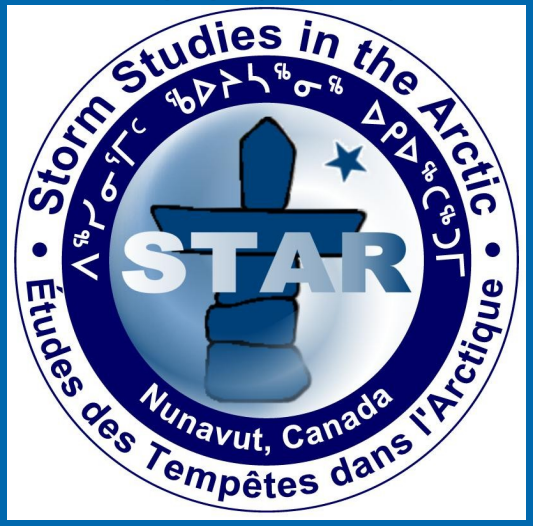
STAR Research



Kent Moore

Department of Physics

University of Toronto

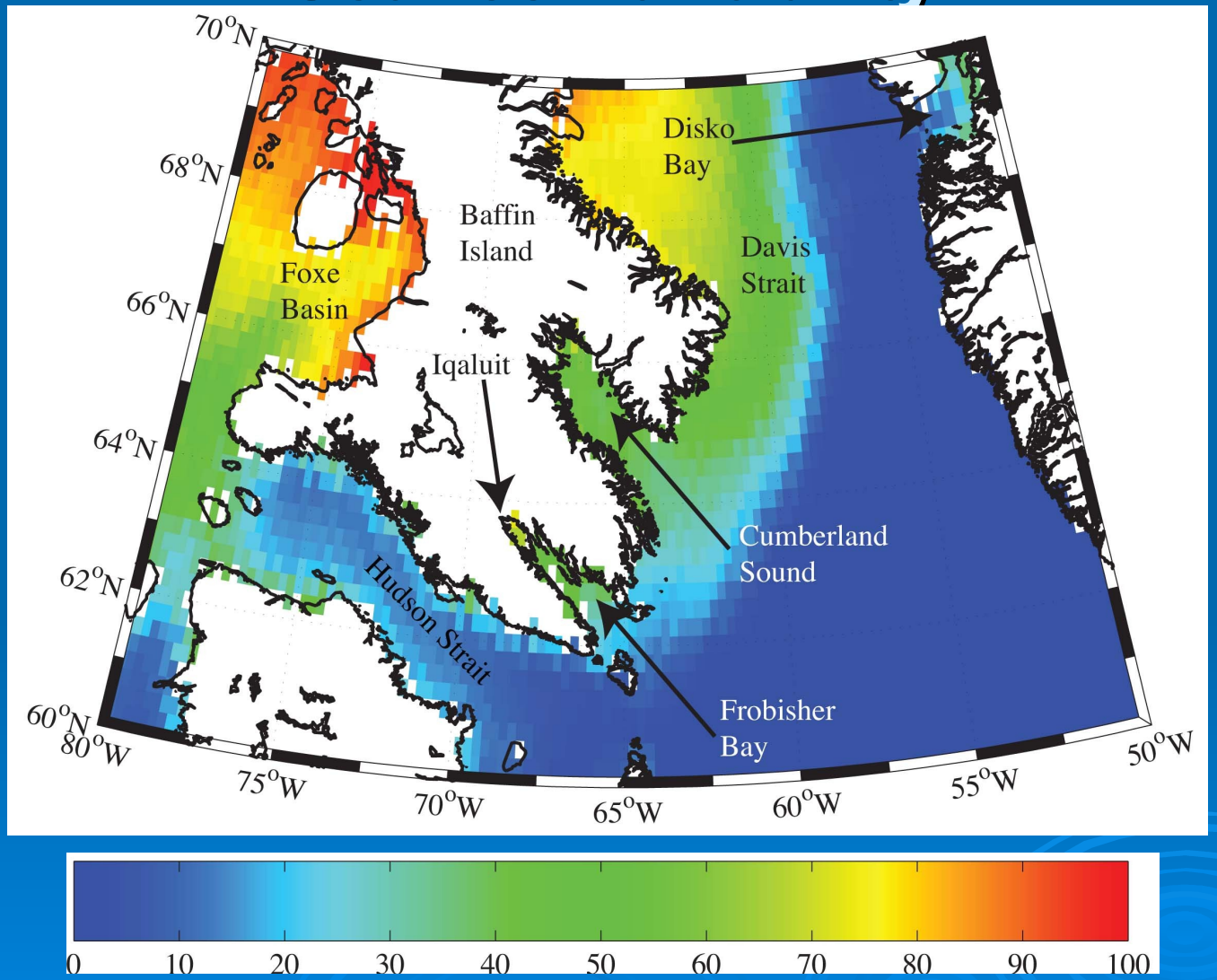
In collaboration with

Shunli Zhang, Rebekah Martin, Tadayasu Ohigashi and Hendra Adiwidjaja & Carling Hay

