Study of the Diurnal Cycle of Microphysical Properties of Clouds in the Amazon Basin using GOES Measurements

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The Amazon Basin plays a fundamental role in the hydrological cycle and the energy budget for the planet, since its mass and energy fluxes of water vapor, sensible and latent heat are crucial to global circulation and precipitation patterns. These energy and mass exchanges occur through precipitation, cloud formation and dissipation cycles. Therefore, understanding the formation and evolution of clouds has great importance for the global energy balance. In the case of the Amazon, however, there are still major gaps in the knowledge of the physical processes that affect the life cycle of clouds. For example, models predict precipitation early in the morning, with precipitation events usually being observed early in the afternoon. This occurs due to limitations in representation in hot convective cloud models and the transition to deep convective clouds. In this work, we used a set of radiance measurements performed by channels 1, 2 and 4 (0.63, 3.9 and 11 μm, respectively) of National Oceanic and Atmospheric Administration Geostationary Operational Environmental Satellite (NOAA-GOES) and radiative transfer codes to obtain estimates of cloud optical depth, as well as the effective radius of droplets and ice particles in convective clouds. We studied how these microphysical parameters vary throughout the day in the Amazon region during the dry and wet seasons. The results will be analyzed and compared aiming correlating their variation with atmospheric aerosol load and to assess the processes of convective cloud formation and development in the Amazon.

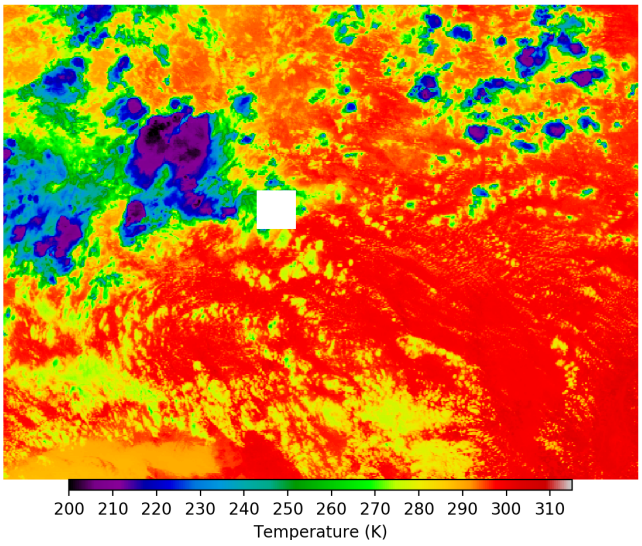

Figure 1. Example of measurement of the brightness temperature obtained through channel 4 of the GOES on the Amazon basin. The white square in the center corresponds to the area used to obtain the data plotted in figure 2.

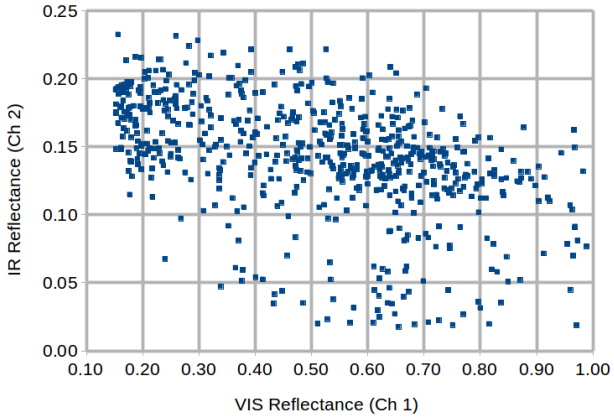

Figure 2. Reflectance values in channel 2 as a function of the reflectance in visible channel, corresponding to the white square of figure 1.