

#5 Received 11/08/2014

Brahmanandam, Potula Sree; Uma, Gouthu; Chu, Y H
Institute of Space Science, National Central University, Chung-Li, Tao Yuan Taiwan

Long-term trends of different stability indices of Earth's atmosphere measured using the COSMIC radio occultation technique

Abstract:

GPS radio occultation (GPS RO) technique, performed on the COSMIC micro-satellites, is capable of providing plausible answers to several unraveled issues of both lower and upper atmosphere regions of the Earth, primarily due to its ability to provide very accurate, all-weather, round-the clock and global coverage of the atmosphere and ionosphere constituents with unprecedented resolutions.

By exploiting the extreme prowess of COSMIC RO satellites, we present, in this study the long-term trends of the Earth's atmosphere stability indices, including CAPE, LI and LFC for more than six continuous years (2007-2012). It is found that the wavelike nature consistently in CAPE seasonal and diurnal trends between June solstice- September equinox and December solstice- March equinox seasons by confining to northern and southern hemispheres and solar activity dependencies, are observed. The wavelike nature in CAPE trends seems to follow the inter tropical convergence zone (ITCZ) movement, which is again confirmed by analyzing outgoing long-wave radiation (OLR) database, thereby indicating that these CAPE trends may be useful to ascertain the ITCZ movements during different years.

As the diurnal trends of CAPE are concerned, maximum (minimum) values are noticed during daytime (nighttime) hours consistent with earlier studies. CAPE magnitudes are showing solar activity dependencies by showing maximum (minimum) values during 2007 (2013), implying that CAPE magnitudes are showing a decreasing trend with the progress of time.

Further, monthly CAPE variations near Delhi and near Kolkata, which are located in northern and eastern parts of India, are showing higher values during July- September and June-August respectively during the majority of the years. These trends also have great coincidence with onset times of monsoon periods in northern and eastern parts of India.