Geophysical Research Abstracts
Vol. 17, EGU2015-11329, 2015
EGU General Assembly 2015

Extreme small-scale wind episodes over the Barents Sea: When, where and why?

Erik W. Kolstad
Uni Research and Bjerknes Centre for Climate Research, Bergen, Norway (erik.kolstad@uni.no)

The Barents Sea is mostly ice-free during winter and therefore prone to severe weather associated with marine cold air outbreaks, such as polar lows. With the increasing marine activity in the region, it is important to study the climatology and variability of episodes with strong winds, as well as to understand their causes. Explosive marine cyclogenesis is usually caused by a combination of several mechanisms: upper-level forcing, stratospheric dry intrusions, latent heat release, surface energy fluxes, low-level baroclinicity. An additional factor that has been linked to extremely strong surface winds, is low static stability in the lower atmosphere, which allows for downward transfer of high-momentum air. Here the most extreme small-scale wind episodes in a high-resolution (5 km) 35-year hindcast were analyzed from a dynamical perspective, and it was found that they were associated with unusually strong low-level baroclinicity and surface heat fluxes. And crucially, the 12 most severe episodes had stronger cold-air advection than 12 slightly less severe cases, suggesting that marine cold air outbreaks are the most important mechanism for extreme winds on small spatial scales over the Barents Sea.

Observational data is sparse in the Arctic, so forecasters are often in need of simple indicators when evaluating the potential for strong winds. Polar low forecasters in northern Norway monitor the vertical difference between the SST and the temperature at 500 hPa, which is a simple and effective indicator of cold air outbreaks. Already 24 hours before the most intense storms' peak intensity, this difference was higher than normal, acting as a possible harbinger of extreme winds for experienced forecasters. As the quality and resolution of the forecast models increase with time, it is in data-sparse regions such as the Barents Sea that human experience still gives a vital edge.