Effects of solar activities on earth climate in various ways

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If we consider the effect of the sun on the earth climate, we have to investigate galactic cosmic ray as one of the first priorities. However, at this moment, information about the possibilities of solar effects on the climate seems too limited and our examinations on various stories using other than cosmic rays to connect them are strongly insufficient. Potentially the solar activity could modulate the condition of earth atmosphere in many ways and in many time scales. Before focusing on the galactic cosmic rays, we need to make careful assessments of such possibilities, that is, influence by solar UV, global electric circuit, radiation belt particles and galactic cosmic rays. Also the combination of these issues and relationship with intrinsic periodicity of the earth atmosphere should be investigated. Our knowledge on this field is too poor and interactions between each specific field would be essential to solve the problem for sun-earth climate connection. Especially, close cooperation with atmospheric scientist is absolutely necessary. We also suggest the importance of hierarchy in periodicities of phenomena.

Here we show the strong but not perfect evidences of the sun-earth climate connection, concentrating rather short time scale. The global lightning activity and the cloud amount estimated by OLR in western pacific warm pool (WPWP) show one month modulation with an amplitude of about 20 percent. The modulation of OLR is prominent only in the solar maximum years. These facts suggest the solar influence on the climate. However, the phase relationship between such modulation and the solar parameters, such as cosmic rays and geomaginetic activities, are not stable. Further careful and detail examinations are strongly required.