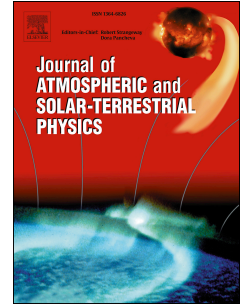


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Signature of Gravity Waves and Ionospheric Perturbations over European and North African region during the Solar Eclipse of 1 August 2008

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Abstract

Solar eclipses provide unique chances to study the ionospheric/thermospheric response to solar radiation changes. The solar eclipse of 1 August 2008 was an outstanding event since it has occurred during the deep minimum of the solar cycle 23. The ionospheric behavior during that event has been investigated using global GPS-Total Electron Content (TEC) maps, COSMIC satellite measurements and Coherent Ionospheric Doppler Radar (CIDR). We analyzed the behavior of total ionospheric ionization over European and North African region by reconstructing TEC maps and differential TEC maps. TEC estimation showed that the total ionization reduces up to 30% at high latitude region during the eclipse as a function of obscuration. COSMIC observations showed a height profile of percentage reduction in electron density with a maximum reduction at the F2 layer of about 30%. The CIDR system allowed us to study the spatial changes of the ionospheric F2 layer during the passage of the solar eclipse which revealed many interesting features of horizontally-propagating gravity waves with wavelength (λ) about 752.39 km and velocity ~ 151.28 km/min associated with the solar eclipse. The wavelet analysis displays the existence of Wave-like Structures (WLS) of ~ 5 min period at F-region altitude.

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