Overview

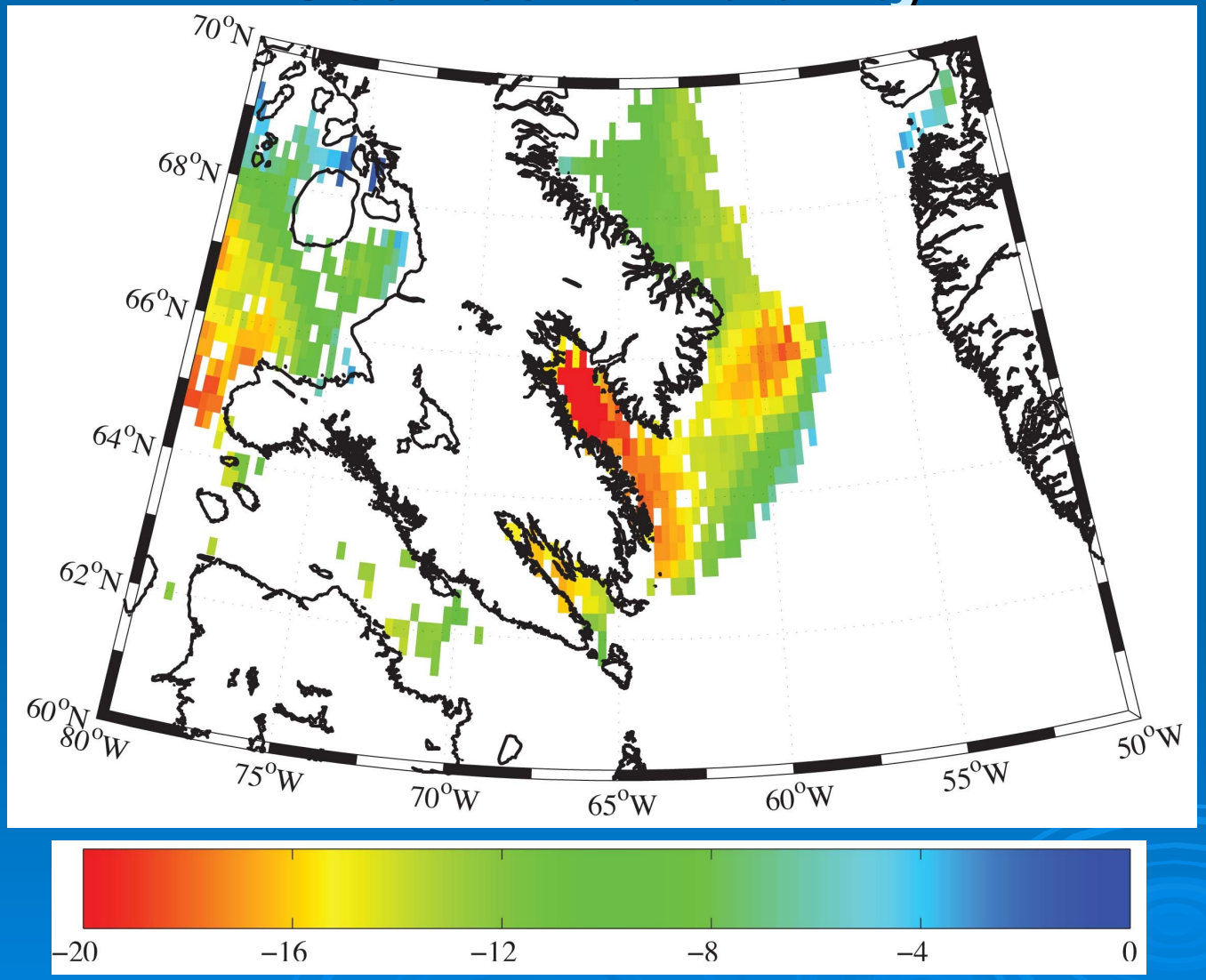
- Sea Ice Variability & Trends in Southern Baffin Island.
- Regional-scale modeling of high impact weather in the region.
- Cloud-resolving modeling of air-sea-ice interaction.
- Real-time modeling during experiment.
- Mesonet.
- Identification of cases of interest (NW Gap Flow).

Sea-Ice Variability



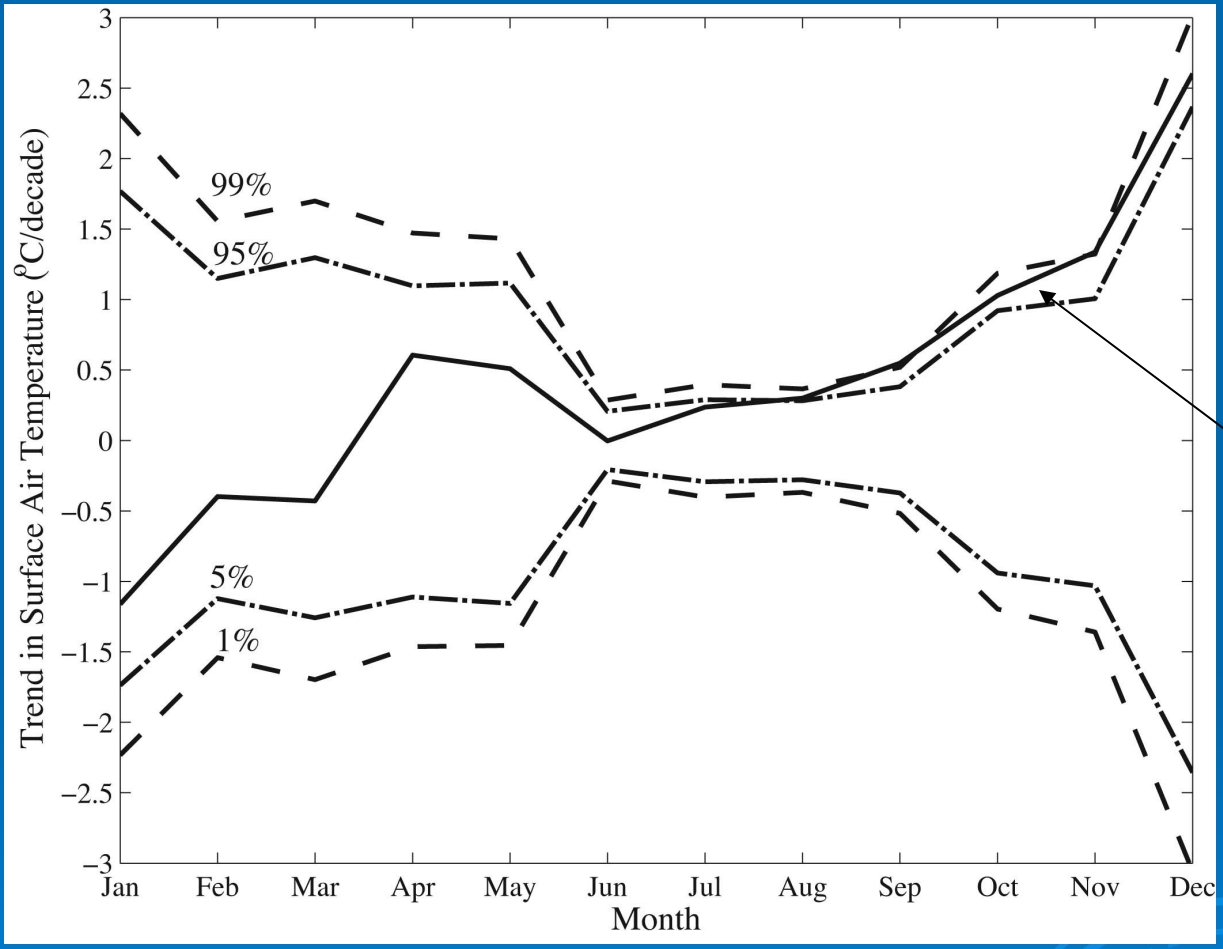
November mean sea ice concentration (%)

