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Ionospheric and dayglow responses to the radiative phase of the Bastille Day flare

R. R. Meier

E. O. Hulburt Center for Space Research, Naval Research Laboratory, Washington, DC, USA

H. P. Warren

Harvard-Smithsonian Center for Astrophysics, Cambridge MA, USA

A. C. Nicholas

E. O. Hulburt Center for Space Research, Naval Research Laboratory, Washington, DC, USA

J. Bishop

E. O. Hulburt Center for Space Research, Naval Research Laboratory, Washington, DC, USA

J. D. Huba

Plasma Physics Division, Naval Research Laboratory, Washington, DC, USA

D. P. Drob

E. O. Hulburt Center for Space Research, Naval Research Laboratory, Washington, DC, USA

J. L. Lean

E. O. Hulburt Center for Space Research, Naval Research Laboratory, Washington, DC, USA

J. M. Picone

E. O. Hulburt Center for Space Research, Naval Research Laboratory, Washington, DC, USA

J. T. Mariska

E. O. Hulburt Center for Space Research, Naval Research Laboratory, Washington, DC, USA

G. Joyce

Plasma Physics Division, Naval Research Laboratory, Washington, DC, USA

D. L. Judge

University of Southern California, Los Angeles, CA, USA

S. E. Thonnard

E. O. Hulburt Center for Space Research, Naval Research Laboratory, Washington, DC, US

K. F. Dymond

E. O. Hulburt Center for Space Research, Naval Research Laboratory, Washington, DC, USA

S. A. Budzien

E. O. Hulburt Center for Space Research, Naval Research Laboratory, Washington, DC, USA

Abstract

The Sun's Bastille Day flare on July 14, 2000 produced a variety of geoeffective events. This solar eruption consisted of an X-class flare followed by a coronal mass ejection that produced a major geomagnetic storm. We have undertaken a study of this event beginning with an analysis of the effects of the radiative phase of the flare on the dayglow and the ionosphere. The key new enabling work is a novel method of evaluating the X-ray and extreme ultraviolet (EUV) solar spectral irradiance changes associated with the flare. We find that the solar radiative output enhancements modeled during the flare are consistent with measurements of both solar EUV irradiance and far UV Earth thermospheric dayglow. We use the SAMI2 model to predict global ionospheric changes along a magnetic meridian that show significantly different northern and southern effects, suggesting that flares can be used to study ionospheric dynamics.

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