HF waves and energetic plasma particle monitoring as a diagnose tool of the of ionospheric plasma disturbances.

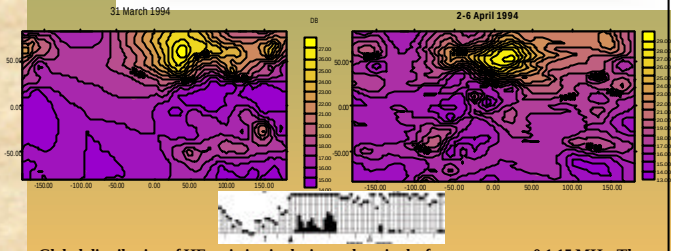
H.Rothkaehl(1), Z. Klos(1), O.Grigoryan (2), K.Kudela (3), M.Panasyuk (2), A.Petrov (2), V.Sheveleva (2).

(1) Space Research Center ,PAS Warsaw, Poland

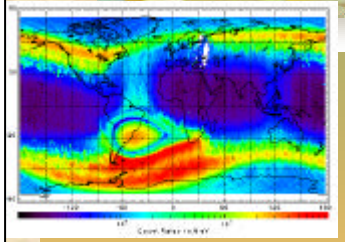
(2) NPI MSU, 119992,Moskow, Russia.

(3) IEP SAS, 04353 Kosice, Slovakia.

CORONAS I HF diagnostic



Global distribution of HF emission in the ionosphere in the frequency range 0.1-15 MHz. The spectral intensity was integrated at night time 30.03.1994 during quiet condition and from 2 to 6.04.1994 during strong geomagnetic disturbances, recorded by SORS-1 instrument on board the Coronas-I satellite. The resolution is 5x5 deg; the units are DB/μV. It is evident that in the main phase of the geomagnetic storm. In the area over which the observed enhancement of HF noises during geomagnetic disturbances seems to be larger than for quiet conditions, the observed intensities of these noises are practically at the same level. In the auroral region at the longitude large than 150 deg the local enactments of radiations seems to be driven mainly by the natural particle precipitations



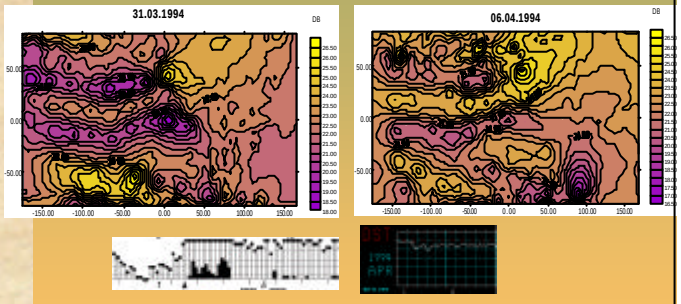
Gamnma rays measurements

The map of average electron fluxes in the energy range 0.5-1.5 MeV detected by MKL, electron sensor with a geometric factor of 0.55 cm²sr and with an acceptance angle of ± 30°, on CORONAS-I satellite during the period from March 1994 through June 1994.

Measurements of relativistic electrons (500 keV to 12 MeV) within the drift loss cone during geomagnetic storms in the spring of 1994, obtained with MKL instrument aboard the low-altitude (~500 km) polar-orbiting satellite CORONAS-I are reviewed. Electrons precipitated into the drift loss cone will drift eastward until they interact with the atmosphere and are lost, usually in the region of the South Atlantic Anomaly. CORONAS-I satellite observed two more pronounced electron enhancements during the period studied (March-June 1994). Time profile of D_{st} index indicate that these events occurred after magnetic storms on March 3, 1994 (day 61, D_{st}=-109 nT) and April 4, 1994 (day 93, D_{st}=-111 nT). Both time and L shell variations of the precipitating electron fluxes over the wide L shell range of 1-9 are presented and discussed. On the average these fluxes had a maximum value at L=3.8-4.6 observed during the storm recovery phases and characterised by rather soft energy spectra ($\sim E^{-5}$).

The geographical regions covering at an altitude 500 km the following positions: (1) two areas bounded by contours labeled as 100, where the minimal altitude of mirror points Hmin is above 100 km and where particles are mostly stable trapped and (2) the shaded area where the corresponding conjugate points are below 100 km and locally mirroring particles are in the bounce loss cone. In the other positions the electrons may be temporarily trapped during their longitudinal drift around the world, which depends on the pitch angle of observation

CORONAS I HF diagnostic



Global distribution of HF emission in the ionosphere in the frequency range 0.1-2 MHz during day time sector. The spectral intensity was integrated at around 500 km atlitude 31.03.1994 during quiet condition and on 6.04.1994 during strong geomagnetic disturbances, recorded by SORS-1 instrument on board the Coronas_I satellite. The well manifested enhancements of HF frequency(whistler frequency range) follow the geomagnetic equator and some enhancements is also remarkable in the region where energetic proton fluxes are detected

Map of near-equatorial protons obtained by CORONAS-

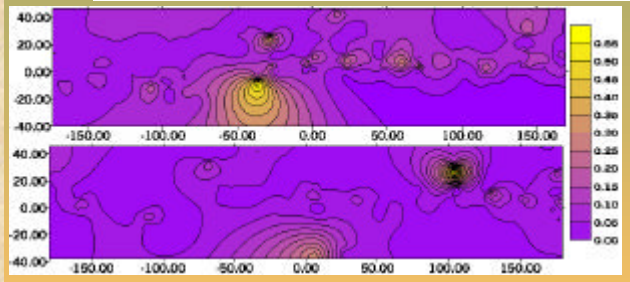


Figure presents the CORONAS-I satellite data about the near-equatorial proton flux registration. The altitude is H=500 km The energy of protons is E=1.2 MeV. The upper figure corresponds to the disturbed period of geomagnetic activity. The lower figure – to quiet period of geomagnetic activity. It is visible that flux increased in the geomagnetic disturbances time. This is additional argue that one source of equatorial protons is radiation belt (current ring).