Cirrus Clouds Properties Observations at the Atmospheric Observatory ‘El Arenosillo’ (SW Iberian Peninsula): A Case Study for Radiative Implications

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1. Introduction

Cirrus (Ci) clouds play an important role in Earth radiative forcing and Climate Change since they affect the solar radiation levels reaching the ground, enhancing or negating the global warming effect. Recently, a polarized Micro-Pulse Lidar (P-MPL), the standard NASA/Micro-Pulse NETwork (MPLNET) system was deployed at the INTA/Atmospheric Observatory ‘El Arenosillo’ (ARN), located in the SW Iberian Peninsula.

The INTA/P-MPL system is used for Ci detection over that station for the first time: a Ci cloud case observed on 28 October 2016 is presented in this work, as reference for future long-term Ci observations. The influence of Cirrus features on radiation is widely required in data assimilation by global climatic models, thereby, the radiative effects of the Ci case observed over ARN are examined in order to explain their influence in the radiative balance at ground level.

Optical and macrophysical properties are retrieved, and used for radiative transfer simulations to study the radiative impact on surface of the Ci clouds. Data are compared to the measured surface radiation levels and all-sky images simultaneously performed at the ARN station. Results can contribute to validation purposes of the next ESAs EarthCARE mission, whose scientific goal is related to the radiation-aerosol-cloud interactions.

2. Measurement Station

3. Instrumentation and Methodology

4. Results and Discussion

4.1 Optical and macrophysical properties of Ci clouds

4.2 Surface radiation levels

5. Conclusions

REFERENCES

1) Corbella-Jabonero et al., 2017: Diversity on subtropical and polar cirrus clouds properties as derived from both ground-based lidars and CALIPSO/CALIOP measurements, Atmos. Res., 183, 151-165.

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