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Response of the ionosphere to the great solar flare on October 28, 2003

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The analysis of occurrence of ionospheric electron content of the large solar flare that occurred near 11 00 UT on November 28, 2003 (class X17) are presented. The TEC data was obtained using GPS observation carried out by European Permanent Network. This network provides GPS measurements with high-time resolution (with a 30 sec sampling interval) and covers the whole Europe densely. Currently GPS TEC data provide the main information about response of F-region to solar flares by routinely monitoring. We examine spatial and temporal changes of TEC during solar flare using TEC maps. During creating TEC maps over Europe we used simultaneously measurements from 50-60 GPS stations. Time resolution of these maps were 5 min. Sudden increases of TEC started about 11.00 UT over the whole European region. TEC increased ranging from 5 to 16 TECU on time interval 10 min. The percentage TEC enhancement was about 10-30. The recovery stage lasted more than 2-3 hours. The larger enhancement took place at lower latitudes. The intensity of TEC increase weakly deepened on Sun zenith angles. In the paper solar flare effect by ionosonde measurements are also discussed.