



Rainfall sensitivity analyses for the HSB sounder during Dry-to-Wet/AMC/LBA field campaign

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This work examines the sensitivity of the different channels of the HSB (Humidity Sensor for Brazil), on board the AQUA satellite, for the purpose of retrieving surface rainfall over land. The analysis is carried out in two steps: a) Theoretical study performed using two radiative transfer models, RTTOV and the so called Eddington method; and b) Correlation between coincident measurements of HSB brightness temperatures and radar rainfall estimates during the DRY-To-WET/AMC/LBA field campaign held in the Amazon region during September and October of 2002. Theoretical results indicate the sensitivity of the HSB to water vapor content and cloud liquid water in the precipitation estimation. Theoretical and experimental analyses show that the channels 150 and 183 \pm 7 GHz are more adapted to estimate precipitation than 183 \pm 1 and 183 \pm 3 GHz. The simulations analyses show clearly a hierarchy in physical effects that determine the brightness temperature of these channels. The rain and ice scattering dominate over the absorption of liquid water and the liquid water absorption effect dominates over the absorption of water vapor. The results show that the 150 and 183 \pm 7 channels are more sensitive to the variation of liquid water and ice than the 183 \pm 1 and 3 channels. For the precipitation estimation using these channels, it was found that it is best adapted to the low precipitation rate situations, since the brightness temperature is rapidly saturated in the presence of high intense precipitation. A case study to estimate precipitation using the radar data has shown that it is possible to adjust a curve that relates the precipitation rate to the brightness temperature of the 150 GHz channel with a good level of accuracy for low precipitation rates.