Sea-Ice Variability



November mean sea ice concentration trend (%/decade)

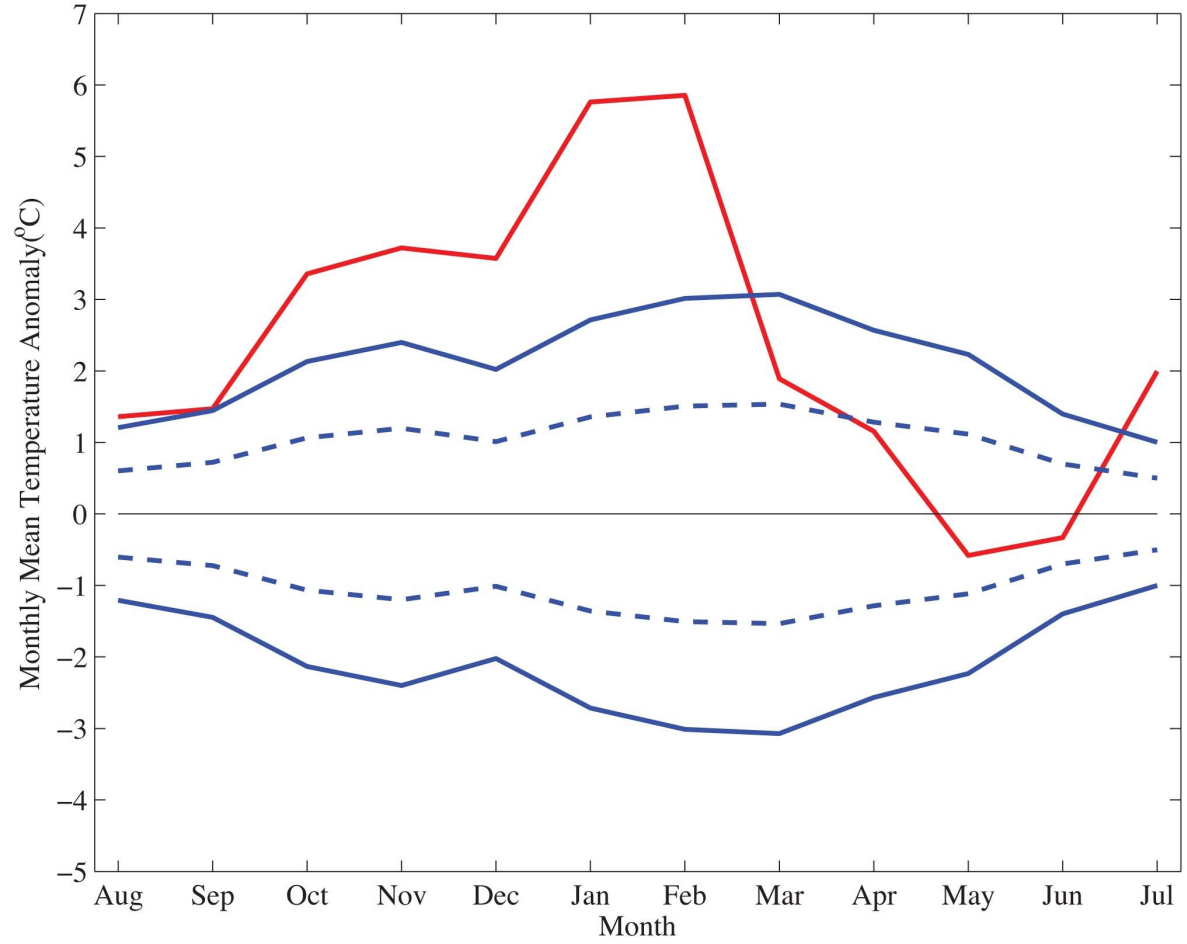
Sea-Ice Variability



Fall Warming

Monthly mean trend in Iqaluit surface air temperature 1979-2004 (°C/decade)

