

中緯度 SuperDARN レーダー・THEMIS 衛星を用いた Pi2 地磁気脈動周期の緯度特性 Latitude dependence of Pi2 Pulsation frequency observed by the mid-latitude Super-DARN radars and the THEMIS satellites

寺本 万里子^{1*}, 西谷 望¹, 堀 智昭¹, DEVLIN John², ANGELOPOULOS Vassilis³
TERAMOTO, Mariko^{1*}, NISHITANI, Nozomu¹, HORI, Tomoaki¹, John DEVLIN², Vassilis Angelopoulos³

¹ 名古屋大学太陽地球環境研究所, ² ラトロブ大学電子工学科, ³ カリフォルニア大学ロサンゼルス校

¹Solar-Terrestrial Environment Laboratory, Nagoya University, ²Department of Electronic Engineering, La Trobe University,

³University of California, Los Angeles

At mid-latitudes, Pi2 pulsations appear clearly on the nightside at substorm onsets. Several studies suggested that a transient Alfvén waves might contribute to the excitation of Pi2 pulsations at high latitudes on the nightside. On the other hand, fast mode waves trapped between the ionosphere and plasmasphere are responsible for Pi2 pulsations at mid and low latitudes on the nightside. Using the Sweden And Britain auroral Radar Experiment (SABRE) coherent radar at auroral and sub-auroral latitudes, Yeoman et al. [1991] found that the radar could distinguish between these two types of Pi2 pulsations and suggested that the mid latitude is transition region of these two types of Pi2 pulsations. Few studies have been examined the characteristics of Pi2 pulsations over wide geomagnetic latitude, using radars located at mid latitude.

We report on one event of Pi2 pulsation at 09:10 UT on 11 August 2010 detected simultaneously by the Hokkaido, Tiger, and Unwin SuperDARN radars and THEMIS-A, -D, -E satellites when they were located in the pre-midnight sector. THEMIS satellites observed Pi2 pulsations predominantly in the compressional and radial components of the magnetic field and the azimuthal component of the electric field when satellites were located at $L < 4$ inside the plasmasphere. These pulsations had a predominant frequency at 14 mHz and high coherence (~ 1) with the H-component Pi2 pulsations at Kakioka (KAK: magnetic latitude 27.47; magnetic longitude 209.2 degrees). The four radars detected Pi2 pulsations as fluctuation in the Doppler velocities while operating with themiscan mode, which provides 8-s sampling data. Pi2 pulsations in Doppler velocities of echoes backscattered at lower latitude had predominant frequency at 14 mHz while Pi2 pulsations observed at higher latitude by the radars had predominant frequency of both 14 mHz and 21 mHz. These results may indicate that the radars detected harmonic structures of Pi2 pulsations in the plasmasphere.