



Is the correlation between solar proxies and clouds affected by ENSO and volcanic events?

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Studies of correlation between the cloud cover and solar proxies suggest that variations of solar activity can affect the cloud cover at Earth. Atmospheric processes are important when studying the extent of the link between the solar activity and global climate change and it was suggested that climatic or terrestrial quasi-periodic and sporadic phenomena, such as ENSO and/or major volcanic eruptions, which do affect the cloud formation, may influence the results of statistical studies of the Sun-cloud relation. Using partial and total correlation analysis, we show that removing ENSO and volcanic years from the full-set analysis does not alter the results. Moreover, some relations, as for instance the anticorrelation between low clouds and UV irradiance, are improved. This supports the idea that the solar signal affects clouds directly. An interesting result relates to an area in the eastern Pacific, where the full-set analysis showed that the relationship between cosmic ray induced ionization and clouds is opposite to the global one. This odd correlation is no longer observed when the “problematic” years are removed. We conclude that, although removing years of strong ENSO and volcanic eruptions has no important effect on global correlation patterns, caution must be paid when interpreting the results of correlation studies in some areas, prone to be affected by extreme internal climate processes.