

Controls upon the Diurnal Cycle of Clouds and Radiation in the Sahel Region of West Africa

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The Sahel region in sub-Saharan Africa is home to one of the largest water vapor gradients on Earth known as the Intertropical Front (ITF). The climate of the Sahel is modulated by the position of the ITF, which experiences a seasonal north-south oscillation in response to the phase of the West African monsoon circulation. The Sahara Desert essentially annexes the Sahel region during the hot and dry season (dry season) and a near-surface shallow modified maritime air mass from the tropical Atlantic Ocean undercuts the Saharan air mass during the summer months (wet season). The wet season diurnal cycle is of particular importance due to its role in the production of precipitation in this sub-arid climate. An experiment conducted by the Atmospheric Radiation Measurement Program in 2006 enabled detailed measurements of the diurnal cycle of the net radiation budget during the wet and dry seasons and comprehensive measurements of the clouds and aerosols that could influence the radiation budget. These measurements have been used to construct a composite diurnal cycle of clouds and radiation that can be used to evaluate representations of the regional climate in models.