Azimuthally propagating ionospheric flow fluctuations during storm times as seen from satellite-radar conjunctions

*堀 智昭[1]、西谷 望[1]、Shepherd S. G.[2]、Ruohoniemi J. M.[3]、Connors Martin G.[4]、寺本 万里子[1]、中野 慎也[5]、桂華 邦裕[6]、関 華奈子[6]、高橋 直子[6]、笠原 慧[6]、横田 勝一郎[7]、三谷 烈史[8]、高島 健[8]、東尾 奈々[9]、松岡 彩子[8]、浅村 和史[8]、風間 洋一[10]、Wang Shiang-Yu[10]、Tam Sunny W. Y.[11]、三好 由純[1]、篠原 育[8]
*Tomoaki Hori[1], Nozomu Nishitani[1], Simon G. Shepherd[2], J. M. Ruohoniemi[3], Martin G Connors[4], Mariko Teramoto[1], Shin'ya Nakano[5], Kunihiro Keika[6], Kanako Seki[6], Naoko Takahashi[6], Satoshi Kasahara[6], Shoichiro Yokota[7], Takefumi Mitani[8], Takeshi Takashima[8], Nana Higashio[9], Ayako Matsuoka[8], Kazushi Asamura[8], Yoichi Kazama[10], Shiang-Yu Wang[10], Sunny W. Y. Tam[11], Yoshizumi Miyoshi[1], Iku Shinohara[8]

1. 名古屋大学宇宙地球環境研究所、2. Dartmouth College、3. Virginia Tech、4. Athabasca University、5. 統計数理研究所、6. 東京大学大学院理学系研究科、7. 大阪大学・理学研究科、8. 宇宙航空研究開発機構、宇宙科学研究所、9. 宇宙航空研究開発機構、筑波宇宙センター、10. 台湾中央研究院、11. 台湾成功大学、宇宙プラズマ研究所
1. Institute for Space-Earth Environmental Research, Nagoya University, 2. Dartmouth College, 3. Virginia Tech, 4. Athabasca University, 5. Institute of Statistical Mathematics, 6. University of Tokyo, 7. Graduate school of Science, Osaka University, 8. ISAS, JAXA, 9. TKSC, JAXA, 10. Institute of Astronomy and Astrophysics, Academia Sinica, Taiwan, 11. Institute of Space and Plasma Sciences, National Cheng Kung University, Taiwan

The recent Super Dual Auroral Radar Network (SuperDARN) observations show that ionospheric flow fluctuations of the mHz or lower frequency range appear even in the subauroral to mid-latitude region during magnetic storm times. An intriguing feature of the flow fluctuations is that they appear to propagate azimuthally either westward or eastward, and occasionally bifurcate toward the both directions. Taking a closer look with high spatial resolution measurements provided by the radars reveals that those flow fluctuations consist of meso-scale patchy structures of ionospheric convection with a significant latitudinal flow component and a longitudinal scale of ~1h MLT. The azimuthal propagation properties strongly suggest that westward-drifting ions and eastward-drifting electrons of tens of keV in the inner magnetosphere can be the moving sources responsible for excitation of the flow fluctuations seen at the ionospheric height. Recent observations in the inner magnetosphere by the Arase satellite and the Van Allen Probes have provided excellent evidence for it as well as a good opportunity to examine their magnetospheric counterpart in further detail. The close conjugate observations of the radars and the satellites reveal that multiple drifting clouds of ions and electrons can be mapped to the electric field fluctuations propagating westward and eastward, respectively, in the ionosphere. The most likely interpretation for it would be that meso-scale pressure gradients carried by drifting ring current ions and electrons distort field lines one after another as they drift through the inner magnetosphere.

