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Analysis of the direct and diffuse partitions of solar irradiance measured in the North of France, and comparison with their estimations from satellite.

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In the context of climate change, of a very likely growth of the world energy consumption, and need for a decarbonation of energy, the use of solar energy should be at the heart of energy policy of many countries, particularly but not only to those in development and that benefit from a strong solar irradiance at the surface. Obviously, solar ressource depends very much on meteorology and understanding the multiple aspects of this dependence is very important. One ambitious and important objective is the multiscale forecast of the solar ressource and of PV energy.
The detailed knowledge of solar irradiance is important to evaluate and optimize the performance of solar systems, particularly when clouds are present. The spectral content of the solar irradiance, its partition between the direct and diffuse components, the angular distribution of the downwelling radiation field, are important characters as they condition the productivity of solar systems. For example the response of solar cells differ, and they are not only sensitive to the quantity of irradiation but also its quality.
The detailed analysis of the solar irradiance measured at the surface allows moreover the characterization, besides clear sky, of cloudy atmosphere and their radiative effects. Climatological link between meteorology and cloud cover at a given site can thus be obtained. It allows also the analysis of the cloud/radiation interaction's complexity, especially tridimensionnal effects.
In this study, we present the analysis of solar irradiance measured at the surface in the North of France. We analyse a 8 year climatology of the solar ressource and compared with estimation from satellite mesurements (PVGIS). We investigate the level of accuracy of this estimation, and the reason for discrepancies. We analyze also the local link between cloud cover and solar ressource. We show the interest of the possible synergy of solar irradiation measurements with those from other instruments (lidar, sky imager).