

Link between solar activity and cloud cover: Fact or artifact?

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While it is commonly accepted that the solar activity affects the Earth climate, the exact driving process is still not identified. An important potential driver is a link between cosmic rays and cloud cover, suggested on the basis of extensive correlation studies of cosmic rays (solar activity) and atmospheric cloudiness. Such studies are mostly based on the satellite ISCCP cloud data. However, doubts have been cast that these relations can be an artifact of instrumental effects, i.e., of the masking/obscuring the low clouds by higher clouds in the satellite view. If this is the case, most of the earlier results based on ISCCP data would be devaluated. Here we re-analyze the ISCCP cloud coverage data and its relation with the cosmic ray induced ionization, and show that the correlation between low clouds and cosmic rays is affected by higher clouds in some geographical regions, but it is not a global feature. In turn, our results show that low clouds also may affect the relation of higher clouds with cosmic rays in some regions. Accordingly, correlation analysis can be performed only when the strong relation between clouds of different types is taken into account. In particular, studies based on global or latitudinal (zonally averaged) cloud data should be revised.