

Climatology of Extreme Winds in the Chukchi/Beaufort Seas/Alaska Region Using the North American Regional Reanalysis

Steve T. Stegall and Jing Zhang

The high-resolution (32km, 3-hourly) North American Regional Reanalysis (NARR) surface winds were used to examine the detailed structures of the distribution and evolution of the surface wind across the Chukchi/Beaufort Seas/Alaska region. First the NARR surface winds were verified against the station observations over the study area and the comparisons indicate that NARR essentially captures the distribution of the observed winds in summer. However, an obvious bias exists in winter, when the easterly component of the bimodal pattern is overestimated, while the westerly component is underestimated, particularly in January. Then we used the NARR surface wind data to examine the wind field climatological features, interannual variability and long-term change over the study area by analyzing the monthly maximums, 99th, 95th, 90th, and 50th percentile wind speeds (m/s) for each month of the year from 1979-2006. Decadal differences (i.e. the difference from 2000-2006 and 1990-1999 and 1990-1999 and 1980-1989) were also investigated to understand the long-term change in the area's surface winds. The results indicated that the maximum wind speeds in the Chukchi/Beaufort Seas have lower values from January through May. Then there is a progression northward of the higher wind speeds beginning in the Bering Strait in June and continuing into the Chukchi/Beaufort Seas during July-October; in November and December the maximum winds in the area start to decrease with a southward migration into the Chukchi Sea and eventually back through the Bering Strait into the Bering Sea, which is coincident with the sea ice retreat and advance in the area. The yearly variance of the wind speeds follow a similar northward and southward migration while the highest variance happened in October. The decadal differences mainly show a large increase in the maximum winds speeds in September and October in the Chukchi Sea.