Amazonian Boundary Layer: revisiting its characteristcs using measurements and modeling outputs

Gilberto Fisch
Instituto de Aeronaútica e Espaço (IAE)
Departamento de Ciência e Tecnologia Aeroespacial (DCTA)
São José dos Campos, SP
fisch.gilberto@gmail.com

The Amazon region is well known as a source of convection and it has a strong influence on the world climate. Although this region is mainly covered by pristine tropical forest, there is a high rate of deforestation for cattle activities and crop production. For a microscale perspective, the presence of a clearing of different size/dimensions can alter the energy budget at the surface producing a low level convergence and an increase of upward movement, thus originating clouds and rainfall. The boundary layer (BL) processes is the link between the surface and the base of the clouds and its characteristics and growth are very important to understand. Nevertheless, the actual knowledge about the boundary layer is mostly associated with the use of rawinsoundings and/or tethered balloon. The CHUVA Project, Go Amazon 2014/15 field campaigns and ACRIDICON experiment provide new and original data set as remote sensing (ceilometer, minisodar, windprofiler, microwave radiometer) and aircraft measurements (G1 aircraft) as well routine rawinsounding data (6 launchings per day). The observational data are being analyzed and new information about the erosion of the nocturnal boundary layer and its impact of the growth of the BL, the entrainment fluxes data at the top of the BL and the ratio between entrainment and surface turbulent fluxes were computed for both IOPs (wet and dry 2014). Also, the spatial variability of the solar radiation amongst the sites (T3, Manaus and Embrapa) and the temporal variability (years 2014 and 2015) for T3 were determined. Finally, a high resolution model (PALM Large Eddy Simulation model developed by Prof. S. Raasch from Hannover University) were run for the T3 site during wet and dry typical days (during IOPs) in order to evaluate the growth of the daytime BL and the occurrence of the convective cells generated by the free convection associated with the heterogeneity.