

Abstract ID:**Session ID:** A004. Advances in Optical Remote Sensing of the Atmosphere and Surface**Viability of using thermal infrared imagery to obtain cloud properties in the Amazon Basin (ATTO tower site).**Theotonio Pauliquevis^(1,2), Marcia A. Yamasoe⁽²⁾, Henrique M. J. Barbosa⁽³⁾, Alexandre Correia⁽³⁾,
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This study investigates how reliable is the deployment of our thermal infrared camera system (ASIVA) for studying cloud detection under a broad range of columnar precipitable water vapor (PWV) conditions, from subtropical winter (PWV=13 mm) to equatorial wet season (65 mm). ASIVA consists of an automatic, continuously operating, digital imaging and software system designed to capture hemispheric sky images and provide time series of infrared radiance (and derived products) during day and nighttime hours. The instrument provides radiometrically-calibrated sky imagery in two bands: 8-9 μ m and 10-12 μ m. Measurements were carried out in Sao Paulo, Brazil (July 2017, Winter, 13mm<PWV<17mm; and February 2018, Summer, 16mm<PWV<33mm). Simulated radiances were calculated using the libRadTran code with radiosonde data as input. The band integrated sky radiance for different zenith angles was compared to clear (cloud-free) sky measurements.

During the winter, simulated clear sky radiance at zenith slightly underestimate observations (1.8 vs 2.2 W/(m² sr μ m)). In contrast, cloud bases detected at 1800 m agl with a ceilometer showed radiances ~4.2 W/(m² sr μ m), which made cloud detection straightforward. Cloud radiance was smaller than Black Body emission for such temperatures (~ 6 W/m² sr μ m), a difference that we attribute to the low cloud optical thickness. Summer conditions presented different radiance levels but comparable contrast between clear sky and clouds. Simulated and observed sky radiance at zenith were ~3.5 W/(m² sr μ m) while cloud radiance was always above 6.5 W/(m² sr μ m). For Amazon Basin wet season conditions (surface temperature 28°C, PWV=60mm, cloud base height/temperature = 1200 m/19°C), simulations show zenith sky radiance of 5.7 W/(m² sr μ m) and cloud base radiance of 8.2 W/(m² sr μ m), the difference indicating the detection of low clouds is feasible. For mid-level clouds (base height/temperature ~3500 m/9°C), the cloud base radiance reduces to 7.0 W/(m² sr μ m), indicating only thick clouds can be detected. In conclusion, even for high PWV levels in the Amazon low clouds are perfectly detectable, while mid-level clouds can be detected only in certain circumstances in such extremely humid equatorial conditions.