

SEARCH Workshop on Understanding Change

How can “Understanding” be given traction within SEARCH?

- **Ultimate aim is to galvanize the research community’s efforts toward high-impact advances in understanding Arctic change**
- **More immediate aim is to interface “Understanding” with “Observing” and “Responding to” Arctic change**
 - **guide observing strategies as well as planning (adaptation, mitigation)**

In addition, the workshop's outcome should:

- **Marry readiness and impact in identifying key research thrusts**
- **Point to approaches and partnerships that will lead to advances in Understanding**

SEARCH Understanding Change Panel (UCP)

**(J. Walsh, M. Berman, J. Overland, A. Proshutinsky,
M. Serreze, J. Shimel, K. Arrigo, J. Randerson)**

Identified gaps and needs in Arctic observations based on examination of SEARCH-related science driving questions, and other recently emerging activities in Arctic change:

- SEARCH Implementation Plan (2005)**
- Arctic Observation Integration: Workshop Report (2008)**
- ISAC Science Plan (2009)**
- input from various members of research community**

Organization of UCP assessment:

Marine changes

Atmospheric change

Terrestrial changes

Arctic-global connections

Integration of information/knowledge networks

Marine changes

- **Are changes in Arctic marine mammal and fish distributions outside the range of natural variability?**
- **What is happening with Arctic sea ice?**
 - **relative importance of various drivers (ocean, atmosphere) of recent changes has not been firmly established**
- **Are carbon pathways in the Arctic marine system undergoing changes that are consequential locally and/or globally?**

Atmospheric changes

- **Are changes in aerosols, particularly black carbon, playing a role in Arctic change?**
 - **Simulated Arctic trends are generally smaller than observed**
 - **Are the discrepancies partially attributable to decreasing aerosol concentrations (“solar brightening”) or black carbon?**

Terrestrial changes

- **What are the drivers of recent Arctic terrestrial changes (increases of river discharge, wildfires, changes in “greenness”)?**
 - **changes in evapotranspiration are not known**
 - **changes in snow (seasonality, water equivalent, vegetative masking) have major implications for soil temperature, vegetation, air temperature**
 - ⇒ **areally integrated changes of ET and snow need to be monitored and evaluated in context of Arctic system changes**

Arctic –global connections

- **How is the Arctic contributing to global sea level rise?**
 - **relative roles of Greenland and smaller glaciers/ice caps**
 - **mass balance of glaciers is poorly sampled**
- **How are mid-latitude climate and the global heat budget influenced by the loss of Arctic sea ice?**

Integration of community/industry networks and/or ecological knowledge cooperatives

- **integration of diverse local information is a long-recognized need**

Recent activities/reports relevant to “Understanding”

AOSB/IPY Synthesis Report (2010, Bob Dickson)

-- key science questions in Arctic marine science

DOE Atmospheric System Research Science Plan (2010)

-- atmospheric priorities for reducing uncertainty:

clouds, aerosols and radiative interactions

(measurements to modeling)

What's new in the present activity?

- **Understanding in a cross-disciplinary context (“intersections”)**
- **Interface with “Responding to Change”**
- **Approaches, partnerships to achieve advances**
- **Broader community input**

⇒ Questions and objectives that will galvanize the research community (and sponsors, users)