Sea-Ice Variability

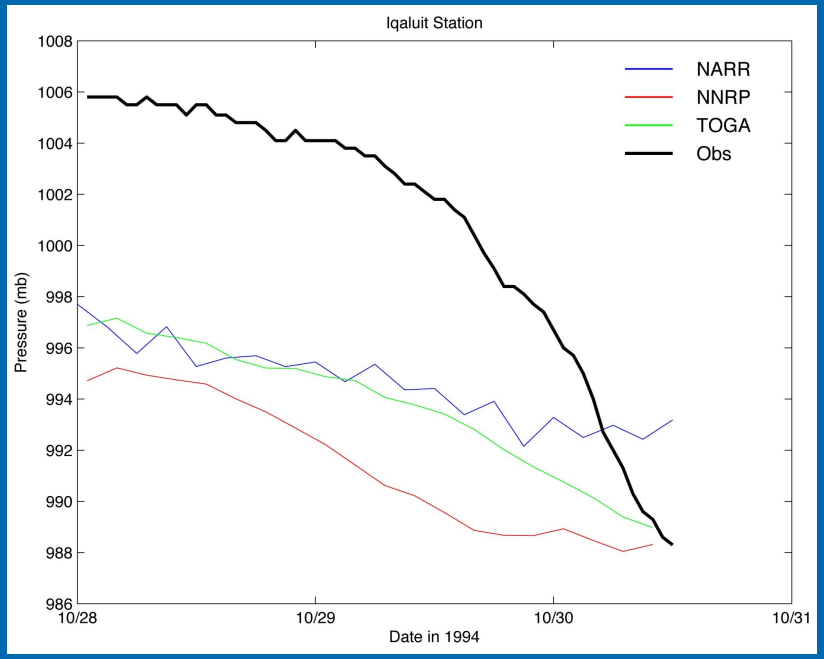


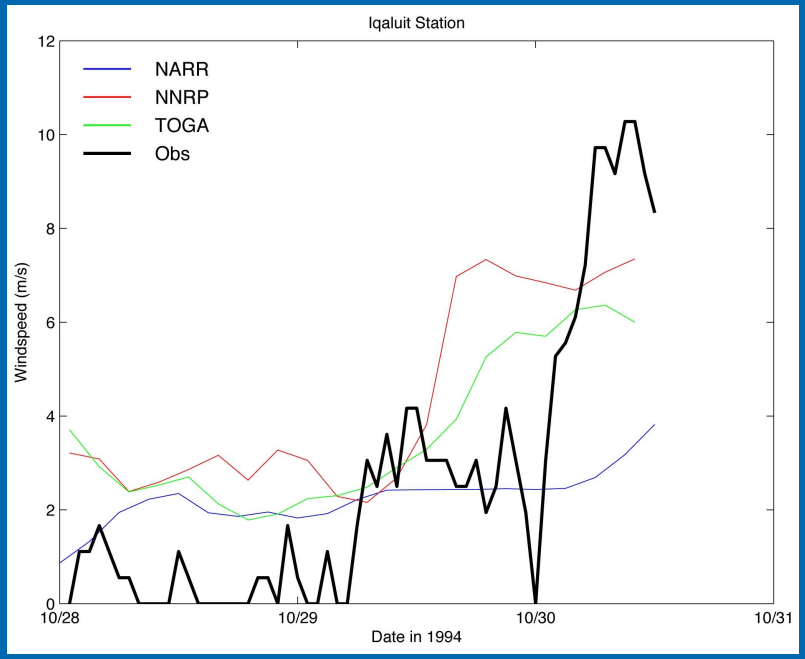
Anomaly in surface air temperature @ Discovery Bay 1871-2004

Regional Scale Modeling

- QASAOQ event October 29/30 1994
- Inuit vessel was on a walrus hunting expedition to the mouth of Frobisher Bay.
- Stormy weather kept vessel sheltered near Loks Island.
- Weather cleared on the 29th, vessel headed west of Loks Island.
- Vessel encountered gale force winds, flooding results and vessel was abandoned.
- 8 of 10 occupants died. 2 were rescued after spending 3 days at sea!

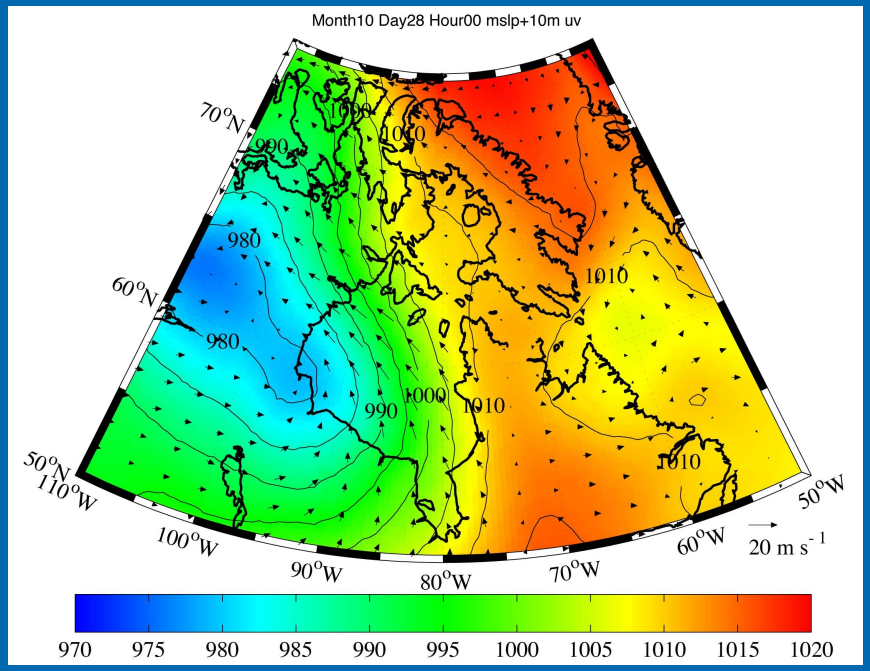
QASAOQ event



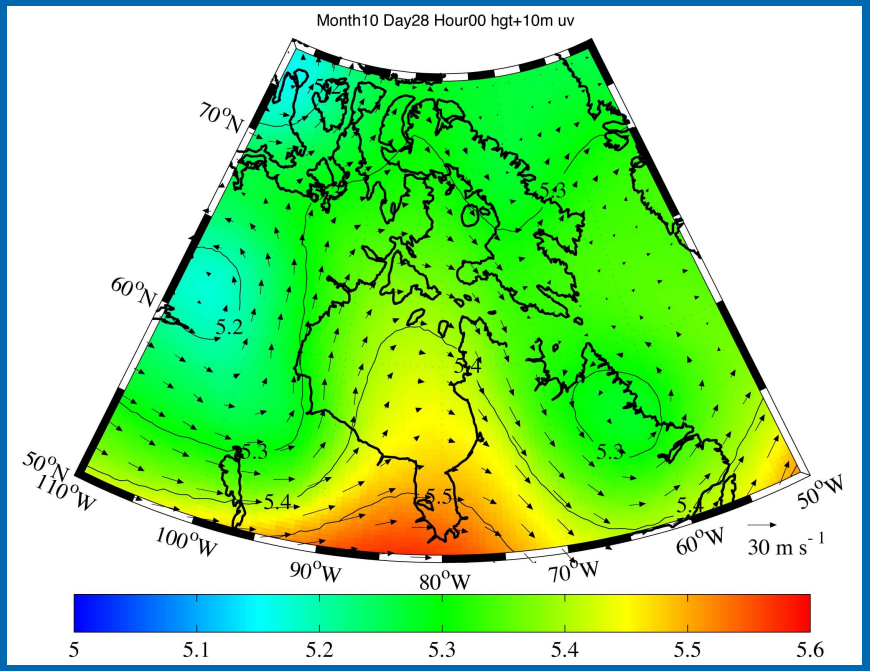


Operational analyses and NARR are suboptimal in Iqaluit region
High winds at YFR were on the 30th!

