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Comprehensive Experimental and Theoratical Investigation of Solar Radiation Conditions in Bostwana: A Semi-desert Region

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Abstract

Solar radiation parameters and mean monthly optimum slopes are studied experimentally and theoretically at 10 different locations of Botswana. It is found that throughout Botswana all mean yearly daily solar radiation components are extremely high. Mean monthly optimum slopes are negative (collector should face North) in June and positive (collector should face South) in December. It was also observed that the UV-component during the last 8 years has increased by about 5 - 7%. It was also found that the filter used in the instrumentation for UV-radiation measurements is slowly degrading, and hence calibration should be done at least every six months of the year. Cases of anomalous phenomena when direct normal radiation is increasing greatly (and diffuse radiation decreasing) after solar noon, are observed and discussed. It is also found that when humidity is low and visibility is high, hourly Ig-values recorded with a pyranometer can be less than (Ibn.cos?z + Id) values. This discrepancy, which could be quite common for regions with desert conditions (low humidity and turbidity) is discussed and explained.

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