The spatial and temporal behavior of Pc 5 ULF at ULTIMA stations during magnetic storms

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ULF waves in frequency band between 1.67 and 6.67 mHz, especially Pc 5 magnetic pulsations, are believed to contribute to Relativistic Electron Enhancement (REE) in the outer radiation belt during magnetic storms. In theoretical studies, the possible mechanisms are discussed for accelerating electrons of the radiation belt by ULF (e.g., the poloidal or toroidal Pc 5). For example, Elkington et al. (1999, 2003) suggested that toroidal Pc 5 can transport electrons with 10-100keV energies at the magnetopause to MeV energies in the inner magnetosphere by radial diffusion. Moreover, Summers and Ma (2000) presented that the poloidal Pc 5 can accelerate source electrons with 100-300keV energies in the inner magnetosphere. On the other hand, from ground-observed observations many researchers indicated that high solar wind velocity and high long-duration Pc 5 power in the storm recovery phase are closely associated with the production of relativistic electrons (Baker et al., 1998; Rostoker et al., 1998; Mathie and Mann, 2000; O'Brien et al., 2001, 2003). However, no one has proven with observational hard evidence for accelerating electrons by the poloidal or toroidal Pc 5. In order to clarify which kinds of Pc 5 modes are associated with REE, it's necessary to identify the distribution of Pc5 power intensity with narrowband (monochromatic spectrum) or broadband frequency with respect to local time and magnetic latitude during magnetic storms.

Using magnetometer data obtained globally from ULTIMA (Ultra Large Terrestrial International Magnetic Array, http://www.serc.kyushu-u.ac.jp/ultima/ultima.html) stations, we investigate the distributions of occurrence, amplitude and narrowband (or broadband) Pc 5 pulsations during magnetic storms. Particularly, we compare these characteristics of Pc 5 pulsations observed at different magnetometer chains (330MM chain; McMAC and CARISAM, 210MM and Africa chain; MAGDAS/CPMN), in each magnetic storm phase (initial, main and recovery phase).

Acknowledgment: MAGDAS data used in this paper were obtained in mutual collaborations with the following representatives of various organizations; Dr. David Aranug (Weather Service Office YAP, YAP).