



## **Possible impact of solar and galactic cosmic rays on optical properties of the atmosphere**

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Despite numerous evidence suggesting for a relation between solar variability and Earth's climate, an exact mechanism leading to such a relation is still obscure. A possible mechanism may be via an effect of varying cosmic rays on physical-chemical properties of the atmosphere, in particular, on its transparency at different wavelengths. Even a small deviation in the optical properties of the atmosphere can shift the balance between absorption, transparency and albedo of the atmosphere and thus affect the amount of radiation received by Earth without modifying the solar irradiance. This gives a physically motivated scenario for an enhanced triggering effect of solar activity in the Earth atmosphere.

Here we present a systematic statistical study of a relation between the observed atmospheric optical depth and solar and galactic cosmic rays for the period 1976-2005. The atmospheric data are compared with detailed realistic computations of the ionization induced by cosmic rays. The effect is studied separately at long (regular modulation of galactic cosmic rays) and short (sporadic solar eruptive phenomena) time scales and in different regions. The results suggest that a significant relation exists in some regions, particularly at high latitudes.