

Arctic Climate Group 1

Time Scale	Sources of Predictability	Observations	Modeling
8 days -16 days	Initial Value NWP (extended) Ensemble required	<p>Inexpensive buoys</p> <ul style="list-style-type: none"> - SLP, ice drift or surface currents <p>Instrument platform of convenience^P:</p> <ul style="list-style-type: none"> - Ships of opportunity/VOS - Drilling platforms (include thermistor chains to ~200m) <p>Product driven OSSEs/sensitivity studies</p> <p>RAOBs (in a few locations)</p> <p>Use of limb sounding data</p>	<p>Atmospheric Processes:</p> <ul style="list-style-type: none"> - Improve Arctic stratus - Assess present operational models - Assess/further develop assimilation systems - Employ best practices of ensemble forecasting and apply to the Arctic (reforecasting to bias correct)

^P – partners (Industry, international)

Time Scale	Sources of Predictability	Observations	Modeling
Sub-seasonal 2 2 weeks – 5 months	Upper ocean: - Temperature - Salinity Sea ice: - thickness - surface conditions (melt ponds) Land conditions: - soil moisture - snow cover - vegetation Atmospheric teleconnections	Satellite & Aircraft remote sensing for - sea ice concentration & thickness - albedo Soil moisture active/passive (SMAP) Thermistor strings Salinity measurements Gliders Argo-like floats (further development under ice) Process level observations (clouds, boundary layer, surface fluxes)	Fully coupled models Mine NMME: maintain and develop -Arctic forecast products - Improve land surface hydrology Improve polar physics: - Boundary layer resolution and parameterization - Clouds Waves and potential interactions with ice

Time Scale	Sources of Predictability	Observations	Modeling
Seasonal to interannual	Subseasonal + Horizontal ocean heat transport Studies of sources of predictability, e.g. AMO, ENSO	See subseasonal	See subseasonal

Action Items (planning)

- Develop action plan for NOAA's engagement and support of Year of Polar Prediction (YOPP)
- NOAA should advocate for a polar Regional Climate Center RCC – for pan Arctic products
- Prioritize Arctic observations build-out plan
- Develop pipeline for interagency data (e.g. NASA) for albedo (MODIS), sea ice thickness (ice sat 2), soil moisture (SMAP)
- Assimilate data into models – agreements to obtain data from other agencies (e.g. NASA)
- Develop a plan to acquire necessary Arctic observations and the means to assimilate them into NOAA models
 - “new” – could build off past efforts at other prediction centers

Action Items

- Assign Resources to field programs:
 - Understand the emerging Arctic (e.g. lots of this ice)
MOSAIC (to gain process understanding of cloud topped boundary layer)
 - ICECAPS
- Expand Arctic Voluntary Observation Ship (VOS) program
- Thermistors on industry platforms
- Assess current predictive skill for key products
 - NWS 8-16 day
 - CPC & OAR longer term
 - (probabilistic) skill for extreme events
- Employ user based metrics for Arctic Test bed
- Develop AMPS (Antarctic Mesoscale Prediction Systems) for Arctic region
- Improve Stratus clouds (From yesterday)
- NMME framework

Top Three

Easy

- Take advantage of existing observations
 - Immediate use
- Mine NMME and support its frame work and development
- Leverage partnerships
 - NOAA-industry data sharing
 - Quick enhancement of key observations

Hard

- Invest resources in getting clouds and boundary layers correct
- Assess what observations and assimilation techniques are needed to improve predictive skill of key products
 - OSSEs
 - Prediction Limits
- Assess predictability (and vulnerability) of high impact weather events

~~SUBSEASONAL TO SEASONAL~~ ~~5-7 WEEKS~~

SOURCES OF PREDICTABILITY

- UPPER OCEAN
 - HEAT
 - SALINITY
- LOWER ATMOSPHERE HEAT + MOISTURE CONTENT (PERSISTENT PATTERNS)
- SURFACE ALBEIDO (BLACK CARBON)
- STRATOSPHERE
- SEA ICE THICKNESS DISTRIBUTION
- SURFACE ICE CONDITIONS (MELT PONDS)
- LAND CONDITIONS
 - e.g. SOIL MOISTURE, SNOW COVER
 - VEGETATION
- TELECONNECTIONS

OBSERVATIONS

- SATELLITE + AIRCRAFT REMOTE SENSING FOR SEA ICE THICKNESS / ALBEIDO ^{+ OTHER ICE CHARACTERISTICS}
- SOIL MOISTURE ACTIVE / PASSIVE SMAP!
- THERMISTER STRINGS + SALINITY IN THE UPPER OCEAN (INCLUDING GLIDERS)
- PROCESS LEVEL OBSERVATIONS TO IMPROVE MODELS ^{LEVERAGE PARTNERS}
 - { e.g. CLOUDS... BOUNDARY LAYER }
SURFACE EXCHANGE
... + OTHER LINKAGES

The Source

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group