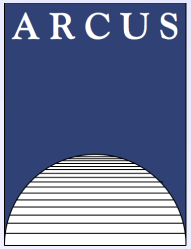
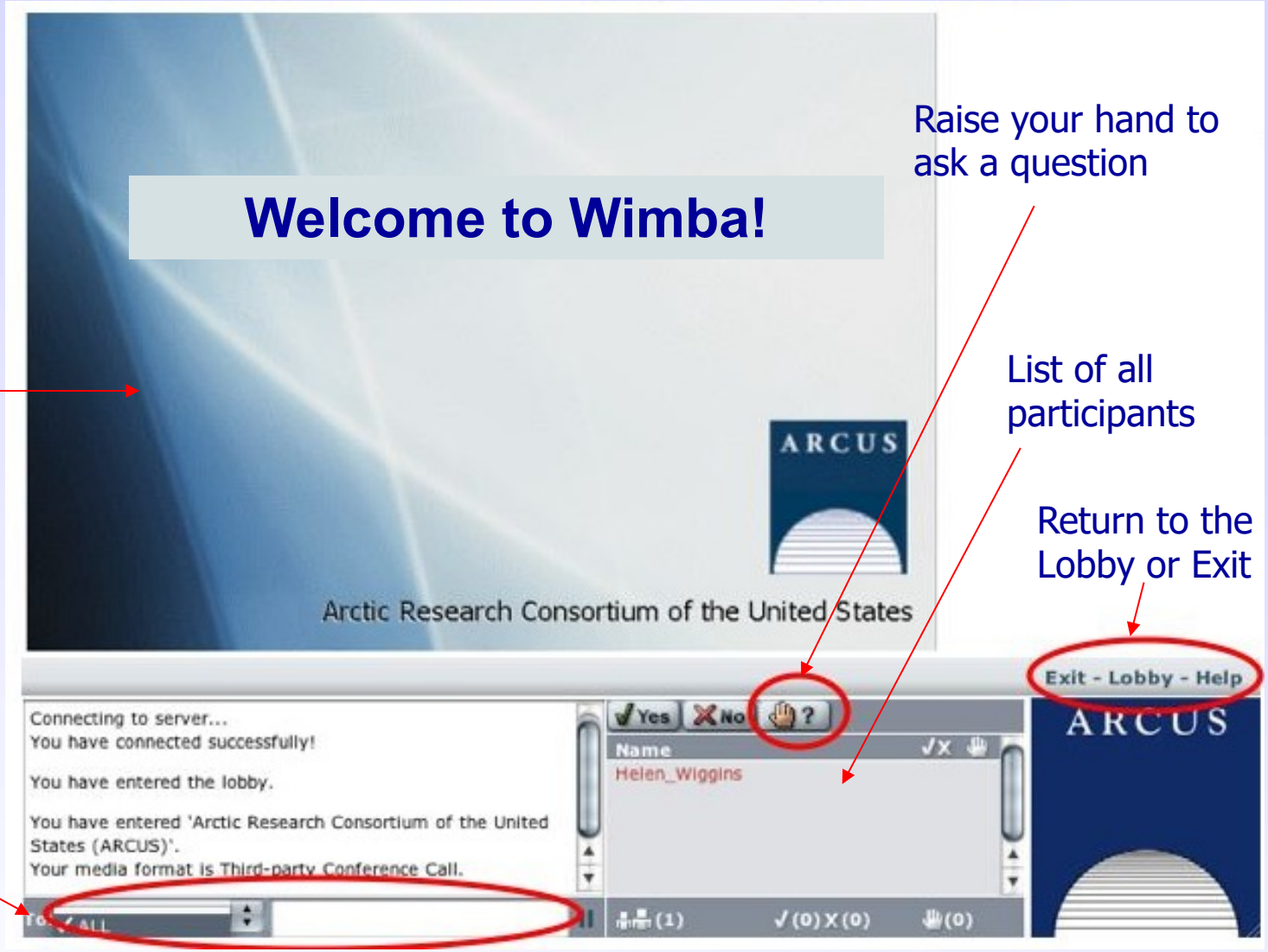
# ARCSS eTown Meeting: Changing Seasonality in the Arctic System


