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Improved Modelling of Shortwave Fadeout with 30 MHz riometer data

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Bursts of enhanced electron density in the ionospheric D-region due to photoionization by X-ray radiation from solar X-ray flares leads to a fadeout of short wave signals, potentially causing a loss of high frequency radio communication in affected regions. D-region absorption is typically monitored using riometer instruments which typically operate at 30 MHz. There are well established relationships for modelling the absorption anticipated during a SWF event based on the energetic electron flux. These relationships are examined using the Natural Resources Canada riometer network which provides a unique opportunity to study SWF over a wide spread in latitude (45.4° to 82.5°) for a 90° band of longitude. Based on observations from an event on 11 March 2015, current methods for modelling SWF are shown to severely underestimate absorption. We devise an improved SWF model which corrects this underestimation. Improved modelling provides a better estimate of the peak absorption and its duration above threshold levels anticipated to impact HF radio communication.

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