

## On the geomagnetic and ionospheric responses to an intense storm associated with weak IMF $B_z$ and high solar wind dynamic pressure

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### Abstract

A study of the geomagnetic storm of July 13-14, 1982, and its ionospheric response is presented using the low-latitude magnetic index,  $Dst$ , and interpreted using solar wind interplanetary data: proton number density, solar wind flow speed, interplanetary magnetic field southward component  $B_z$ , and solar wind dynamic pressure. The F2 region structure response to the geomagnetic storm was studied using  $foF2$  data obtained during the storm from a network of various ionosonde stations. Our results appear to show simultaneous abrupt depletion of  $foF2$  that occurred at all latitudes in both the East Asian and African/European longitudinal zone during the period: 18:00–19:00 UT on July 13 and is as result of an abrupt increase in the dynamic pressure between 16:00 and 17:00 UT. The dynamic pressure increased from 3.21 to 28.07 nPa within an hour. The aforementioned abrupt depletion of  $foF2$  simultaneously resulted in an intense negative storm with peak depletion of  $foF2$  at about 19:00 at all the stations in the East Asian longitudinal zone. In the African/European longitudinal zone, this simultaneous abrupt depletion of  $foF2$  resulted in intense negative storm that occurred simultaneously at the low latitude stations with peak depletion at about 20:00 UT on July 13, while the resulting negative storm at the mid latitude stations recorded peak depletion of  $foF2$  simultaneously at about 2:00 UT on July 14. The present results indicate that most of the stations in the three longitudinal zones showed some level of simultaneity in the depletion of  $foF2$  between 18:00 UT on July 13 and 2:00 UT on July 14. The depletion of  $foF2$  during the main phase of the storm was especially strongly dependent on the solar wind dynamic pressure.

**Key words:** geomagnetic storm, solar wind, solar wind dynamic pressure, IMF  $B_z$ , ionospheric storm.