



Solar activity - cloud cover correlations: Is a revision needed?

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The link between the solar activity and the Earth climate is nowadays subject of fervent debates. The clouds play an important role in the terrestrial radiation budget, thus the existence of a signature of the solar activity in the cloud properties would have important consequences for the study of the climate change causes. During the last decade it has been shown that the low altitude clouds observed by the ISCCP satellites and the flux of galactic cosmic rays are highly correlated. These results have been recently challenged by the supposition that such a relationship is an artifact of instrumental effects originating in the masking/obscuring of the low altitude clouds by the high and middle altitude clouds in the satellite data. On the other hand, thick layers of low clouds could alter the high cloud cover data over different backgrounds. If either of these would be proven to be a global feature, results based on satellite cloud cover data should be revised. In order to verify this supposition, we have performed a thorough analysis of the ISCCP cloud data for 1984-2004 and focused on two directions. First, we have investigated to what extent the correlation between two solar proxies (CR and UV) and the low, middle and high cloud cover is direct or spurious. Second, we have analyzed the relationship between these different types of clouds and its possible causes. Our results show that there is a strong relation between low clouds and high and middle clouds but we conclude that this relation is based on real conditions rather than an observational artifact. This relationship has a clear geographical pattern and is double sided: in some areas low clouds could be obscured by high clouds, while in others the high cloud cover could be underestimated because of the underlying low clouds. On the other hand, there are large areas free of these relationships where corre-

lation studies are not disturbed. Therefore, any correlation analysis between different types of clouds and any solar proxy should be preceded by a careful analysis of possible artifacts induced by the presence of other type of clouds in some geographical areas. Moreover, studies based on zonally averaged cloud data should be carefully reanalyzed.