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## Analysis of Cloud Types and their Geometrical Properties over the Mediterranean using CloudSat Observations

**Iliana Koutsoupi**<sup>1,2</sup>, Eleni Marinou<sup>1</sup>, Kalliopi Artemis Voudouri<sup>1,3</sup>, Ioanna Tsikoudi<sup>1,2</sup>, Peristera Paschou<sup>1,3</sup>, Vassilis Amiridis<sup>1</sup>, Alessandro Battaglia<sup>4</sup>, Pavlos Kollias<sup>5</sup>, and Eleni Giannakaki<sup>2</sup>

<sup>1</sup>Institute for Astronomy, Astrophysics, Space Applications and Remote Sensing, National Observatory of Athens, Athens, Greece (il.koutsoupi@noa.gr)

<sup>2</sup>Department of Physics, Section of Environmental Physics-Meteorology, National and Kapodistrian University of Athens, Athens, Greece

<sup>3</sup>Department of Physics, Aristotle University of Thessaloniki, Thessaloniki, Greece

<sup>4</sup>Department of Environment, Land and Infrastructure Engineering, Politecnico di Torino, Turin, Italy

<sup>5</sup>School of Marine and Atmospheric Sciences, Stony Brook University, New York, USA

Earth's climate system and weather are affected by clouds, as they regulate the global radiative budget, depending on their altitude, structure and composition. Therefore, accurate cloud information is crucial, particularly above the Mediterranean, which is considered as a climate hotspot.

In this work we utilize space-based radar products from the CloudSat mission to provide statistics on the properties of the clouds observed above the Mediterranean during the period 2007 – 2017. CloudSat's payload, the Cloud Profiling Radar (CPR), is the first spaceborne 94-GHz (W-band) radar producing vertical cloud profiles over the globe. Three domains are selected in the Mediterranean to study the geometrical properties and the cloud types by month and altitude.

Our results reveal that low-level clouds are dominant above the Mediterranean region especially during winter and spring periods, mainly appearing at altitude up to 4 km, while high clouds prevail throughout the year at altitudes between 9 and 14 km, except in July and August above the East Mediterranean, where they are nearly absent. In the East Mediterranean, a higher frequency of low-level clouds is observed during the summer period. The majority of the deep convective clouds are observed above the West and Central Mediterranean, indicating the influence of the Atlantic systems and the mid-latitude cyclones on the Mediterranean weather conditions. Additionally, a cloud climatology is constructed in order to examine trends in each cloud type.

The results from this intercomparison will be used to derive a better understanding of the model's limitations to accurately predict cloud geometrical and microphysical properties in the region, and to improve the aerosol-cloud interaction model representation.

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