EMS Annual Meeting Abstracts
Vol. 14, EMS2017-233, 2017

Liquid water path over Arctic and Antarctica between 1982 and 2015 during the summer season.

Mauro Boccolari (1) and Flavio Parmiggiani ()

(1) Universita' di Modena e Reggio Emilia, Dipartimento di Scienze Chimiche e Geologiche, Modena, Italy (mauro.boccolari@unimore.it), (2) ISAC-CNR, Bologna (Italy)

Abstract

This study investigates trend and variability of cloud liquid water path (LWP) over both the North Pole (NP) and the South Pole (SP). The period of analysis covers 34 years, from 1982 to 2015. Because of some main limitations of the LWP retrieval (availability of daylight and the problems with LWP retrieval over ice and snow) the study is focused on the summer seasons of the respective region that is June-July-August for the NP, and December-January-February for the SP). These summer seasons are those of sea ice melting whose trends have a significant importance in the study of climate change. Seasonal data were computed from monthly LWP, which is part of the cloud products of the CLARA-A2 archive, available from the EUMETSAT SAF on Climate Monitoring (CM SAF), derived from AVHRR observations of NOAA and EUMETSAT MetOp satellites. Observations for the Arctic and Antarctic regions are available on two equal-area polar grids at 25 km resolution and covers an area of $1000km \times 1000km$.

Linear trend in liquid water path during the analysed period summer seasons are positive for both (about $1.0\,kg\,m^{-2}/dec$ and $0.5\,kg\,m^{-2}/dec$ for SP and NP, respectively), but the trend is statistical significant (at $\alpha = 0.05$) only for SP. At a finer spatial resolution, substantial differences are observed: i) in the Arctic, a significant increase over Greenland and a decrease over the Arctic Ocean; ii) in Antarctica, a significant increase over all the continent, apart a modest decrease around the pole, over the Ross Sea and near the western Antarctic coast. Spatial variability was tested by means of EOF technique. For both the Arctic and Antarctica, only the first main eigenvector seems significant, in both cases explaining about the 20% of the variance. For the Arctic, the higher variability is noted near the pole and in the south-east of Greenland, while, for Antarctica, over the Ross Sea and its surrounding areas and near the opposite coastlines.