QASAOQ event



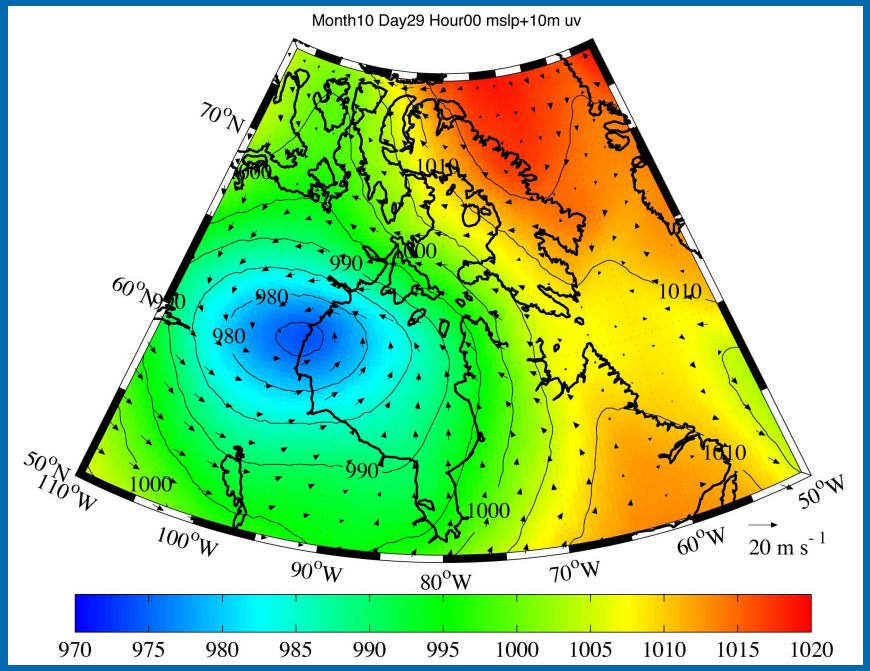
MSLP & 10m wind



500mb Height & winds

00Z October 28 1994

QASAOQ event



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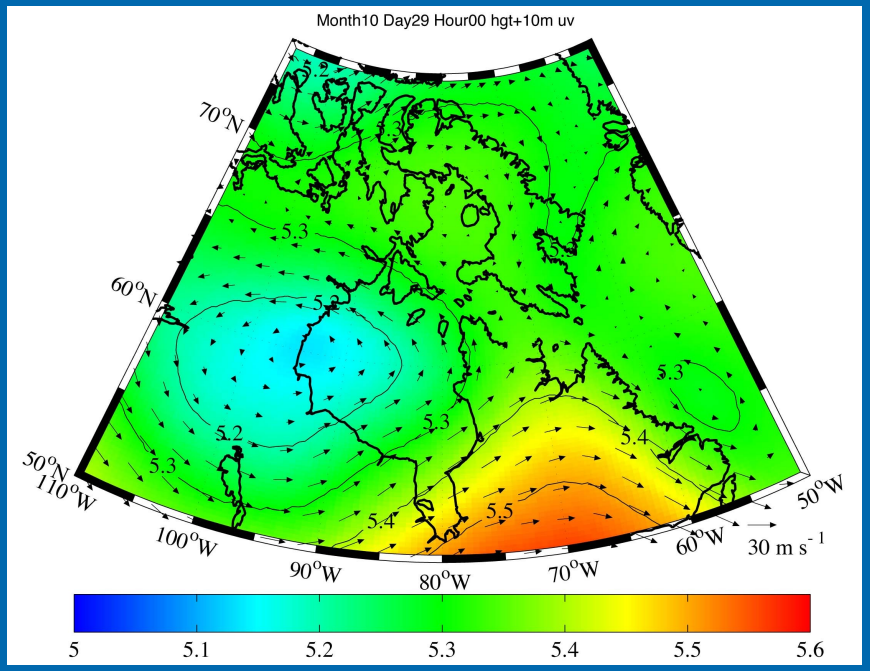

500mb Height & winds

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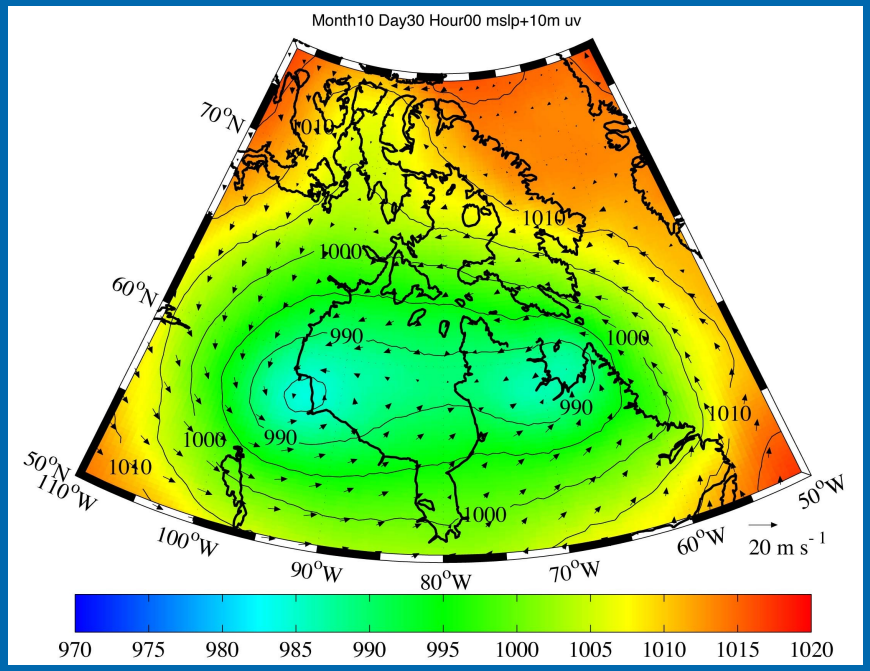

