Interactive processes of lower and upper atmosphere in search of precursor of earthquake.

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The relative role played by earthquake induced processes in modifying ionosphere and the lower atmosphere are examined through analysis of Total Electron Content (TEC), scintillation data from GPS, VHF Radio Beacon (RB) signals and aerosol and cloud features from LIDAR. The data for this analysis are mostly collected at Guwahati (26^0N and 92^0E), a low latitude seismically active location in sub Himalayan region , however fof2 data from a number of other low latitude stations from topside and ground based ionosonde provide inputs for examining "spatial " and " temporal " modification features at the ionosphere and then to identify the best mode of analysis for identification of earthquake precursor. Ion and electron density variations prior and during earthquake received from DEMETER act supporting information in our analysis.

The of TEC and foF2 data shows that enhancement and depletion of ionisation density at low latitudes depend on the position of epicentre and type of earthquake and are effected by seismically induced E field that modifies the ExB drift. Conspicuous changes in density are noticed just prior to and after the noon hours. These are discussed in the paper including recent earthquake of 15^{th} February 2006 (epicentre near 27.8° N and 88.5° E). The paper also shows that ionospheric modification before the earthquake could be more clearly identified by topside data in comparison with bottom side ones and spatial mode of observation gives better predictability than temporal mode as earthquake-borne effect in temporal foF2 variations looks like usual Q disturbances in many cases . This limitation however could be screened from supporting parameters if available. We try to do this by using Lidar and sodar observations and paper will present Lidar echograms for a number of earthquake cases (of magnitudes $>$6) and for epicentre lying within 4° N to 28° N and longitude +- 20° from the observing station . A few salient features of such echograms are : (I) development of thin elongated cloud or fuzzy cloud like structures (earthquake cloud) 3-4 days prior to an earthquake event (ii) Disappearance of rain clouds a few days prior to an earthquake. (iii) Such disappearance is significant at the observing lidar site.

Finally the paper examines through theoretical approaches and supplemented by observations (in cases) as how waves and turbulences within a limited horizontal distance from the impending earthquake could create situation for possible coupling of distur-

bances from lower to upper atmosphere prior to an earthquake.