

# **Solar flare effect on the geomagnetic field and Ionosphere**

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A solar flare effect (sfe) over the ionosphere and the geomagnetic field during a very quiet geomagnetic period is studied. Then the variations of the geomagnetic field and ionosphere measurements are easily related with the solar flare radiation. On December 13, 2001, an X6.2 solar flare occurred near the solar centre (at solar coordinates N16 E09). This way, it is possible guarantee that the sfe arrive at the Earth. From GOES (Geosynchronous Operational Environmental Satellites) data every minute, the flare started at 14:24 UT and had its maximum at 14:30 UT. Considering that the subsolar point is at 23:18 S and 37.17 W (geographical latitude and longitude respectively), the geomagnetic and ionospheric variations are studied using the measurements of observatories located around the subsolar point at different solar zenith distance. The records of geomagnetic observatories available in WDC Kyoto are used to analyze the geomagnetic variability under SFE. The parameter used to study the ionospheric variability is the vertical electron content obtained from the GPS stations which belong to IGS (International GPS Service). In both cases the time resolution is 1 minute. The geomagnetic data record the solar effect 1 or 2 minutes after GOES report and in most of the cases the amplitude is lower than 40 nT. Only in few cases the maximum variation reaches values larger than 60 nT and they can be related with the location of these observatories since they are placed near the equatorial electrojet. The VTEC measurements record a sudden variation related to the sfe simultaneously with the GOES reports and the maximum variation reach 6 TECU. The aim of this work is to show the quantitative and qualitative relation between the sfe and the geomagnetic and ionosphere variation.