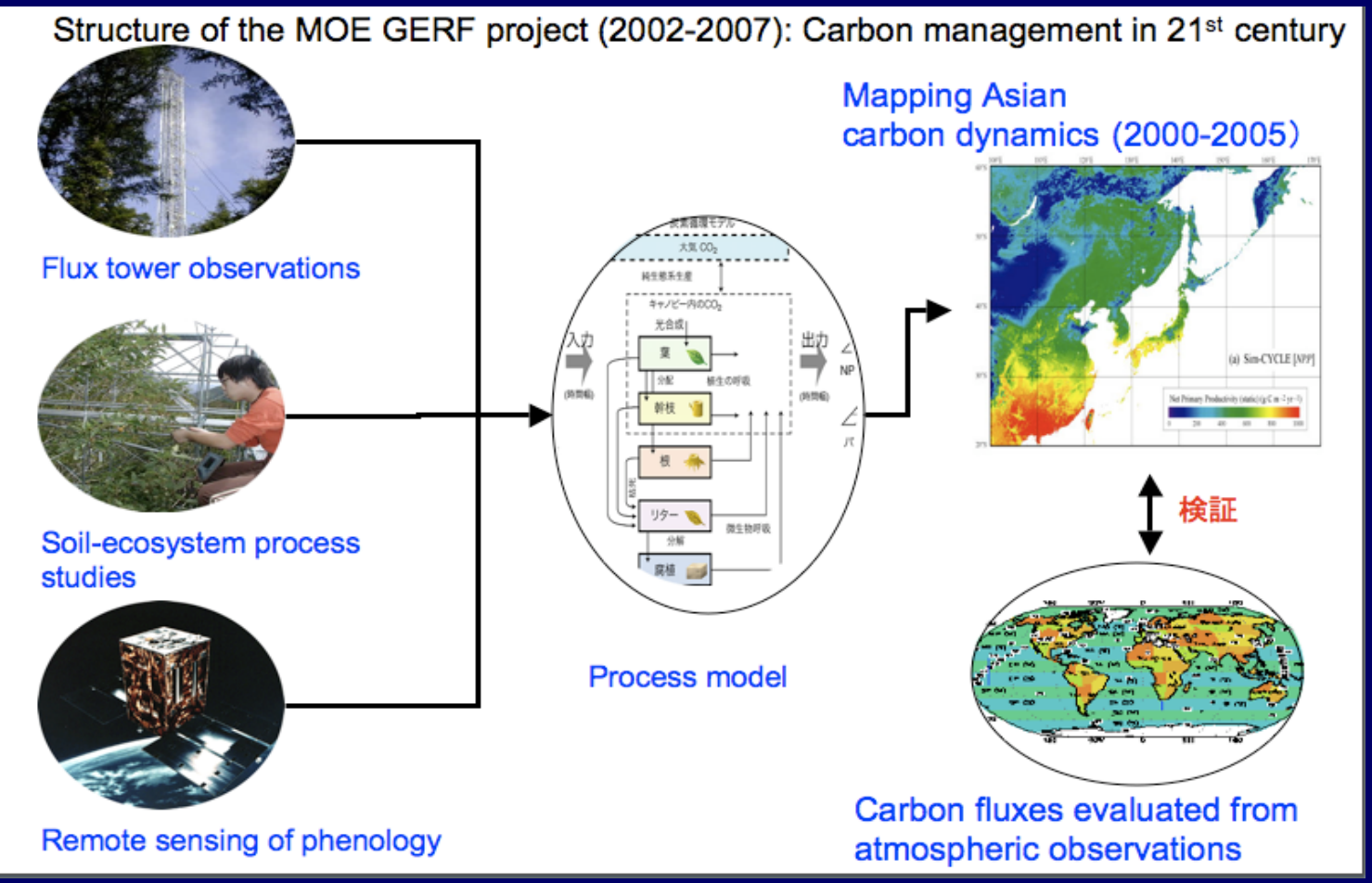
- Initial break-out groups will be organized around 5-6 "worked science examples," science challenges to frame the discussion on needs & future approaches to advance arctic system science
- These are not science planning priorities, but rather are a means of stimulating discussion on the broad issues of data management and innovation
- The workshop discussions will move from these break-out “science examples” to more integrative and broad data management issues

