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Comparative study between ERA-20C and ERA INTERIM reanalysis datasets

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The continuous development of the 20th century had a positive effect on the meteorological forecasts as well. Thanks to that the numerical models and their forecasts became more precise by the end of the century. Therefore in the 1990s scientists required to verify the results of previous numerical models with the available new technologies. In this way now it is possible to get a more accurate picture of the atmosphere's past. To meet this need reanalyses were improved. Reanalyses not only help to represent the conditions of the atmosphere more precisely, but they also help to recognize the errors of the numerical models. All these progresses are the basics of making trustworthy forecasts, and getting precise results of global climate models as well. Thanks to the innovation of data-assimilated methods and further technical developments several reanalysis projects were improved in the last decades.

In our current studies we are making a proper, comparative study between the two most modern ECMWF reanalysis datasets (ERA INTERIM, ERA-20C). In the first step we assigned three periods of ERA-20C (1901-2000, 1901-1950 and 1951-2000) where we examine several selected parameters. We also assigned a collective period from both ERA INTERIM and ERA-20C (1981-2010). Four different meteorological parameters – 500 hPa height, 850 hPa temperature, mean sea level pressure, and ice coverage in the Arctic- Circle regions were investigated in our study. Emphasis is also placed on extreme weather situations. Firstly we are monitoring the detectability and the changes in frequencies of rapid cyclones in the period 1981-2010 collectively in both reanalysis datasets. Besides we examine some selected cyclones' frequency and spatial location in three periods of ERA-20C (1901-2000, 1901-1950 and 1951-2000).

By the results we can recognize the strengths and weaknesses of the two reanalyses. It is a great benefit for all the reanalysis users, such as climate researchers, and the developers of climate modelling and reanalysis, because as our results point out these miscalculations and uncertainties, they support the development of new reanalysis products.