Impacts of Air-sea Interactions on Arctic summer storms

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Model description
Storm simulation
Air-sea interaction
Summary

submitted JGR
Atmospheric model
- surface air temperature, specific humidity
- sea level pressure,
- total cloud amount and 10m wind

Ice model

Ocean model

SST

T, S and current

Momentum, heat and moisture fluxes

ice volume
Sea ice on July 31, 2008

Ice extent

NSIDC

CIOM

Climatology

Ice concentration and ice edge

Runs:
1) Coupled CRCM – ice-ocean
2) Uncoupled CRCM on climate ice-ocean
Sea ice on July 31 2008

**EP1:** forced with ice climatology (blue line).
**EP2:** same as EP1 but forced with the sea ice predicted by the coupled model (shaded).

Red: observation
Blue: climatology
Shaded: model
Sea Level Pressure

0:00 July 29 2008

0:00 July 30 2008

0:00 July 31 2008

CMC

Coupled CRCM
Storm track and intensity

**Storm track**

- Black: CMC analyses
- Red: EP1, ice climatology
- Green: EP2, predicted sea ice
- Blue: observed ice edge

**Central sea level pressure**
10m wind

EP1, climatological sea ice

EP2, model predicted sea ice
Maximum wind speed (m/s)
Difference of surface temperature for 0:00 UTC 31 July 2008 (EP2-EP1)
Vertical profile of temperature difference (EP2-EP1)
Vertical profile of wind speed at 0:00 July 31

Air potential temperature

Wind speed difference (EP2 – EP1)

More stable – EP1 – climatology ice
Less stable – EP2 – coupled model
Speed of surface current at 12:00 UTC 31 July 2008 (EP2)
Surface temperature difference between 0:00 UTC 31 July and 0:00 UTC 29 July (EP2)
Vertical profile of currents + water temperature (EP2)
Spray impacts on 10m wind speed

0:00 July 29 2008

0:00 July 30 2008

0:00 July 31 2008

Same EP2, but with spray

EP2, coupled model predicted sea ice
Summary

The dominant ocean response to the storm occurs over open water regions.

Upper ocean mixing results in sea surface cooling of up to 2°C in coastal waters along the southern Beaufort Sea coast.

The effect of increased open water results in enhanced storm-generated surface winds, by as much as ~ 4 m/s.