Goal of Science Example Approach

- Science examples will be used to "test" and illustrate the paths forward for:
  - Data access and discovery
  - Data integration and assimilation
  - Output and practical applications
  - Cultural and organizational issues
  - Other data management needs to advance arctic system synthesis

A few candidate examples for consideration…

Example 1: Designing a carbon accounting system for the pan-Arctic

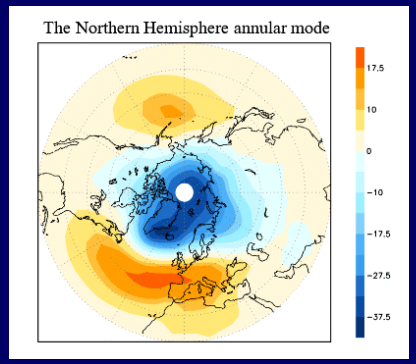


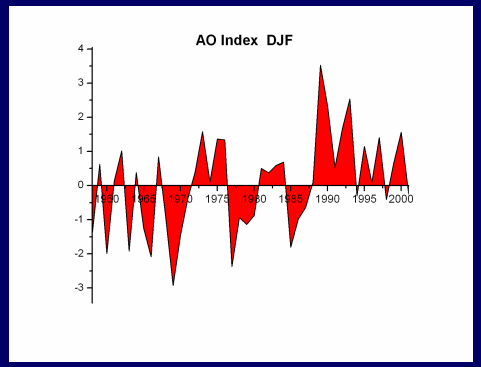
- Technical issues: *mapping/interpreting land use change, emission estimates, links to H2O and BGCs, feedbacks from climate variability, scaling from plot to region, sensors*
- Policy engagement issues: *cap and trade economics, control of industrial vs biotic sources, enforcement, lags/response times*

Courtesy of S. Maksyutov, NIES, Tsukuba, Japan

Example 2: How do modes of Arctic atmospheric and oceanic Circulation affect life in the Arctic?

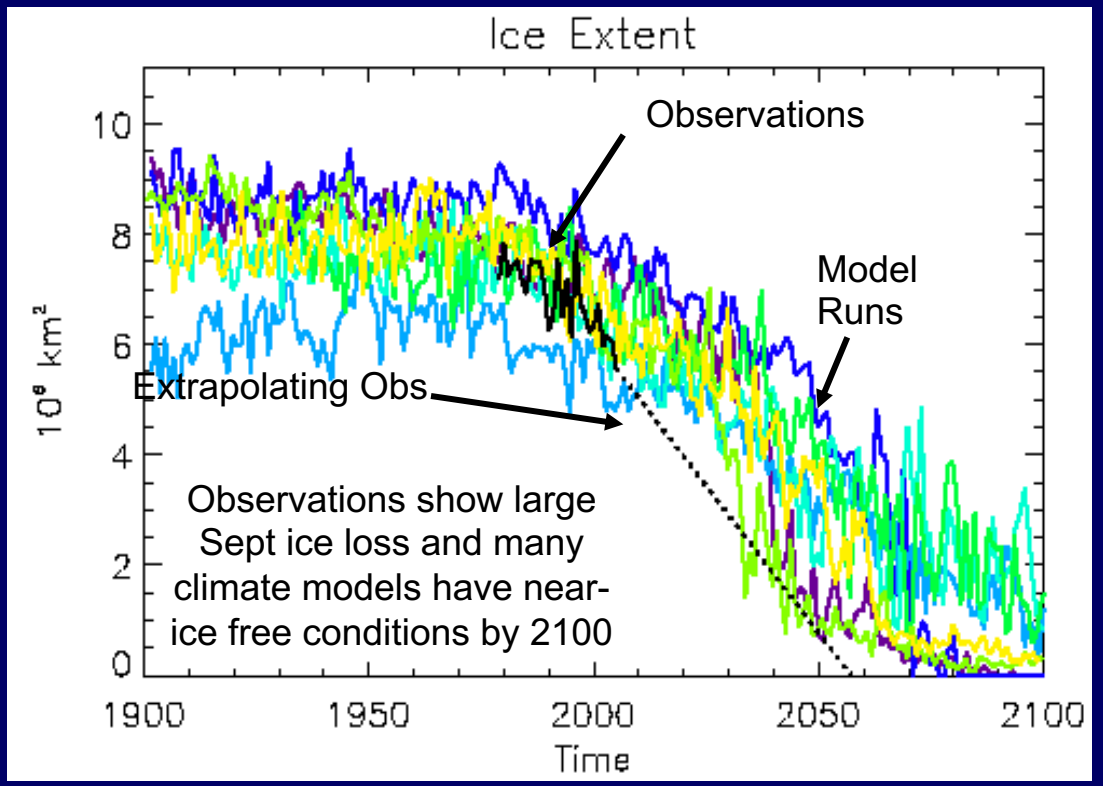
Examples:
- Arctic residents – weather and ice conditions, tundra, hydrology
- Nutrients and productivity on ocean shelves
- Migration patterns (whales and reindeer)

