



Relation between stratospheric sudden warming and the lunar effect on the equatorial electrojet based on Huancayo recordings

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It has been known for many decades that the lunar tidal influence in the equatorial electrojet (EEJ) is noticeably enhanced during northern hemisphere winters. Recent literature has discussed the role of stratospheric sudden warming (SSW) events behind the enhancement of lunar tides and their findings suggest a positive correlation between the lunar tidal amplitude and lower stratospheric parameters (zonal mean air temperature and zonal mean zonal wind) during SSW events. The positive correlation raises the question whether an inverse approach could also be developed which makes it possible to deduce the occurrence of SSW events before their direct observations (before 1952) from the amplitude of the lunar tides. This study presents an analysis technique based on the phase of the semi-monthly lunar tide to determine the lunar tidal modulation of the equatorial electrojet (EEJ). A statistical approach using the superposed epoch analysis is also carried out to formulate a relation between the EEJ tidal amplitude and lower stratospheric parameters. Using these results, we have estimated a threshold value for the tidal wave power that could be used to identify years with SSW events from magnetic field observations.