the all-sky imager (ASI) and an induction magnetometer during the growth and expansion of intense substorms on December 31, 2015 is analyzed.

During the enhanced magnetospheric convection due to the southward IMF Bz turning ASI observes an equatorward motion of the diffuse aurora (DA) boundary in the 557.7 and 630.0 nm emissions and H-beta (486.1 nm) band from the northern horizon of observation station. At the same time, the weak SAR arc appears equatorward of DA. In 10 minutes after the expansion onset of intense substorm in the midnight MLT sector ASI registers the SAR arc intensity growth from the western horizon toward the east with an angular velocity of ~ 4 deg/ min. As a result, along the arc a few intensity maxima are formed. At the same time, the narrow arc in the H-beta emission with similar dynamics appears northward of the SAR arc at a distance of ~ 0.6º.

The induction magnetometer detects a sharp increase of Pc1 pulsation amplitude at frequencies of 0.5–0.7 Hz during the arrival of end of the arc in the H-beta emission to the zenith of observation station. The Pc1 pulsations and the dynamic proton arc are registered within ~ 30 minutes. The SAR arc is registered by ASI until about 1400 UT. We connect the observed phenomena in the SAR arc and proton aurora with the eastward propagation of the excitation region of EMIC waves along the plasmapause in the evening MLT sector. The research is partial supported by RFBR grants No 18-45-140037 p_a

AN APPROACH TO REGIONAL THREE-DIMENSIONAL MODELLING OF GROUND ELECTROMAGNETIC FIELD VARIATIONS DURING SPACE WEATHER EVENTS USING RESULTS OF MAGNETOHYDRODYNAMIC MODELLING OF THE EARTH'S MAGNETOSPHERE AND IONOSPHERE

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In order to assess the hazard to ground-based technological systems from space weather we developed an approach to regional three-dimensional (3-D) modelling of ground electromagnetic (EM) field variations during space weather events using results of magnetohydrodynamic (MHD) modelling of the Earth's magnetosphere and ionosphere. The approach involves four main steps. First, we run a global MHD model of the near-Earth space for geomagnetic disturbance of interest. Then, using results of MHD modelling, we compute the spatio-temporal distribution of the external magnetic field for this event on a regular grid at the surface of the Earth. Third, the external field is converted into equivalent current (source of excitation equivalent to 3-D current system), and, finally, for a given source and a given 3-D conductivity model of the Earth the spatio-temporal distribution of the ground EM field is computed in the region of interest. Using this approach and the British Isles as a test region, we perform 3-D modelling of the ground EM field for the Halloween geomagnetic storm in October 2003 and discuss modelling results.