



Solar radiation map on the Atlantic ocean

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The work addresses the zonation of the Atlantic Ocean based on typical yearly profiles of the downwelling solar radiation at ocean surface and its inter-annual variability. Solar radiation climatic zoning is of large importance for preliminary assessment and modeling of systems natural systems, e.g., heat fluxes or radiation balance. Zoning can also guide the selection of appropriate measuring stations for a given geographical location. Satellite data offers archives of synoptic views of the Atlantic Ocean and its cloud cover. The surface solar radiation may be derived from such images. The HelioClim3v5 data set originates from a proper processing of Meteosat images using Heliosat-2 method. It offers estimates of the surface solar radiation over the tropical and equatorial Atlantic Ocean every 15 min with a spatial resolution of approximately 5 km. HelioClim3v5 has been validated against the The Prediction and Research Moored Array in the Tropical Atlantic (PIRATA) network of moorings in the Tropical Atlantic Ocean, considered as a reference for oceanographic data. This work is a first attempt to propose a map of the solar radiation on the Atlantic ocean. The Atlantic ocean has been discretized in the form of a structured grid of uniform resolution of 0.25 degree. A data set of monthly means of the global irradiance has been constructed for each cell and is available at MINES ParisTech. For each calendar month, the monthly means were averaged over the years and the inter-annual variability was computed. A cluster analysis was applied at each cell with these 24 values as inputs to create classes that were reported into a map of the Atlantic ocean. The zonation exhibits latitudinal trends. Noticeable anomalies are observed at South of equator. Interactions between Angola-Benguela current and atmospheric dynamic through global irradiance in this area are discussed.