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Atmospheric Electric Field Effects on Cosmic Rays detected at Sierra Negra, Mexico

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The effect of thunderstorms' atmospheric electric field on secondary cosmic rays (CR) detected at high altitude was studied. We analyzed the data obtained during the period of October 2019 to March 2020 by the Solar Neutron Telescope (SNT) and a Boltek EFM-100 electric field monitor installed in the Sierra Negra Cosmic Ray Observatory (SNCRO) located at 4580 m a.s.l. in Puebla, Mexico. Based on the measurements of the Boltek EFM-100, 15 thunderstorms were identified in the established period. When the majority of thunderstorms occurred, fluctuations in the average counting rate of 2 SNT channels were observed. On the basis of the general theory of atmospheric electric field effects in the secondary CR components proposed by Dorman, we calculated as a first approximation the effect on the total charged component and the neutron component at the observation level of SNCRO. Simulations of air showers in the presence of a simplified electric field were performed with the CORSIKA code to complete the calculations. The observations were consistent with the calculated intensity variations.

Keywords

Secondary cosmic rays; atmospheric electric field

Collaboration

other Collaboration

Subcategory

Experimental Results

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