

Study of optical properties and spatial distribution of cirrus clouds over São Paulo, Brazil, using CALIPSO level 2 data

Giovanni Souza (1), Fábio J. S. Lopes (1), and Eduardo Landulfo (1)

(1) Centro de Laser e Aplicações (CELAP), Instituto de Pesquisas Energéticas e Nucleares (IPEN), Av. Prof. Lineu Prestes, 2242, Cidade Universitária, 05508-000, São Paulo – SP, Brazil

Contact: giovanni.souza@usp.br

Abstract: Cirrus clouds have an important role in the earth's radiation budget, they have a wide spatial extension and are the most present type of clouds in the atmosphere, especially in tropical regions (Sassen et al., 2018). Due their thickness, Cirrus clouds are almost transparent for the incoming shortwave solar radiation and opaque to the longwave emitted by the planet's surface. Despite the importance of Cirrus clouds in the earth's climate, there is a lack of studies focused on this type of cloud in the southern hemisphere. Since 2006, the Cloud-Aerosol Lidar and Infrared Pathfinder Satellite Observation (CALIPSO), a joint mission between NASA and the French space agency, CNES, provides physical and optical information of clouds and aerosols to improve the understanding of their role in the climate, air quality and radiation budget in the Earth. The primary instrument of CALIPSO payload is the Cloud-Aerosol Lidar with Orthogonal Polarization (CALIOP), which is a lidar system operating on 1064 nm and 532 nm (with parallel and perpendicular polarization) wavelengths. CALIOP provides as level 1 data, high-resolution vertical profiles of aerosols and clouds. In turn, the level 2 data provides processed products such as cloud-aerosol discrimination, cloud base and top layer altitude, and cloud optical depth. The aim of this work is use the CALIOP global coverage to study the physical and optical properties of Cirrus clouds over the São Paulo State (roughly centered on 21.3°S, 50.3°W), in Brazil. We have employed a statistic analysis of 9 years (2007-2015) of data using the level 2 products to obtain spatial distribution and optical properties of cirrus clouds over São Paulo state, in order to understanding the long-term trend of Cirrus clouds coverage in the São Paulo state and later on Brazil.

Keywords: lidar; Cirrus clouds; CALIPSO.

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