



Decrease of cloudiness in the Mediterranean region since the 1970s: consistency between observations and climate simulations

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One of the main limitations when studying clouds and their associated radiative effects is related to the difficulties in obtaining temporal homogeneous observations of clouds. In this study, total cloud cover trends from surface observations over land (EECRA) for the Mediterranean area since 1971 have been examined. Then, the observed changes have been compared with different global databases for a common period 1984-2005. Specifically, several satellite projects (ISCCP, CLARA, PATMOS-x) and reanalysis products (ERA-Interim, MERRA, NCEP-DOE, NCEP-CFSR) have been chosen. Finally, simulations from 44 climate models of the Coupled Model Inter-comparison Project Phase 5 (CMIP5) corresponding to the historical scenario have been compared against the observations. The observations show a widespread decrease of total cloud cover over the Mediterranean since the 1970s, especially during the winter and spring. There is a relatively good agreement between this time evolution of cloud cover provided by surface observations and reanalyses, as well as with PATMOS-x and corrected ISCCP data (Norris and Evan, 2015), whereas raw ISCCP, CLARA and ERA-Interim provide unrealistic trends. Historical climate model simulations from the CMIP5 also indicate a decrease of cloud cover over the Mediterranean since the 1970s, although with a lower magnitude as compared with observations. Overall, the observed decrease in cloudiness over the Mediterranean could explain a fraction of the increase in downward shortwave surface radiation detected since the 1970s (i.e. brightening period) by using direct and indirect (e.g. sunshine duration data) measurements.

Norris, J. R. and A. T. Evan (2015) Empirical Removal of Artifacts from the ISCCP and PATMOS-x Satellite Cloud Records, *Journal of Atmospheric and Oceanic Technology*, in press.