



Validation of CALIPSO Infrared Imaging Radiometer (IIR) during the Cirrus Cloud Experiment (CIRCLE-2) campaign

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Cirrus clouds are now considered of having a major, but still badly determined influence on global climate and radiative phenomena in the atmosphere. Numerous studies have been performed during the last decades in order to enhance our knowledge of their global impact, through for instance a better understanding of their microphysical structure. However due to the high altitude and relative low optical thickness of these clouds, precise observations are still seldom, especially using aircrafts. Consequently, the use of datas from spatial missions dedicated to climate studies such as CALIPSO (part of NASA's A-Train) occurs to be of primal importance.

During summer 2006, the CIRCLE-2 campaign was performed with the intention of studying cirrus clouds microphysical properties (optical thickness, ice crystal shape and effective diameter), but also took place as the first CALIPSO validation campaign. In this study we used radiative measurements made by the two aircrafts in order to compare them with CALIPSO datas. Aircrafts were equipped with a lidar, an infrared radiometer, and in situ and thermodynamical measurements instruments. The lidar and radiometer specifications were highly similar to the ones onboard CALIPSO. The comparisons are made in terms of brightness temperature, or of brightness temperature difference using the Split-Window method. Afterwards analogies are obtained using simulations by the FASDOM fast radiative transfer code. Look-up Table methods using linear interpolations were first used to retrieve microphysical properties out of aircrafts and satellite measurements, with the help of several ice crystals models.

Good correlations were found between aircrafts and CALIPSO measurements. Furthermore by the use of inversion technics on these datas, we have retrieved optical thickness and crystal effective diameter close from in situ observations. First studies were made within the thermal infrared spectrum, according to the range of the CALIPSO radiometer. Nevertheless, similar studies within visible spectrum are being attended, through the use of POLDER or CloudSat measurements to retrieve similar results, first of all along the CIRCLE-2 campaign tracks to comfort validations.