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Arctic cyclones and their possible changes by the end of the 21st century from regional climate model simulations

Mirseid Akperov (1), Igor Mokhov (1), Annette Rinke (2), Klaus Dethloff (2), and Heidrun Matthes (2)

(1) A.M. Obukhov Institute of Atmospheric Physics, RAS, Moscow, Russia (aseid@ifaran.ru), (2) Alfred Wegener Institute Helmholtz Centre for Polar and Marine Research, Potsdam, Germany

Characteristics of Arctic cyclones (frequency, intensity and size) and their changes in a warmer climate are analyzed with the use of the HIRHAM regional climate model simulations with SRES-A1B anthropogenic scenario for the 21st century. The focus is on Arctic cyclones for the warm (April-September) and cold (October-March) seasons. The present-day cyclonic characteristics from HIRHAM simulations are in general agreement with those from ERA-40 reanalysis data. Differences noted for the frequency of Arctic cyclones are related with different spatial resolution for model simulations and reanalysis data. Possible future changes in Arctic seasonal cyclone characteristics are analyzed. According to the model simulations, the frequency of cyclones is slightly decreasing in the warm season and increasing in the cold season for a warmer climate in the 21st century, but these changes are statistically insignificant. Noticeable changes were detected for the intensity and size of Arctic cyclones for the both seasons. Significant increase was found for the mean cyclone size and intensity, and frequency of weak cyclones during the cold season. Further, a general increase in the frequency of small cyclones was calculated in the cold season, while its frequency decreases in the warm season. Distinct regionally different changes are simulated.