



Investigating the trends of the Hadley Circulation in ERA20C

Roberta D'Agostino (1,2) and Piero Lionello (1,2)

(1) University of Salento, DISTEBA, Lecce, Italy (piero.lionello@unisalento.it), (2) CMCC, Lecce, Italy

The trends of the Hadley Circulation (HC) significantly differ in reanalysis data and historical climate simulations. While some re-analyses show increasing trend of the strength of the HC over the three last decades of the 20th century, most of the historical climate simulations show that the HC strength decreases and widens at a rate of about 1.2°lat/K (which is lower than observed rate) with the global mean temperature increase. In this study, we investigate the role of the assimilation of atmospheric observations in detecting trends on strength and width of the HC by comparing the evolution of the HC in the ERA20CM Experiment and ERA20C Reanalysis. Both datasets are based on an AMIP-like model (the atmospheric component of the European Center for Medium Range Weather Forecasts IFS – Cy38r1) with prescribed SSTs (HadSST2) and radiative forcing following CMIP5 recommendations, but while ERA-20CM does not assimilate meteorological observations, ERA20C assimilates surface marine winds and surface atmospheric pressure. The comparison of HC trends between ERA20CM and ERA20C is a starting point for evaluating the need to assimilate atmospheric fields in order to have realistic description of the evolution of HC and to improve model ability to describe changes in tropical atmospheric circulation.