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Geomagnetic storms of the solar cycle 23

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The paper presents the analysis of the largest geomagnetic storms of solar cycle 23. Their solar origin and interplanetary results are examined based on SOHO and ACE data. Their effects on the Earth magnetosphere are examined based on ground geomagnetic data from three latitudinal chains of the geomagnetic observatories.

Detailed look at the solar activity and its interplanetary sequence shows that the maximum number of ICME at ACE location produced during half of the solar rotation period can be equal to two, resulting in two significant geomagnetic storms. At the same time, the magnetospheric response depending on the interplanetary activity is latitudinally different. It is shown that geomagnetic field variations at polar and auroral latitudes are influenced by the sheath regions of ICME, high speed streams and CIR, while at lower latitudes this influence is reduced significantly. In order to propagate the geomagnetic disturbance to the lower latitudes, requires long duration southward IMF which mostly occurs during passage of magnetic cloud.