Assessments of the Nighttime and Daytime Radiative Fluxes Balance on Seasonal Timescale over West African Climate

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The main aim of this paper is to assess the variations of the net radiation flux and to express its trend over West African climatic zones as classified by the World Meteorological Organization such as Hyper-Arid (HAR), Arid (ARD), Semi-Arid (SAR), Semi-Humid Dry (SHD), Semi-Humid Humid (SHH) and Humid (HUM) zones. To achieve this, thirty-six years surface data of net shortwave and longwave radiation between 1980 and 2015 on 24 hours' time-series format were obtained from the Archives of the Modern-Era Retrospective Analysis for Research and Application, Version 2 (MERRA-2) database. The analyses showed that on the diurnal time scales, the net radiation flux has the maximum values of 420 W/m^2 in HAR zone, 480 W/m^2 in ARD zone, 500 W/m^2 in SAR zone, 560 W/m^2 in SHD zone and 580 W/m^2 in SHH zone at 13.00 hours respectively and 590 W/m^2 in HUM zone at 12.00 noon. On regional basis, the highest values of net radiation flux were observed in Mauritania in HAR and SAR zones, Mali in ARD zone, Gambia in SHD zone, Senegal in SHD zone, and Guinea-Bissau in Humid zone both in the night and daytime. Finally, the results of monotonic trends analysis of the net radiation flux using non-parametric Mann- Kendall statistical test revealed that the majority of trends in the three humid zones in West Africa showed significant decreasing trends at 0.1%, 1%, 5% and 10% level of significance for the net radiation flux in all the timescales.

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