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Statistical analysis of ionospheric boundary wave phenomena on Venus

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In contrast to Earth, Venus does not possess an intrinsic magnetic field. Hence the interaction between solar wind and Venus is significantly different when compared to Earth, even though these two planets were once considered similar. Within the induced magnetosphere and ionosphere of Venus, previous studies have shown the existence of vortex like structures. These structures may play an important role in the atmospheric evolution of Venus. Using Venus Express data, all of the photoelectron boundaries (PEBs) are determined from 2006 to 2014 and used as an identifier for the ionopause. Pulses of dropouts in the electron energy spectrometer were observed in 371 events, which suggests potential perturbations of the boundary. Minimum variance analysis of the 1Hz magnetic field data for the perturbations is conducted and used to confirm the occurrence of the boundary waves. Statistical analysis shows that they were propagating mainly in the +-Y direction in the polar north terminator region. The generation mechanisms of boundary waves and their evolution into the potential nonlinear regime are discussed and analysed.