Cloud types and geometrical properties above the Mediterranean using decadal dataset

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Earth's climate system and weather are affected by clouds, which play an indispensable role in modulating the global radiative budget (Pachauri, 2014). Uncertainties attached to cloud properties lead to uncertainty in climate projections. Thus, monitoring the vertical structure of clouds is crucial (Stephens, 2018). In this work, we utilize space–based radar products from CloudSat mission and provide statistics on the properties of the clouds observed above the Mediterranean (Med herein) during 2007 – 2017. Three domains are selected as shown in Fig.1. and the statistics are provided in Fig. 2 per month (left columns) and per height (right column).

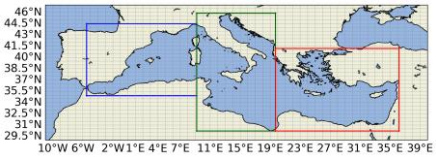

Figure 1. CloudSat data analysis above West, Central and East Mediterranean

The cloudiest months in the West, Central, and East Med, are February, November, and January respectively, while August presents the least cloud abundance overall (15 – 32%). Maximum cloudiness conditions are observed during the winter months above the West Med (77%), while minimum conditions are observed above the East Med during summer period (<25%). September and October are much less cloudy (<40%) above East Med than they are above West and Central Med (60 – 70%), in which the majority of the deep convective clouds (deep) are observed, indicating the effect of the Atlantic systems and the mid-latitude cyclones on the Med weather conditions.

Stratocumulus (Sc) are dominant above the Med region especially during winter and spring periods, appearing mainly up to 4 km altitude. High clouds (high) prevail also during all months at altitudes higher than 9 km, except for July and August above the East Med, where they are almost absent. In the East Med, more cumulus (Cu) are observed during the summer period (<4 km), while altostratus (As) are almost absent, contrary to the rest of the region. Nimbostratus (Ns) are observed at all levels.

Future work includes the comparison of the observed clouds with modeled cloud datasets in the Med

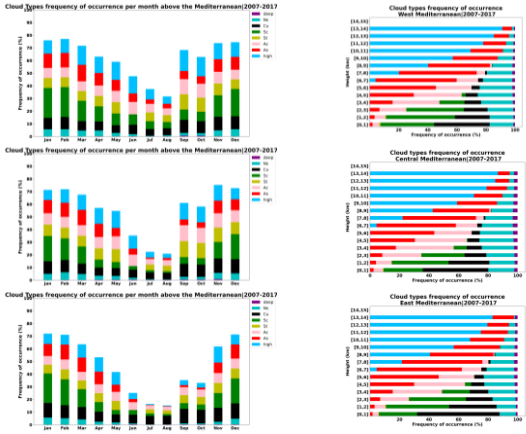

Figure 2. Frequency of cloud types occurrence (left) per month, and (right) per height, for (top) West Med, (central) Central Med, (bottom) East Med, 2007 – 2017.

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