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OBSERVATIONS OF ULF WAVE RELATED EQUATORIAL ELECTRODYNAMICS FLUCTUATIONS

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Abstract. Global magnetospheric ULF pulsations with frequencies in the Pc 5 range (f = *1.7 7 mHz*) and below have been observed for decades in space and on the Earth. It is well known that the ULF pulsation contributes to the magnetospheric particle transport and diffusion and may play an important role in magnetospheric dynamics. However, one aspect of the understanding of ULF waves that still remain rudimentary is their penetration into the ionosphere and thus to equatorial latitudes. Very few studies have been performed on ionospheric observations of ULF wave-related perturbations. In this paper we report on Pc5 wave related electric field oscillations in the equatorial electrojet as observed by ground- and space-based magnetometers. We use ground-based magnetometer data from AMBER, SAMBA, and INTERMAGNET magnetometer networks, primarily in the African and American sectors. From space, we use magnetometers on GOES 12 and C/NOFS. Solar wind dynamic pressure is suggested as a probable source of the ULF wave activity. Using data from the WIND spacecraft, we present direct evidence that solar wind number density and ram pressure fluctuations observed far upstream from the terrestrial magnetosphere contain signatures of ULF waves at discrete frequencies. We show that these same oscillations are observed in the magnetosphere by the geosynchronous GOES

spacecraft, C/NOFS satellite, and ground-based magnetometers. Interestingly, the Pc5 ULF wave related electric field fluctuations have also been observed by ground-based magnetometers and by the VEFI instrument onboard C/NOFS satellite. The Pc5 ULF wave penetration from high latitude through the equatorial ionosphere is also presented, and the latitude Pc5 wave amplitude comparison shows a maximum at auroral latitudes. The simultaneous appearance of intense daytime Pc5 pulsations at the auroral and equatorial latitudes could be due to the instantaneous penetration of the dawn-to-dusk electric field, accompanied by an enhancement of the field aligned currents, from the polar latitudes to the equatorial ones.