Geophysical Research Abstracts
Vol. 12, EGU2010-8519, 2010
EGU General Assembly 2010

On the statistical relation between ion upflow and naturally enhanced ion-acoustic lines observed with the EISCAT Svalbard radar

Yasunobu Ogawa (1), Stephan C. Buchert (2), Ingemar Häggström (3), Ryoichi Fujii (4), Satonori Nozawa (4), and Hiroshi Miyaoka (1)

(1) National Institute of Polar Research, Japan (yogawa@nipr.ac.jp), (2) Swedish Institute of Space Physics, Uppsala, Sweden, (3) EISCAT Scientific Association, Kiruna, Sweden, (4) Solar-Terrestrial Environment Laboratory, Nagoya University, Nagoya, Japan

We have investigated characteristics of ion upflow and naturally enhanced ion-acoustic lines (NEIALs) based on the European Incoherent Scatter (EISCAT) Svalbard radar (ESR) data continuously obtained during the first year of the International Polar Year (IPY) interval between March 2007 and February 2008. For the ion upflow study we have used approximately 78,000 field-aligned profiles (5-min integration data) obtained with the ESR. For the NEIAL study we have identified approximately 1400 NEIALs in the ESR data at altitudes between 100 and 500 km in the 1-year interval. The occurrence frequency of ion upflow events shows two peaks, at about 8 and 13 magnetic local time (MLT), while only one strong peak is seen around 9 MLT for NEIALs. The upward ion flux has also only one peak around 11-13 MLT. The occurrence frequency of ion upflow varies strongly over season, and it is higher in winter than in summer, whereas NEIALs are more frequent and upward flux is higher in summer than in winter. The NEIALs frequently occur under high geomagnetic activity and also high solar activity conditions. Approximately 9% of the NEIALs in the F-region/topside ionosphere were accompanied with NEIALs in the E-region (occurred at altitudes below 200 km). Upshifted NEIALs dominate in the E-region whereas downshifted NEIALs are usually stronger above an altitude of 300 km. The high occurrence frequency of NEIALs at the prenoon region (8-10 MLT) might be associated with the acceleration of thermal ions to suprathermal ones, as suprathermal ions and broad band extremely low frequency (BBELF) wave activity have previously been observed at the same MLT and geomagnetic latitude as now the NEIALs.