Geophysical Research Abstracts
Vol. 17, EGU2015-1869, 2015
EGU General Assembly 2015

Aerosol effects in different types of precipitating clouds in the Amazon

Ramon Braga (1), Rachel Albrecht (2), and Daniel Vila (1)
(1) Instituto Nacional de Pesquisas Espaciais - INPE, (2) Universidade de São Paulo – USP

The goal of this research is focused on the influence of aerosol in the formation of different precipitant clouds (warm - wrc, stratiform - str and convective - cnv cloud). The analysis was carried out in the Amazon basin region, also known as 'green ocean' region, due to its low cloud condensation nuclei count over the forested regions, resembling the oceanic regions. The September to December period from 2000 to 2013 were selected for this research. The September to November period was chosen because it belongs to the dry-to-wet transition season (when from forest fires are still active at this region); while December is on wet season, when the 'green ocean' environment is observed. Daily data of atmospheric optical depth (AOD) and Normalized Difference Vegetation Index (NDVI) from Moderate-Resolution Imaging Spectroradiometer (MODIS) sensor, on board AQUA and TERRA satellites, was used to discriminate enviroment as polluted or clean and forested or deforested areas. Cloud type, reflectivity profile, liquid water path (LWP), ice water path (IWP) and rain rate (RR) data were retrieved from Tropical Rainfall Measuring Mission-Precipitation Radar (TRMM-PR) satellite. For wrc type the results suggest that the highest values of rain rate observed for higher AOD values is related to the enhancement of colision and coalescence processes. The explanation for this pattern could be related to cloud drops reaching precipitating drop size and growing in function of a high concentration of small droplets. The results suggests that the increase in Bowen ratio at deforested areas (lower NDVI values) showed lead to the enhancement of updrafts at clouds and more water vapor available for cloud drops generation. It is observed for deforested areas different distribution patterns of LWP and IWP. Lower values are observed for cnv clouds in comparison to forested areas, while the opposite is observed for str clouds. These results suggests that at polluted environments over deforested areas cnv clouds tends to generated smaller drops at cloud warm phase of development than over forested areas. At forested areas the drops grows more and fastly due to lower water vapor competition. At cold phase riming/accretion processes decreases at deforested areas due to the lower availability of large drops and LWP, generating a higher population of small ice particles with lower density than at over forested cases. On the other hand, str clouds at deforested areas has aggregation processes intesified due to the transport of more ice particles from convective phase, generating higher IWP, LWP and RR than at forested areas.