



The effect of solar cosmic rays in the atmospheric ionization

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Cosmic ray induced ionization (CRII) is an important factor of the outer space influence on atmospheric properties. The main agent of CRII is related to galactic cosmic rays which are always present in the vicinity of Earth. On the other hand, the flux of charged particles of lower energy may increase by orders of magnitude during sporadic solar particle events (SPEs). There are some studies showing a statistical relation between such SPEs and atmospheric properties, although a quantitative modeling of such a relation is still missing. Here we present a numerical model to compute the quantitative effect of solar cosmic rays in CRII of the troposphere-stratosphere for several SPEs, ranging from moderate to severe. It is shown that a severe SPE may indeed enhance CRII in middle and high latitudes down to the troposphere, but moderate SPEs produce no additional ionization in the troposphere, even in polar regions. The global effect of moderate-to-strong SPE in the ionization is tiny.