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Ionospheric changes caused by solar eclipse August 21st 2017, as obtained by GPS observations

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Ionosphere is the upper layer of the atmosphere and is produced when Sun's radiation ionizes atoms and molecules within this layer.
Different natural and artificial phenomena affect physical behavior of the Earth's ionosphere. Among these, solar eclipse is a phenomenon which has an apparent effect on the ionosphere. Solar eclipses occur when Sun, Earth and Moon are aligned at the phase of new Moon, in which the Moon is placed directly between the Sun and the Earth and its shadow falls on the Earth.
Remote sensing the ionosphere during the solar eclipse provides great opportunity to study this phenomena and the behavior of ionospheric parameters through its occurrence.
On each solar eclipse the geometry of eclipse formation, magnetizes plasma differently so none of them make exact similar disturbances. In this study we investigate the effects of the solar eclipse on ionospheric models and scintillation indices before, during, and after eclipse incidence at August 21st 2017. Daily observations from ground-based IGS stations over North-America were used for ionosphere modeling and also high-rate GPS observations from UNAVCO data center which includes thousands of globally distributed permanent station network were used for studying scintillation indices.
The driven results of this study demonstrate that scintillation effects are significantly reduced when solar eclipse occurs. Regarding TEC models, our results confirm previous studies on ionospheric responses to eclipse as well as theoretical assumptions.