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Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Cloud detection and properties with whole sky images

P. Tzoumanikas (1,2), A. Kazantzidis (1), S. Fotopoulos (2), and G. Economou (2)

(1) Laboratory of Atmospheric Physics, University of Patras, Greece (akaza@upatras.gr), (2) Electronics Laboratory, Physics Department, University of Patras, Greece

In recent years, the use of digital whole sky images has been used for the determination of the spatial and temporal distribution of clouds. In most cases, systems for the cloud detection and the estimation of percentage cloud cover have been developed. However, the determination of cloud types and the visible percentage of sun behind the clouds is still an open issue. These parameters are crucial for the estimation of solar radiation reaching the ground. In this study, a fully automated whole sky imaging system is presented, based on a simple and inexpensive commercial digital camera, a fish-eye lens and an image processing algorithm. The objective of the system is to estimate the percentage cloud cover, the part of sun that is visible, seven cloud types and the presence of rain.
The method results are quantitatively validated with human observations of clouds and radiation measurements. According to results, the accuracy in the determination of percentage cloud cover is around 90%, with some inconsistencies in cases of cirrus cloudiness. The accuracy in the determination of cloud type ranges between 79 and 91% depending on the cloud type. The part of the sun that is obscured by clouds is also validated with solar radiation measurements. In this case, our estimations are compared with the measured cloud modification factor (the ratio of solar radiation under real conditions with the same value under cloud-free conditions).