eTown Meeting of the Arctic Science Community
19 August 2008



# eTown Meeting Interface




Slides will be shown here

Raise your hand to ask a question

List of all participants

Return to the Lobby or Exit

"Chat" with one person or the entire group

**Slides, audio, and group chat will be archived**

# Welcome and Introductions

- Community Participants (73 total registered participants as of 18 August 2008)
  http://www.arcus.org/arcss/etm/august_08/p_list.html
- ARCSS Committee Members Participating
  - Josh Schimel (chair)
  - Marika Holland
  - Don Perovich
  - Matthew Sturm
  - Jennifer Francis
  - Maribeth Murray
  - Mark Serreze
  - Michael Steele
  - *ARCSS Committee Members unable to attend: Joe McFadden, Craig Nicolson, Charlie Vörösmarty*
- ARCSS Science Management Office Staff (ARCUS)

# Goal of eTown Meeting

- Provide an open community forum for discussion on the new ARCSS "Changing Seasonality" effort and future directions

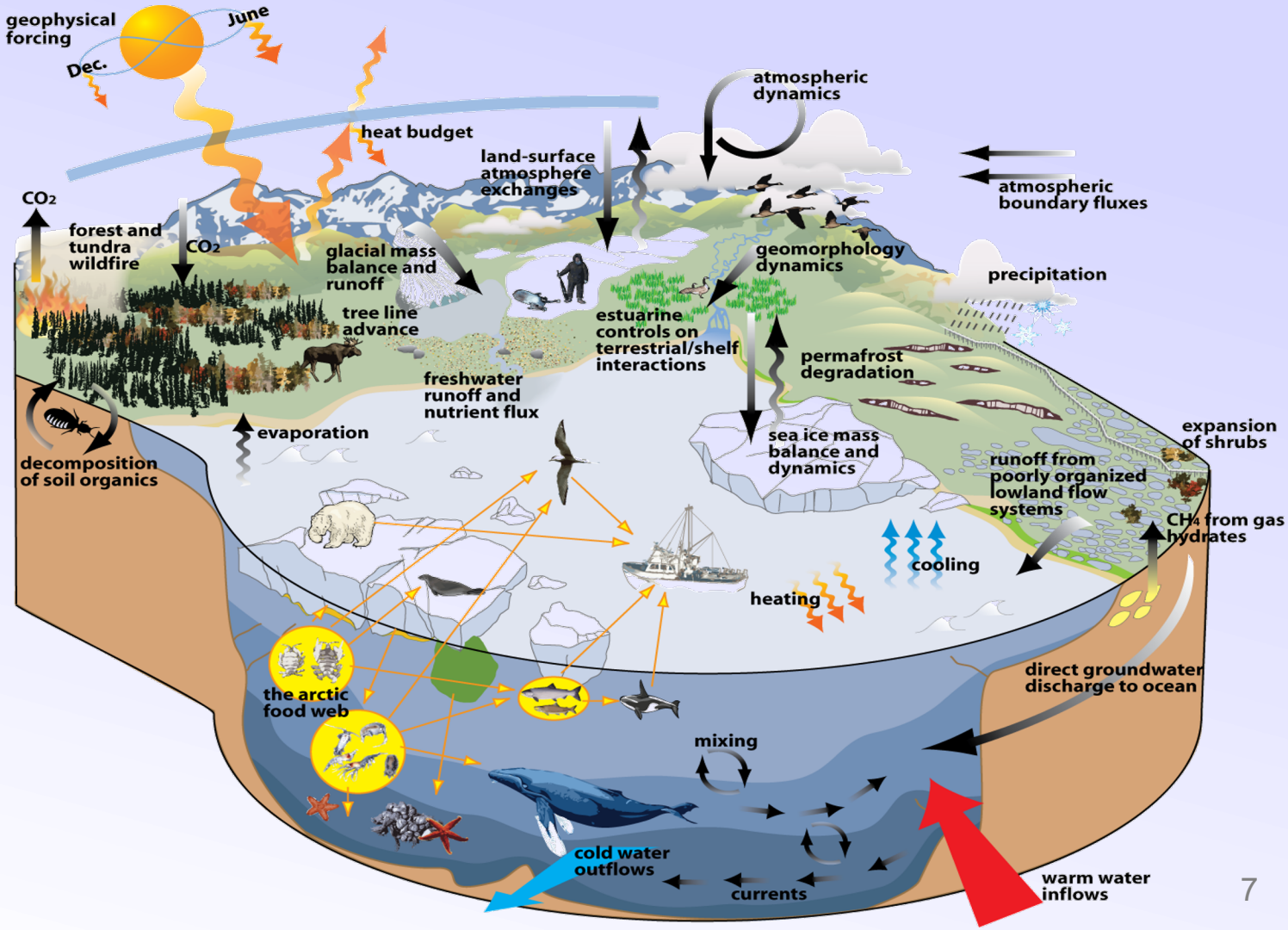
# Meeting Outline

- ARCSS and the Arctic System
- Development of "Changing Seasonality" Science Priority
- NSF Announcement of Opportunity
- Examples of System-level Seasonality Science
- Discussion

# ARCSS Program and the Arctic System

- The goal of the Arctic System Science (ARCSS) Program is to answer the following question: ***What do changes in the arctic system imply for the future?***
- To address this question, ARCSS must:
  - Advance from component-understanding to system-understanding of the Arctic
  - Understand the behavior of the arctic system—past, present, and future
  - Understand the role of the Arctic as a component of the global system
  - Include society as an integral part of the arctic system

# ARCSS Program and the Arctic System



# Development of "Changing Seasonality of the Arctic System"

- Since the ARCSS All-Hands Workshop 2002, changing seasonality has been increasingly recognized as a ***key unknown in predicting arctic system behavior***
- Why Seasonality?
  - Different aspects of the seasons are changing: timing & duration of seasons
  - Different components of the arctic system couple differently to seasons
