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Investigating Possible Links between Incoming Cosmic Ray Fluxes and Lightning Activity

Themis Chronis
Hellenic Center for Marine Research, Inland Waters, Athens, Greece (themis@ath.hcmr.gr)

During the past two decades, particular scientific attention has been drawn to the potential cosmic ray-atmospheric coupling. Galactic cosmic rays reaching the upper troposphere are suggested as the key modulators of the global electric circuit with further implications on cloud microphysical processes. Unfortunately, the scarcity of the associated observations renders the evaluation of the theoritized mechanisms rather difficult. This contribution proposes a different approach by introducing observations provided by the National Lightning Detection Network for the period 1990-2005. The study area encompasses the greater part of continental U.S. and the surrounding waters. The results highlight a statistically significant positive trend between monthly lightning activity and galactic cosmic ray fluxes during the winter season. During the summer season the trend becomes statistically non-significant. In addition, the featured analysis introduces a technique to assess the potential impact of Forbush Events on daily lightning activity. Results illustrate that lightning activity may be responsive (minimized) 4-5 days following a Forbush Event.