

Special campaigns: proposal from Pál Bencze ([bencze@ggki.hu](mailto:bencze@ggki.hu))

Special campaigns are only in that case reasonable and successful, if the time of the special campaign coincides with a probably geoactive solar event. Such events may occur, if the solar event takes place at the western part of the solar disk. As the first sign of a solar event may be observed in the Xray (EUV) bands of the solar electromagnetic radiation, these affect the lower ionosphere (upper part of the D region, lower part of the E region (SID, solar flare effect)). That is these phenomena are precursors of more serious disturbances. SID s and the solar flare effect can be recorded – taking into account the observation area of COST 296, first of all at low mid – latitudes and around the local noon. SID s can be observed with methods used for study of the lower ionosphere (measurement of ionospheric absorption of radio waves at different frequencies, phase height measurement etc.), solar flare effects by means of recording components of the geomagnetic field.

Depending on intensity of the solar event, the following act in the scenario is arrival of high energy charged particles (solar cosmic rays) into the environment of the Earth. These particles can approximate energies of 1-10GEV and their delays as compared with SID arrival time depends on their energy. The larger the energy, the smaller is the delay. The delay can amount to a fraction of an hour, the period of these particle fluxes is about some hours. It is also to be noted that the intensity of such charged particle fluxes increases with increasing latitude. Satellite measurements are needed for the processing of ground based measurements. Ground based measurements include riometer observations (PCA) at high latitudes (lowering of the cut-off energy).

Usually, about 48 hours after the flare effect the plasma cloud pushed out from the Sun at the place of the solar event reaches the Earth environment exerting pressure on the sunward side of the magnetopause. This enhancement of the pressure appear in geomagnetic records as an impulse like enhancement of the geomagnetic field called SSC. The SSC indicates the start of a geomagnetic storm characterized by three phases, initial, main and recovery

phase. At the same time decrease in the neutron monitor records, increase of the riometer absorption, as well as enhancement of the proton flux is observed. Decrease of the neutron monitor records (Forbush decrease) is related to the screening of the Earth's environment from the galactic cosmic ray flux. Increase of the riometer absorption is connected with charged particle precipitation at high latitudes. The main and recovery phases of geomagnetic storms are due to the enhancement and decrease of the equatorial ring current. An important feature in the scenario of geomagnetic storms are substorms occurring during the recovery phase.

Solar events are responsible for the so called geomagnetic disturbances of a continuous commencement indicating a 27 day recurrence and as it has been shown due to coronal holes birth place of corotating high speed plasma (solar wind) streams (HSPS). HSPS's are indicated not only by the geomagnetic field, but also by a decrease on neutron monitor records (Forbush decrease).

Summarizing the most regularly recurrent solar events are related to solar active longitudes. For their study first of all geomagnetic records (at low mid-latitudes), neutron monitor measurements, riometer absorption observations and ionospheric soundings (a moderate decrease of electron density at high mid-latitudes) are needed. Considering effects of severe solar events as CMA s, their observation includes changes of propagation conditions of radio waves in different frequency bands (SID), geomagnetic records indicating SSC, main and recovery phase, as well as indications of substorms in the recovery phase, ionospheric soundings (at different latitude showing the boundary between positive and negative ionospheric storms, effects of substorms), neutron monitor records, riometer absorption at high latitudes.

For the moment, these would be my ideas noting that measurements of different type are the basis for drawing conclusions concerning radio wave propagation.

Best regards

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