## Investigation of Long Period Oscillations in the Equatorial Middle Atmosphere

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The middle atmospheric dynamics is modulated strongly by long period waves and oscillations apart from short period gravity waves, tides and planetary scale waves. Owing to the importance of these phenomena in the middle atmosphere, several studies have been carried out globally using in situ measurements and models to identify and investigate the waves and oscillations as well as their forcing mechanisms. In the present work we attempt to investigate the long period oscillations in winds, temperature and ozone simultaneously over a low latitude station, Trivandrum (8.5° N, 77° E) using a combination of ground and satellite based observations. The long term measurements of various atmospheric parameters like winds from radiosonde/rocket flights, atmospheric radars (under ISRO's MIDAS campaign) along with temperature and ozone from SABER on TIMED satellite has for the first time enabled the simultaneous investigation of the chemistry, dynamics and thermal structure of the middle atmosphere over this location. The study revealed several interesting features of stratospheric and mesospheric long period oscillations bringing out the salient features of QBO and SAO in particular. It was observed that stratospheric and mesospheric QBO and SAO in temperature and winds are exactly in opposite phases. The peaking altitudes of stratospheric and mesospheric SAO in case of the three parameters are also different. The comprehensive analysis of the long period oscillations in winds, temperature and ozone simultaneously is one of the first of its kind over this location involving the three parameters contributing to middle atmospheric dynamics.

Keywords: QBO; SAO; middle atmosphere; SABER.