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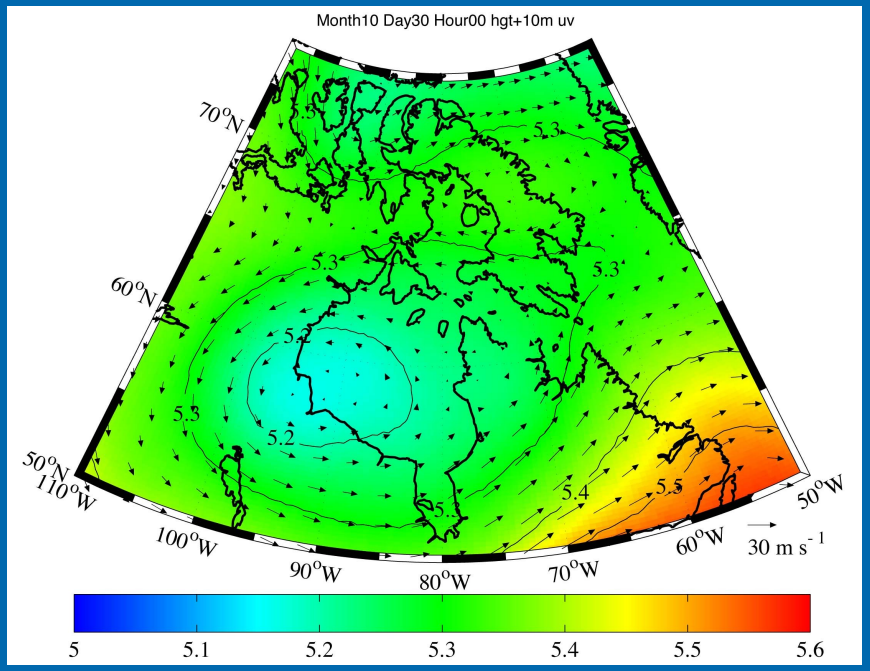
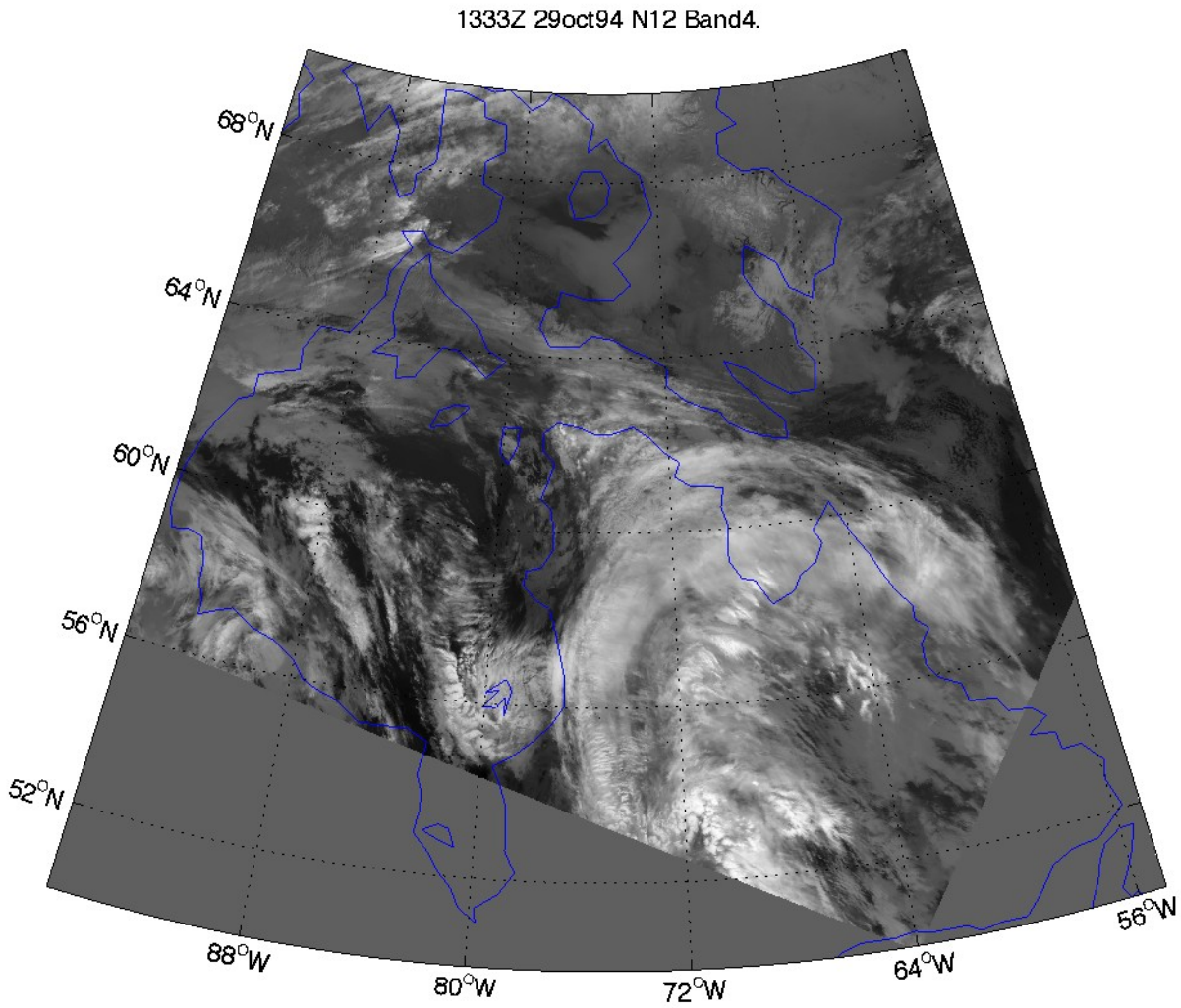