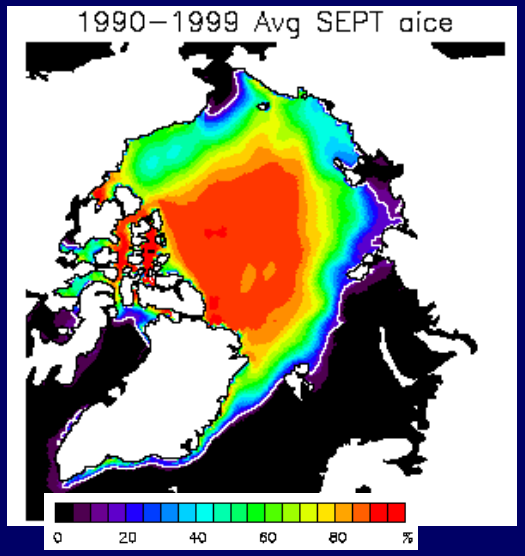


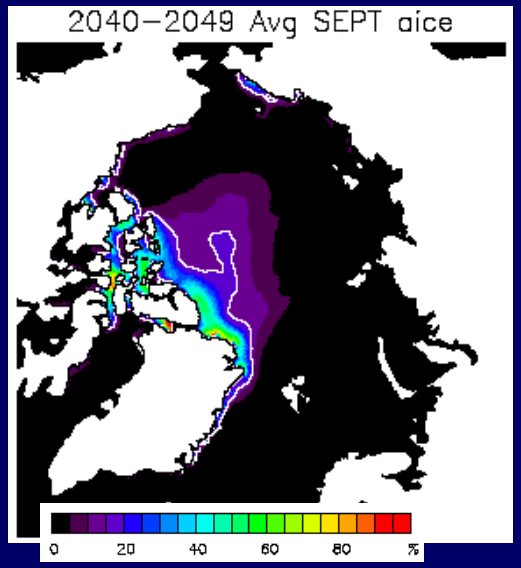


Example 3: Conditions and consequences of a seasonally ice free Arctic

- Integrated/interdisciplinary science (socio-economics, physical climate, carbon cycle, wildlife, etc.)
- Various tools needed: in situ data, remote sensing, paleo proxy data, models, etc.
- Has important and numerous links to global system
- Provides a context to examine data/model needs to advance synthesis science



