EMS Annual Meeting Abstracts
Vol. 11, EMS2014-34, 2014
14th EMS / 10th ECAC
© Author(s) 2014

# Computation Of Cloud Motion For Solar Irradiance Prediction

Rogiros Tapakis and Alexandros Charalambides
Cyprus University of Technology, Department of Environmental Science and Technology, Cyprus (rd.tapakis@edu.cut.ac.cy)

The penetration and acceptance of Renewable Energy Sources has already taken place in our lives. Solar Energy is the feedstock for various applications of RES, thus, the knowledge of the intensity of the incident solar irradiance is essential for monitoring the performance of such systems. The only unpredictable factor in defining the solar irradiance and the performance of the systems is clouds. So far, various researchers proposed several models for the estimation of solar irradiance in correlation to cloud coverage and cloud type. The present work describes the development of an image processing algorithm for field computation of cloud motion using a ground based camera that photographs the sky at scheduled time intervals.

At first the cloudy pixels of the images were identified and separated from the sky pixels using image processing techniques and then, the designated cloud characteristics (i.e. features) were computed. Subsequently, the detected clouds were segmented evenly into smaller regions and the dynamical and microphysical properties of the clouds were considered to be applied to the segmented parts. Then, the short-term motion of each segment was calculated for the scheduled time intervals of the sequential images using the optical flow technique that analyses sequences of images and calculates the discrete image displacements. Finally, the initial cloud was reconstructed and the location of the cloud was computed.

The developed methodology will provide a useful tool for researchers that want to focus on the effect of small local clouds on the energy production of their solar RES.