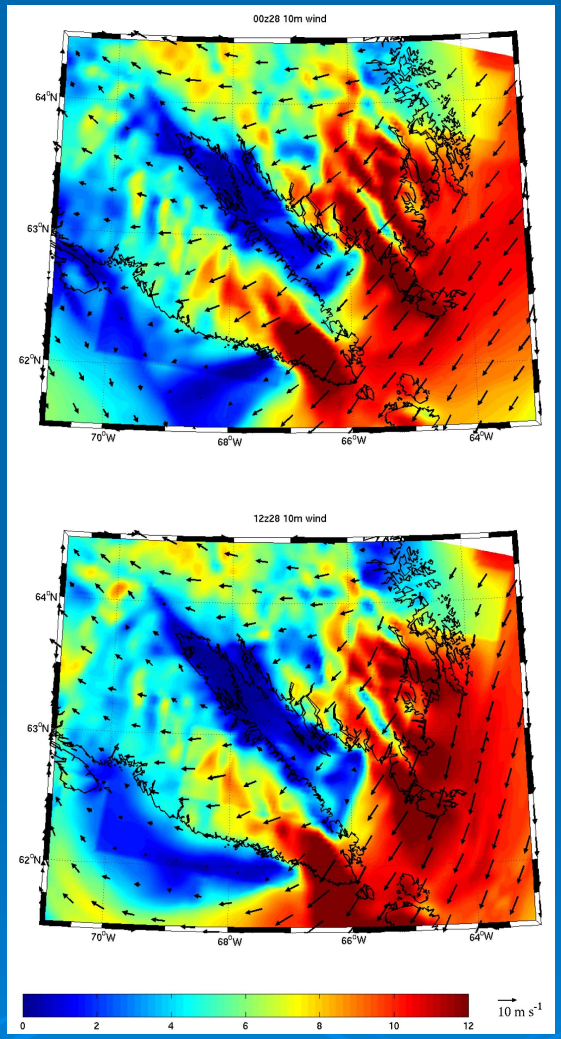
500mb Height & winds

00Z October 30 1994

QASAOQ event

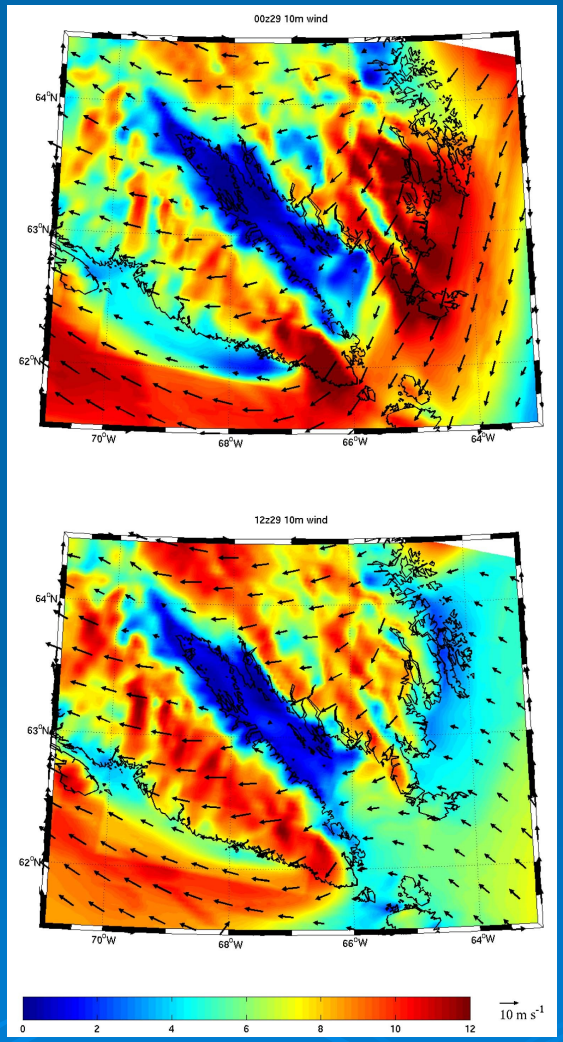


QASAOQ event



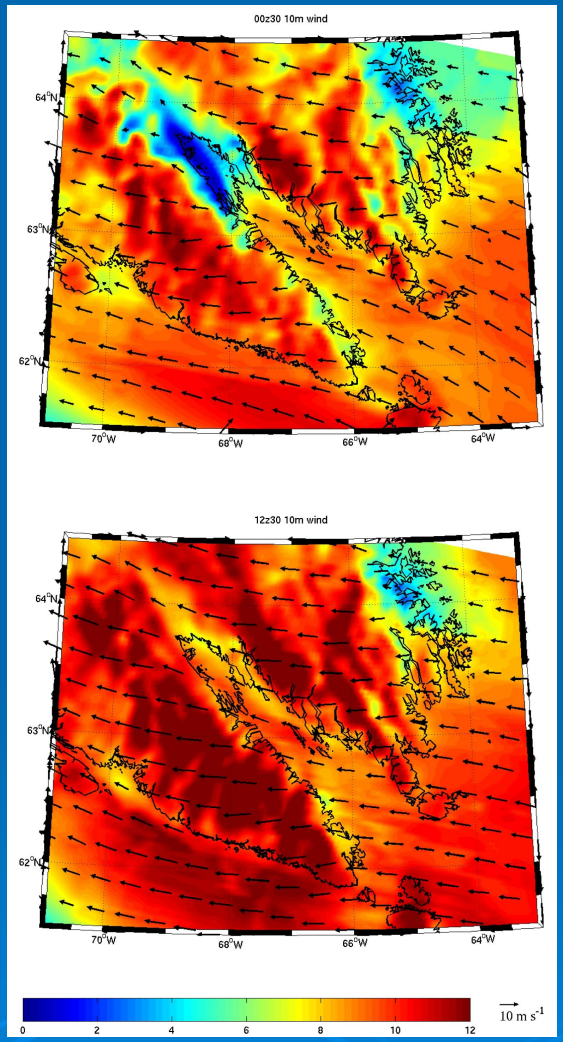
October 28 1994 WRF 3km
inner domain 10m wind speed

