



Use of satellite remote sensing for assessment of climate change over the Indian region.

Radhika Ramachandran

Space physics Laboratory, Vikram Sarabhai Space Centre, e-mail:601sree@gmail.com

Long term remote sensing data from space borne instruments have played a major role in assessing the Earth's climate system and its changes. A large number of active and passive sensors launched by intentional space agencies have proved their mettle in capturing the spatio-temporal states of atmosphere, land and ocean and associated processes. Compared to in situ measurements, advantage of satellite based remote sensing data is its capacity to provide global coverage and uniform data quality. Major limitations however, in satellite observations, include coarse vertical resolution in retrieving atmospheric parameters and restriction to near surface layers for land and oceanic parameters.

At the Space Physics Laboratory, the distribution of carbon dioxide (CO_2) concentration over the Indian region and the surrounding oceanic regions during 2009–2012, was demonstrated using measurements from satellites viz., Greenhouse Gases Observing Satellite (GOSAT) and Atmospheric Infrared Sounder, Carbon Tracker (CT) model simulations and flask measurements from two Indian stations Sinhagad (SNG) ($73^\circ 45' \text{ E}$, $18^\circ 21' 36'' \text{ N}$) and Cape Rama (CRI) ($73^\circ 54' \text{ E}$, $15^\circ 6' \text{ N}$). The concentration of CO_2 is observed to be maximum during pre-monsoon and shows a decreasing phase during the post-monsoon season. In a regional scale, it is found that Indo-Gangetic Plain and northern India have relatively higher concentrations compared to the other regions. The probability distribution of the concentration differences shows that for most of the time, the differences lie between ± 3 ppmv between GOSAT and CT. The comparison between the CO_2 flask measurements over SNG and CRI with respect to that of GOSAT and CT clearly reveals that the differences in CO_2 are as high as 10 ppmv between the ground- and satellite-based measurements. Using the Lagrangian model FLEXible PARTicle (FLEXPART) it was possible to understand the source–receptor relationship over CRI, SNG, and over the equatorial Indian Ocean (IO). The source contributions from the northern and eastern continental regions of the Indian region are found to be more influential over SNG compared to CRI. It is also found from simulations that the equatorial IO has less influence from the continental source and therefore has a reduced seasonal variability compared to the other regions considered in the present study.

The present talk proposes to also cover important climate processes observed by satellite remote sensing with special emphasis over the Indian region. Important discoveries related to climate and its change during the recent times using space borne instruments and the future systems required for better use of satellite remote sensing will also be discussed.