A climatology of wintertime barrier winds off SE Greenland



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CHEMICAL



Background: QuikSCAT climatology

Mean wind speed for DJF 1999-2004

From Moore and Renfrew 2005, J. Climate

- Generally high wind speeds
- 3 bullets around Greenland





Background: QuikSCAT climatology

Barrier winds

- Dynamics: essentially in thermal wind balance?
- Act to pre-condition the Irminger Sea?
- Vital for basin-shelf exchange?



Background: GFDex



- Aircraft-based field campaign in 2007
- Oceanography cruises in 2008
- Tip jets
- Barrier winds
- Polar lows
- Air-sea fluxes
- Targeted observations
- Ocean modelling

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Editorial The Greenland Flow Distortion Experiment

Climatology: ERA-Interim



ERA-Interim: Verification



Percentage of time > 20 m/s



10 m wind field



Wind cross sections



Detection Results



Ocean impact



Warm and cold barrier winds (DSS)







Warm and cold barrier winds (DSS)







-24 hours



Warm and cold barrier winds – Temp anomaly



FIG. 14. Composite of 2-m temperature anomaly (K, contours every 1 K) for warm (left and cold (right) barrier winds detected at DSS at zero lag time. Positive (negative) value shown with black (grey) lines.

Warm and cold barrier winds – 500 hPa wind



Warm and cold barrier winds – mslp anomaly

Warm







Cold







Conclusions

- Barrier winds (>20 m s⁻¹) occur once a week
- Two locations favoured: DSS and DSN
- Correlated with NAO: 0.57 (0.31) at DSN (DSS)
- Large range in 2-m temperature ...
- Warm barrier winds blocking high over Nordic Seas
- Cold barrier winds train of cyclones

See Harden, Renfrew and Petersen, 2011, J. Climate, in press.

