

# Space weather effects on the artificial equipments and human activities in the geospace

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<http://www2.crl.go.jp/dk/c231/index.html>

The performance and reliability of the satellite operation are often threatened by the space weather disturbances such as the solar flare, and magnetospheric and ionospheric disturbances. The solar flare radiates the X-ray, energetic particles and hot plasma into the space. The X-ray ionizes the upper atmosphere, causing the absorption of the HF radio waves. The energetic particles hit the satellite, which could cause fatal damage on the electronic devices and decline of the solar panel of the satellites. The hot plasma interacts with the earth's magnetosphere and gives rise to the magnetospheric, ionospheric and thermospheric storms. The energy deposited in the magnetosphere increases the flux of the energetic particles in the radiation belt, in which the geosynchronous orbit and the low altitude orbits are located. The magnetic disturbances at the geosynchronous orbit would unsettle the attitude of the satellite. Several communications, broadcasting and scientific satellites have suffered from severe damages these several years in Canada, US and Japan. In order to keep stable operation of the satellites, we need to establish the real-time data network that enables us to know what is happening at the surface of the sun and in the interplanetary space, magnetosphere and ionosphere/thermosphere. We then need to develop the algorithm for the prediction of the space weather, using the neural network, empirical and simulations models. The communications Research Laboratory has been operating the space weather forecast system these several tens of years, and developing a new system that integrates the global monitoring, worldwide data network and the models.