

Long – Range Prediction of the Onset of Thunderstorm and Precipitation over West African Sub Region

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ABSTRACT

Upper air data over three West African stations for some years were collected and analysed. The stations are Kano in Nigeria, Bamako in Mali and Niamey in Niger. The existing prediction schemes for onset of rainfall proposed by Omotosho (1990), Omotosho (1992) and Omotosho et al (2000) were further examined and the results of this study have shown them to be reliable and consistent.

Four new long-range prediction schemes are proposed in the present study for Kano and Bamako where upper air data are reasonably continuous while three new long – range prediction schemes are proposed for Niamey. At Kano, agricultural activities can commence about 110 days after the equivalent potential temperature anomalies at the surface becomes positive for at least 10 days or 71 days after the wind direction at

400hPa level becomes easterly ($0^{\circ} - 180^{\circ}$). A new stability parameter, $\sigma(\theta'_e)$, and a

new Richardson's number, $Ri(\theta_e)$, have been introduced in this study to effectively

account for the high moisture content of the West African boundary layer. Thus,

boundary layer stability and Richardson's number offer yet other forecasting methods:

onset is 105 days from the date of first positive maximum of stability and 100 days from

date of separation of $Ri(\theta_e)$ from $Ri_c(\theta_e)$. The corresponding values for Bamako are

80 and 72 days, while over Niamey the corresponding values are 96 and 92 days respectively.