World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:11, No:06, 2017

Tropical Squall Lines in Brazil: A Methodology for Identification and Analysis Based on ISCCP Tracking Database

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Abstract : The ISCCP-Tracking database offers an opportunity to study physical and morphological characteristics of Convective Systems based on geostationary meteorological satellites. This database contains 26 years of tracking of Convective Systems for the entire globe. Then, Tropical Squall Lines which occur in Brazil are certainly within the database. In this study, we propose a methodology for identification of these systems based on the ISCCP-Tracking database. A physical and morphological characterization of these systems is also shown. The proposed methodology is firstly based on the year of 2007. The Squall Lines were subjectively identified by visually analyzing infrared images from GOES-12. Based on this identification, the same systems were identified within the ISCCP-Tracking database. It is known, and it was also observed that the Squall Lines which occur on the north coast of Brazil develop parallel to the coast, influenced by the sea breeze. In addition, it was also observed that the eccentricity of the identified systems was greater than 0.7. Then, a methodology based on the inclination (based on the coast) and eccentricity (greater than 0.7) of the Convective Systems was applied in order to identify and characterize Tropical Squall Lines in Brazil. These thresholds were applied back in the ISCCP-Tracking database for the year of 2007. It was observed that other systems, which were not Squall Lines, were also identified. Then, we decided to call all systems identified by the inclination and eccentricity thresholds as Linear Convective Systems, instead of Squall Lines. After this step, the Linear Convective Systems were identified and characterized for the entire database, from 1983 to 2008. The physical and morphological characteristics of these systems were compared to those systems which did not have the required inclination and eccentricity to be called Linear Convective Systems. The results showed that the convection associated with the Linear Convective Systems seems to be more intense and organized than in the other systems. This affirmation is based on all ISCCP-Tracking variables analyzed. This type of methodology, which explores 26 years of satellite data by an objective analysis, was not previously explored in the literature. The physical and morphological characterization of the Linear Convective Systems based on 26 years of data is of a great importance and should be used in many branches of atmospheric sciences.

Keywords : squall lines, convective systems, linear convective systems, ISCCP-Tracking
Conference Title : ICCP 2017 : International Conference on Clouds and Precipitation
Conference Location : San Francisco, United States
Conference Dates : June 07-08, 2017