Geophysical Research Abstracts
Vol. 17, EGU2015-10675, 2015
EGU General Assembly 2015

Comparison of different tracking algorithms analysing subantarctic cyclones: A contribution to the IMILAST programme

Jens Grieger (1), Gregor C. Leckebusch (2), Christoph C. Raible (3), Irina Rudeva (4), and Ian Simmonds (4)

(1) Freie Universität Berlin, Institut für Meteorologie, Berlin, Germany (jens.grieger@met.fu-berlin.de), (2) School of Geography, Earth and Environmental Sciences, University of Birmingham, Birmingham, United Kingdom, (3) Climate and Environmental Physics, Physics Institute, University of Bern, Bern, Switzerland, (4) School of Earth Sciences, The University of Melbourne, Victoria, Australia

Cyclones are a dominant feature of the mid- and high-latitude atmospheric circulation, however their definition is not straightforward as their characteristics are complex. Thus, a number of studies present different objective cyclone detection and tracking algorithms focusing on different aspects of what is thought to be the main characteristic of a cyclone. For example, studies use either the rotational character of cyclones by using the vorticity as main field to identify cyclones or the mass character by using the pressure field.

In this study, 14 different objective identification and tracking algorithms are compared by analyzing subantarctic cyclones. This region is of especial interest because it hosts the greatest frequencies of cyclogenesis and cyclone occurrence across the whole Southern Hemisphere. The character of cyclones there are strongly influenced by the intense baroclinicity and the presence of the Antarctic massif. The study is part of the Intercomparison of Mid Latitude STorm diagnostics (IMILAST) project. As a common basis ERA-Interim reanalysis data between 1979-2008 is used. This contribution investigates the output of the different tracking algorithms for the representation of extra-tropical cyclones around Antarctica, and all cyclone tracks south of 60° S are selected. We focus on three sectors around Antarctica, namely East Antarctica, Amundsen-Bellingshausen Seas, and Weddell Sea, for a differentiated comparison of the different tracking methodologies. A track-to-track analysis allows the evaluation of differences and similarities of the methodologies for the representation of subantarctic cyclones.

As known from similar studies for the entire Southern Hemisphere, absolute numbers of identified cyclone tracks differ significantly. This is also the case for all sectors around Antarctica. Differences are even more pronounced in austral winter (JJA) due to the different treatment of cyclone intensities by the numerous tracking methods. However, the main features of the geographical distribution are well represented by the different algorithms, whereas major differences are found in the region of Ronne and Ross ice shelves. As would be expected, cyclone characteristics such as trajectories agree better when focusing on strong cyclones rather than analyzing all cyclones.