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Mother's Day Gift from the Sun: Modeling the Response of the Ionosphere to X-Class Solar Flares MAGGIE LEWIS, JAN J. SOJKA, MICHAEL DAVID, ROBERT SCHUNK, Utah State Univ, JOSEPH B. JENSEN, University of New Hampshire, MICHAEL NICOLLS, SRI International, Menlo Park, CA, TOM WOODS, FRANK EPARVIER, LASP, University of Colorado Boulder — The following study was performed to better understand the effects of solar flares on the Earth's ionosphere, focusing on the large X class solar flares that occurred over Mother's Day weekend 2013. NASA's EVE instrument aboard the Space Dynamics Observatory (SDO) satellite measures the irradiance spectrum of the Sun continuously, and data is available in real-time. The sunlight causes ionization of nitrogen and oxygen atoms and molecules in the upper atmosphere thus creating the ionosphere. The important part of the solar spectrum for this ionization is the X-ray and ultraviolet light. The X-class solar flares occur in from solar eruptions that increase the X-ray irradiance by over a 1000 times normal. Using the data collected by EVE to fuel the Time Dependent Ionospheric Model (TDIM), a model of how the ionosphere reacts and changes with regards to Sun's light is simulated. The TDIM models of the ionospheric composition and behavior are then compared to empirical measurements of the ionosphere made by the Poker Flats Incoherent Scatter Radar (PFISR). The PFISR radar is located near Fairbanks, Alaska and operated continually such that a detailed history of how the ionosphere is responding to solar variations is obtained. These variations include the response to the short duration, 30 to 60 minute, X-class flares.

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