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The Response of Neutral Metal Layers to Space Weather

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Most previous studies focused on the effects of geomagnetic storms to the upper atmosphere, rarely pay attention to the relation between geomagnetic storms and middle atmosphere. Neutral metal layers normally located in the middle atmosphere altitudes range of 80-110 km, precisely which is the ionospheric D and E region. In the polar region, magnetospheric energetic particles can enter the D and E region. The entering particles can change the atmospheric composition. Metal layers have close link with lower ionosphere. Therefore, the effects of energetic particles to the neutral metal layers are worth paying attention very much. In order to study the relationship between energetic proton precipitation (EPP) and metal layer, we chose different metal layer (Fe, Na, K) data in geomagnetic latitude sites (Alomar, Logan). Temperature, O and H density data were obtained from WACCM. Superposed epoch analysis (SEA) illustrated that different metal layers have strong connection with EPP, but the response of K layer to EPP is particularly different with other two metals.