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Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Spatial and temporal representativeness of satellite-derived cloud modification factor over Greece

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In recent years, satellite images have been widely used for the determination of cloudiness and its effect on solar radiation reaching the ground. In most studies, the cloud modification factor (CMF) is estimated, which is the ratio of solar radiation under real cloud conditions with the corresponding cloud-free value. This parameter, with the synergetic use of model calculated values of solar radiation under cloud-free conditions, could provide an estimate of the solar radiation reaching the ground.
In this study, the images from the Spinning Enhanced Visible and Infrared Imager (SEVIRI) of MSG at 0.6 and 12 μm, during the 2007-2010 time-period were used for the estimation of cloudiness and the identification of snow covered terrain respectively. Look Up Tables (LUTs), derived from the LibRadTran software package (www.libradtran.org), were used for the estimation of the scattered radiation to the imager for different values solar and satellite zenith and azimuth angle, surface reflectivity and altitude, aerosol and cloud optical properties. For each satellite pixel, the algorithm could provide the CMF value, since all the other parameters were known or assumed from climatological values.
This dataset is being used for two purposes. Our first aim is to use a multivariate segmentation method for the representative localization of each satellite pixel, in order to estimate the number and the places of ground-based sites that would be needed to measure effectively the cloud effect on solar radiation over Greece. Secondly, we try to introduce a short-time forecasting method of CMF, based on phase-space reconstruction techniques. In this way, we represent the CMF time series at each satellite pixel in a multidimensional phases-space and define the needed threshold value to make predictions.