A statistical study of ion upflows observed with the EISCAT Svalbard radar

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In order to understand the generation mechanisms of ion upflows at high latitudes, we have determined statistically several characteristics of the ion upflows by using Common Program data observed during 1998 and 1999 with the EISCAT Svalbard radar located near Longyearbyen (78.2 N). When geomagnetic activity is relatively low, ions flowing up can be observed only around midnight and they start to flow up already at around 300 km height. On the other hand, when the geomagnetic activity is relatively high, ions flowing up are observed most frequently around noon, accompanied by high electron temperature and/or high ion temperature. They start to flow out above 400 km height, which is higher than the altitude for the ion upflows around midnight under the low geomagnetic activity conditions.

We have determined statistically several characteristics of the ion upflows by using Common Program (CP) data observed during 1998 and 1999 with the EISCAT Svalbard radar (ESR) located near Longyearbyen (78.2 N, 15.8 E). In order to understand the generation mechanisms of ion upflows at high latitudes, the present presentation will focus particularly on the magnetic local time (MLT) distribution of the ion upflow as function of geomagnetic disturbances as well as on the altitudes where the ions start to flow up.

When geomagnetic activity is relatively low (Kp<3), ions flowing up can be observed only around midnight and they start to flow up already at around 300 km height. On the other hand, when the geomagnetic activity is relatively high (Kp>3), ions flowing up are observed most frequently around noon, accompanied by high electron temperature and/or high ion temperature. They start to flow out above 400 km height, which is higher than the altitude for the ion upflows around midnight under the low geomagnetic activity conditions.

We will mention possible physical mechanisms to explain the statistical characteristics described above.