R005-08
Zoom meeting C ：11/1 AM2 (10:45-12:30)
11:15-11:30

The effect of heat sources response due to El Nino-Southern Oscillation on MLT solar thermal tides in GAIA model

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Solar thermal tides are global-scale waves with periods of 24 hours harmonics. They are excited by three heating sources: insolation absorption of water vapor in the troposphere and ozone in the stratospheric, and latent heat release. Tidal Wavenumbers and periods are determined by the global distribution of these heating sources, which are governed by lower atmosphere processes. El Nino-Southern Oscillation (ENSO) is a well known planetary scale phenomenon and drastically changes the global distribution of water vapor insolation absorption and latent heat in tropical regions. Liberman et al. (2007) observed an enhanced amplitude of diurnal tide at 90 km altitude during the 1997/8 El Nino and attributed it to high anomalies of water vaper insolation absorption and latent heat in the tropical central and eastern Pacific during ENSO. Warner and Oberheide (2014) presented water vapor insolation absorption and latent heat during the 2010/11 La Nina and compared them to tidal wind response at 100 km altitude. They found that diurnal nonmigrating tides with wavenumbers 2 and 3 (DE3 and DE2) were the most affected. While the two pioneering works cover only one EL Nino and one La Nino events, Liu et al. (2017) covered nine ENSO events and showed that seasonal and latitudinal variation of a diurnal tidal statistical response to ENSO by using 21 years (1996-2016) data-driven from the Ground-to-topside Atmosphere-Ionosphere model for Aeronomy (GAIA). However, there is still a lack of understanding of how changes in the heat sources contribute to tidal response to ENSO.
The purpose of this study is to reveal the contribution of changes in heating sources to tidal response to ENSO by using GAIA model. From the GAIA data, diurnal components of water vaper insolation absorption and latent heat were estimated base on Yanai (1978) and their responses to ENSO are extracted for the period of 1996-2016. This is compared to tidal variations presented in Liu et al., (2017), and their correlations are examined.