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# Spatio-temporal variability of the global and PAR radiation in mountainous terrain

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Incoming shortwave solar radiation is an important parameter in environmental applications. Through its influence on the energy and water balance on the earth surface, it affects different processes as the variations of ground and air temperature, evapotranspiration, photosynthesis, wind or available humidity. At local scales, the topography is the most important factor in determining the distribution of the solar radiation on the surface. The variability of the elevation, the surface orientation and the obstruction due to elevations cause great local differences in insolation and, as a consequence, in the other variables.

This work investigates the magnitude and cause of the spatio-temporal variability of the radiation of in a very complex topography area. Particularly, we analyze data collected along the years 2003 and 2004 in 14 radiometric stations located within the Sierra Nevada National Park, in Granada (Southern Spain). The 14 locations cover a wide range of elevation (from 1100 to 1700 m), aspects, slopes and sky view factor, and both global and Photosynthetically Active Radiation (PAR) is measured. The data were logged in a minute basis and processed to obtain daily integrations. A Principal Component Analysis was carried out in order to obtain commons patterns of spatio-temporal variability between the stations. The results were analyzed on the light of the topographic characteristic using a DEM in a GIS environment.

Results show that is the slope and orientation, and not the altitude of the stations, , the most important factors explaining the observed variability. The influence of these topographic effects changes throughout the year, being much more important in winter than in summer. Nevertheless, a considerable amount of the observed variability can not be explained based only on the topography and the role of other factors, as differences in the surface cover, is also addressed using a GIS environment.