Troposphere-Stratosphere interaction using Vaisala Radio Sonde Data

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The monsoon is manifested as an atmospheric circulation system of land-atmosphere-ocean interaction between continents and oceans in the seasonal cycle. In biennial scales, both the stratosphere and troposphere over the Indian region are closely related and winter season QBO is a good predictor of Indian summer monsoon rainfall (Mohankumar and Pillai, 2008). Upper air data is of crucial importance to address the troposphere-stratosphere interactions and to study its manifestations on the boundary layer. Recently an upper air laboratory has been set up at NIO and the state of the art Vaisala Radio Sonde RS92 SGP system was installed and made operational in 2008. Data has been taken once in three days during monsoon months and weekly during non monsoon months. An autonomous weather station is also operational to monitor the surface parameters at every 10 minutes interval. Goa is geographically placed such a way that the upper air measurement can capture both tropical easterly jet and sub tropical jet stream as the core of these jets fall on either side of this point of observation. The fluctuations in tropopause are linked with the surface convection and in turn surface pressure (Fig.1). It is interesting to note the in-phase and out of phase relationships between these two pressure levels during monsoon and non monsoon months respectively. The time variation of the lifting condensation level (LCL) indicate shifting from 900 mb to 970 mb during monsoon season and its fluctuations closely follows the active and break spell in rainfall. The data had successfully captured the cyclone 'Phayan' during post monsoon transition period. Another interesting observation from the time series is the tracking of upper and lower branches of Hadley Cell as the ITCZ migrates to south during winter months. The Quasi-biennial oscillation (QBO) observed at the lower stratosphere is in phase with the TEJ in the upper troposphere in 2009 that exerts minimum shear to the tropopause and its possible influence on the surface convection and the associated monsoon circulation is being studied.

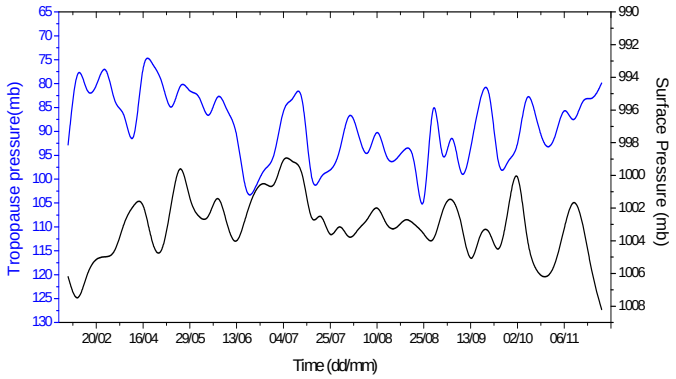

Figure 1: Variation of tropopause pressure and surface pressure.

References:

[1]. K. Mohankumar and P.A Pillai, *Journal of Atmospheric and Solar-Terrestrial Physics*, **77**, 764–773. DOI:10.1016/j.jastp.2007.12.001. (2008).