QASAOQ event



October 29 1994 WRF 3km
inner domain 10m wind speed

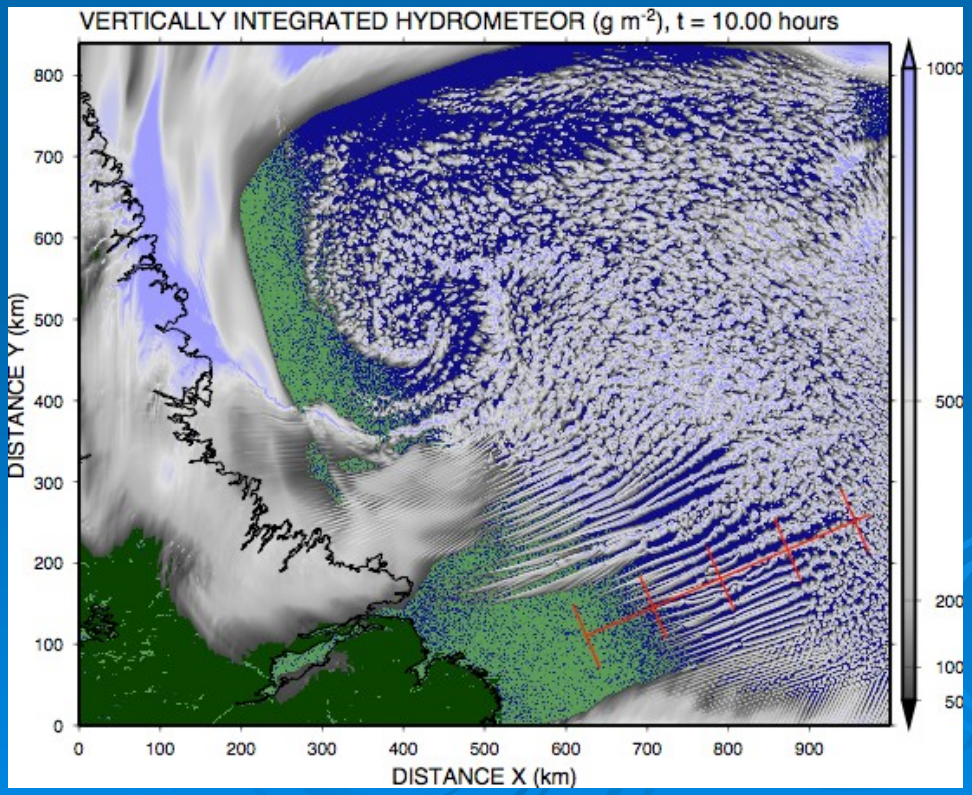
QASAOQ event



October 30 1994 WRF 3km
inner domain 10m wind speed

Cloud Resolving Modeling

- My group has expertise using high resolution (<1km) modeling of weather events that explicitly resolve cloud scale motion.
- Model now has the capability to include sea ice field with heterogeneity on these spatial scales.



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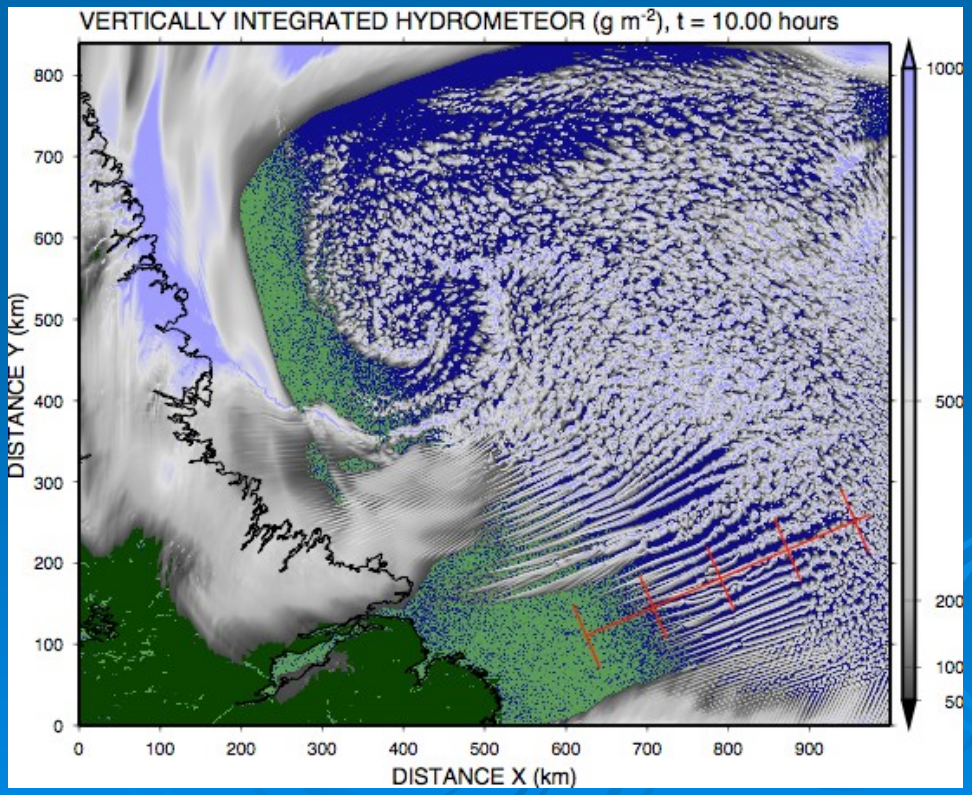

Sea-ice: green
Open water: blue

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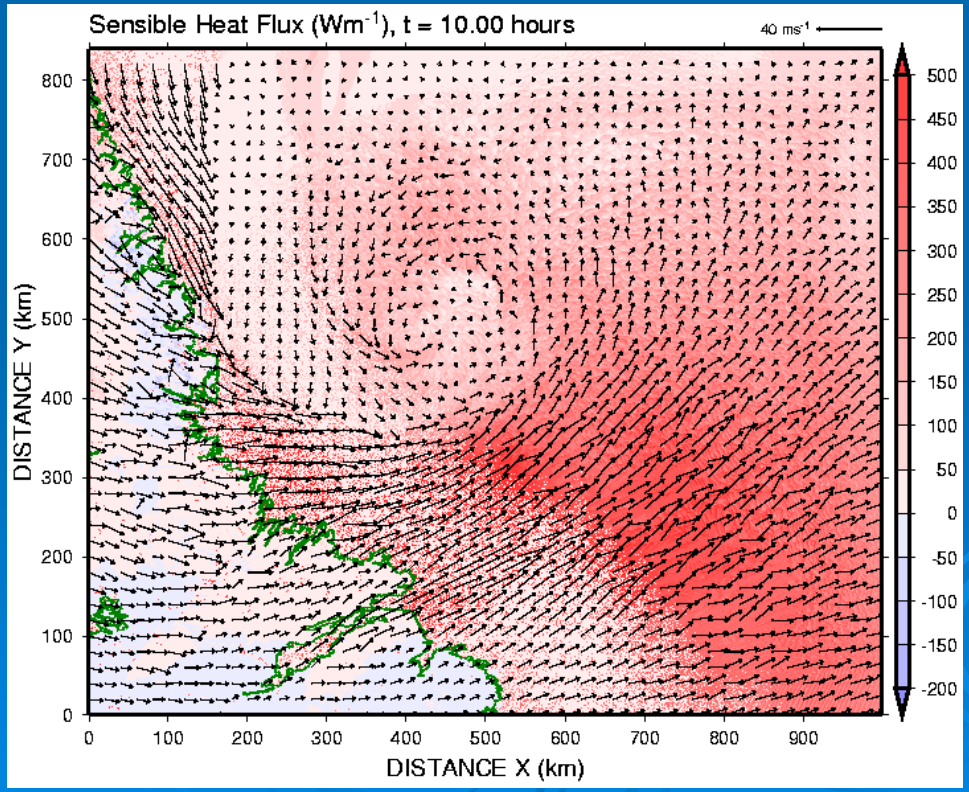

Real-Time Modeling

- My group will be running WRF in real-time at resolutions of 4-12 km over region of interest during STAR field season.
- Twice-daily 48 hour forecasts.