  - Nature of interactions within the system will likely change as seasonal patterns change—changing those linkages will ***change how the system functions***

# Development of "Changing Seasonality of the Arctic System"

- Became a focused science priority through the ***Surface Transformations in the Arctic Environment (STATE) Community of Practice (Co-Op)***
  - STATE Co-oP emerged from "Near Surface Processes" and "Thaw Lakes" Co-Ops
  - STATE Focus: Understanding the drivers and responses of surface change that we need to adequately model the state and functioning of the arctic system
  - STATE produced an Implementation Plan, with Seasonality as one of its three major themes
  - "Changing Seasonality" further discussed as science priority at several venues, including the October 2007 ARCSS Synthesis Workshop

# AO: Changing Seasonality in the Arctic System (CSAS)

*NSF-08567, Proposals Due: 10 October 2008*
*http://www.nsf.gov/pubs/2008/nsf08567/nsf08567.htm*

"***Interdisciplinary*** proposals are sought that employ field studies, retrospective investigation, modeling, or synthesis to explore ***how changes in succession*** (here, the sequence, nature, and timing of critical seasonal events, to include but not be limited to ecological succession) affect the linkages between, and feedbacks among, components and processes of the arctic system, thus ***altering the characteristics and functioning of the system as a whole***."

# AO: Changing Seasonality in the Arctic System (CSAS)

*"Proposals are sought that address one or more of the following broad questions:*

1. What seasonal events in the arctic system are key to its functioning as it does now, how are they changing and what is changing them?
2. How do shifts in seasonal events alter linkages among system components and how do these changes alter the functioning of the arctic system as a whole?
3. How do seasonal shifts in the biological, chemical and physical elements of the system affect subsistence systems (use of Arctic resources for food, fiber and water)?
4. How do seasonal changes within the arctic system alter linkages between the arctic and larger scale Earth systems?"