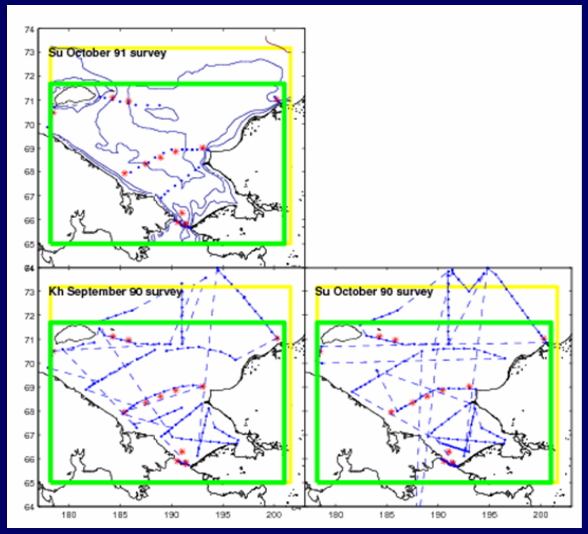




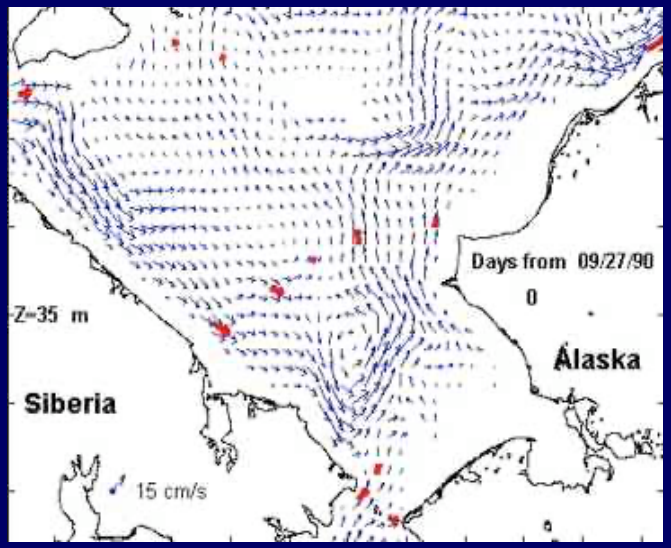
Example 4: Data assimilation to analyze Bering Sea circulation

How can data and models be assimilated to understand the climatology and variability of regional ocean circulation and its impacts?

- Assimilation of different physical data types – profiles, drifters, atmospheric reanalysis data
- Modeled hindcasts and forecasts of circulation and transport
- Further Synthesis –marine biological impacts, carbon budget



Blue dots - CTD surveys during September and October 1990 and October 1991. Red dots - 11 moorings. Yellow line - model domain for the future study. Green line - model domain for the pilot study



Reconstructed circulation at 35m during October-November 1990. Blue arrows – model results. Red arrows – moorings and observed currents.

G. Panteleev, IARC and R. Woodgate: Reconstruction of the Chukchi Sea circulation during 1990-1991

Discussion:

- Do they provide good "test topics" for discussing broad data management issues?
- Do they meet these criteria:
  - Synthesize understanding of the arctic system
  - Cross disciplinary boundaries
  - Integrate a variety of data sources (field data, modeling outputs, historical or archived data, remote sensing, etc.)
  - Link the Arctic to the broader Earth system
  - Enhance communications between scientists, stakeholders, decision-makers, and the public
- Other topics for "worked science examples"?

We also look for your feedback on……

- Initial thoughts in response to workshop focus questions:
  1. What are the data and modeling needs to advance synthesis-focused arctic system science?
  2. What's currently working and what is needed in terms of applying data and modeling for analysis to advance science? What are the keys to success?
  3. What are the practical steps forward as far as mechanisms, approaches, tools and procedures, organization, standards, and related issues?
- Any other issues you would like to discuss

Thank You!

Visit the workshop webpage for eTown meeting archive and powerpoint, workshop updates, and background information on ARCSS data management