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Session 8B Paper 6

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### **SAMI3 Prediction of the Impact of the August 21, 2017 Total Solar Eclipse on the Ionosphere/Plasmasphere System**

On August 21, 2017 a total solar eclipse will traverse the continental United States starting in Oregon and ending in South Carolina. In addition to occulting the visible radiation from the sun, the eclipse will also partially occult the EUV spectrum from the sun which is responsible for the photoionization of the earth's upper atmosphere creating the ionosphere.

In this talk we present a simulation study of the impact of the upcoming total solar eclipse on the ionosphere and plasmasphere using the NRL model SAMI3. We find that the reduction in solar EUV causes the electron density to decrease by up to a factor of 2 in the F region because of dissociative recombination. Associated with this decrease in the electron density there is a decrease in the TEC by up to 8 TECU (roughly a 40% decrease in TEC). The photoelectron heating of the electrons is also reduced; this leads to a cooling of the electrons by up to 800 K in the upper ionosphere and plasmasphere.

The reduction of ionospheric pressure in the F region during the eclipse also causes the O<sup>+</sup> velocity to reverse direction from upward to downward with a velocity 50 m/s. Lastly, the continental size modification of the ionospheric conductance modifies the global electric field which leads to changes in the TEC of roughly 1 TECU in the southern conjugate hemisphere