# Changing Seasonality in the Arctic System (CSAS)

- CSAS is about understanding how the system function changes as a result of changing linkages in system components
- What CSAS is ***not***: it isn't just about understanding changes in a single component of the arctic system (e.g., changing flowering phenology)

# Examples of CSAS Science

***A few examples from the AO***

- How do changes in the timing of freeze-up and thaw affect human activities and how does this affect other components of the arctic system?
- How do changes in the seasonal absorption of solar radiation at the surface alter photochemical reactions that affect atmospheric chemistry, physics, or the biosphere?
- How does an earlier melt and later re-appearance of sea ice and terrestrial snow alter climate and ecosystem dynamics and the feedbacks between them?
- How do changes in the timing of plant production relative to animal migration patterns alter food chain dynamics?
- Etc.

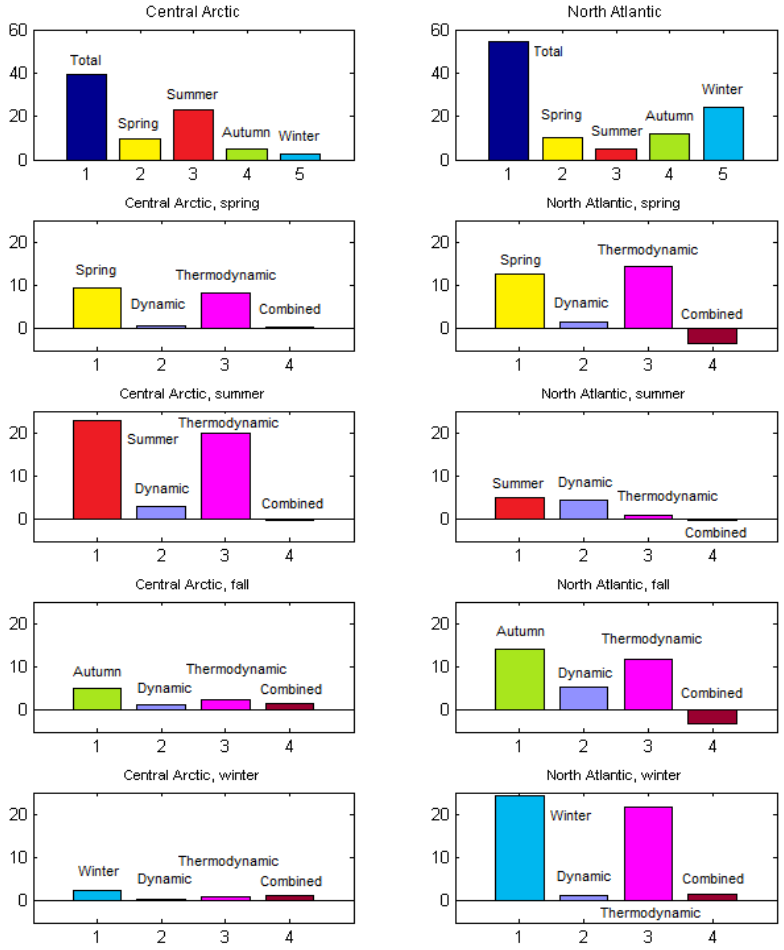
# Examples of CSAS Science

***A few examples from recent literature***

- Post and Forchhammer. 2008. *Climate change reduces reproductive success of an Arctic herbivore through trophic mismatch*.
- Laidre, et al. 2008. *Quantifying the sensitivity of arctic marine mammals to climate-induced habitat change.*
- Elberling B, Nordstrom C, Grondahl L, et al. 2008. *High-arctic soil CO2 and CH4 production controlled by temperature, water, freezing and snow.*

# Examples of CSAS Science

## *A few examples from recent literature (cont'd)*




Changes in atmospheric moisture convergence in the late 21st century versus the late 20th century in the N. Atlantic and the central Arctic (*Skific et al., submitted)*

# Discussion

1. What are the highest priority critical research gaps and key unknowns related to changing seasonality in the arctic system?
2. What would be the optimal outcome of this first stage implementation of a "seasonality" program?
3. What are your ideas for future directions of a "seasonality" program?
4. Other questions, ideas?

# Thank You!

- Visit the eTown Meeting webpages for the meeting archive and PowerPoint