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Modulation of thunderstorm activity by solar activity

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Using both radio measurements of lightning strokes and simple aural measurements of thunder, daily UK thunderstorm activity has recently been shown to be significantly modulated by the polarity of the heliospheric magnetic field in near-Earth space. Similar relations have since been reported in other locales in Europe and Northern America. The underlying physical mechanism has not been determined. Possibilities include changing energetic charged particle access from space to the terrestrial atmosphere, as a result of magnetospheric reconfiguration, or changing ionospheric modulation affecting the atmospheric electric circuit, which in turn affects cloud charging. The variation of thunder with solar activity on longer timescales may help discriminate between these mechanisms. Radio measurements are not suitable for such studies as the observations typically span only a decade or two, and the sensitivity of the networks often changes significantly during that time. Simple "thunderdays", wherein a human observer records whether or not they heard thunder on a given day, and low fidelity, but result in homogenous data. However, the picture from such data is unclear. On annual (and longer) timescales, both correlations and anticorrelations have been reported between thunderstorm occurrence and sunspot number for different locations and different time periods. Unfortunately, long running, continuous records suitable for this kind of analysis are rare. Existing thunder records from Japanese stations spanning 1890 to 1985 show a clear 11-year periodicity until around 1960, after which thunderstorm activity is reduced. UK Met Office records extend back to 1850 and continue to present. We have recently begun digitising these data and present initial findings here.