



Variability of Global Lightning Activity on the ENSO Time Scale

G. Satori (1), E. Williams (2) and I. Lemperger (1)

(1) Geodetic and Geophysical Research Institute, HAS, Sopron, Hungary (2) Massachusetts Institute of Technology, Parsons Laboratory, Cambridge, MA, USA (satori@ggki.hu / Fax: +36-99-508355 / Phone: +36-99-508379)

Global lightning activity has been studied on the ENSO time scale based on recordings of the Earth's Schumann resonances at two distant stations – Nagycenk, Hungary and Rhode Island, USA – as well as observations from the OTD (Optical Transient Detector) and LIS (Lightning Imagine Sensor) satellites. Schumann resonances are excited by electromagnetic radiation from lightning at wavelengths comparable with the Earth's circumference.

The global lightning is mainly concentrated over land and is highly dependent on surface air temperature. Global temperature measurements suggest that all tropical land regions tend to warm during the El Nino phase, and tend to cool in the La Nina phase (Hansen and Lebedeff, 1987).

Both the position and intensity of lightning activity vary on the ENSO time scale. In general, more lightning is observed in the tropical – extratropical land regions during warm, El Nino episodes as indicated by Schumann resonances (Williams, 1992) and observed by satellites (Goodman et al., 2000; Hamid et al, 2001). Although oceanic lightning activity is a minor contributor to the world's lightning activity, an opposite behavior is observed in the Pacific (oceanic) regions. More lightning is present during cold, La Nina conditions than during the warm, El Nino episodes. The annual distribution of world lightning is slightly offset from the equator into the Northern hemisphere due to the north-south asymmetry of the land/ocean ratio. Schumann resonances indicate a southward (equatorward) shift of global lightning during the warm, El Nino episodes (Satori and Zieger, 1999), in accordance with the satellite observations in several regions.