Abstract title:

A numerical simulation of strong wind event at King Sejong Station, Antarctica.

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In this study, a strong wind event that recorded a 10-min average wind speed of about 22 m/s at Sejong Station was simulated using the Polar WRF (Weather Research and Forecasting) model (Hines and Bromwich, 2008), which is a optimized version of WRF (Skamarok et al., 2008) for better representation of polar region's weather. Also, with reference to the previous study which is shown that the moving the initial time of the model simulation shows the largest sensitivity for strong wind simulation in their case study of strong wind event at Mauson, East Antarctica(Orr et al., 2014), sensitivity experiments on the initialization time of the model is also conducted. Through this, first we have evaluated the strong wind simulation performance of the Polar WRF by carrying out cross validation by comparing with local surface observations and reanalysis data. Second, we verified that the main cause of the strong wind observed in Sejong Station by analyzing in detail observaions and numerical simulation results. In addition, we investigate the climatological characteristics of the surface meteorological fields by analizing the in situ meteorolocial observations for 22 years in Sejong Station.

Despite the recent significant climatic changes observed over West Antarctica, adequate validation of regional simulations of extreme weather events is rare for this region. To address this gap, simulation results from a recent version of the Polar Weather Research and Forecasting model (Polar WRF) covering Antarctic Peninsula at a high horizontal resolution of 3 km are validated against near-surface meteorological observations. We selected a case of high wind speed event on 7 January 2013 recorded at Automatic Meteorological Observation Station (AMOS) in King Sejong station,

Antarctica. It is revealed by in situ observations, numerical weather prediction, and reanalysis fields that the synoptic and mesoscale environment of the strong wind event was due to the passage of a strong mesoscale polar low of center pressure 950hPa. Verifying model results from 3 km grid resolution simulation against AMOS observation showed that high skill in simulating wind speed and surface pressure, respectively. Our evaluation suggests that the Polar WRF can be used as a useful dynamic downscaling tool for the simulation of Antarctic weather systems.