

Comparing of lightning activities and climatic reanalysis parameters

SANMIYA, Yusuke^{1*}, TAKAHASHI, Yukihiro¹, SATO, Mitsuteru¹, YAMASHITA, Kozo²

¹Department of CosmoSciences, Hokkaido University, ²Dept.Electrical Engineering, Salesian Polytechnic

The atmospheric convection is activated by the updraft associated with the heating of the surface by solar insolation. This activity carries water vapor and heat to higher altitudes. Maritime Continent (MC) is one of the most important regions for convection and lightning activity in the world, which is related to the global climatic phenomena including El Nino, Madden-Julian oscillation (MJO) and Asian monsoon. Therefore, detail research in this area leads to better understandings of the global climate change.

Until now only a few statistical studies on the lightning activity with energy information of individual discharge have been made for global scale since there have been no lightning observation network with uniform sensitivity. GEON, Global ELF observation Network, constructed and operated by Hokkaido University, provides information including energy of individual lightning stroke which occur anywhere in the world. GEON consists of four observation sites and detects electromagnetic waves in the frequency range of 1-100 Hz, radiated from cloud-to-ground lightning discharges, with a detection threshold of 950 C-km. The estimated average error in geolocation is about 600 km.

We compared GEON data with Outgoing Longwave Radiation (OLR) as a kind of proxy of cloud amount or strength of atmospheric convection. In the initial analysis areas of MC, Western Pacific Warm Pool (WPWP) and Eastern Indian Ocean (EIO) are examined from August 2003 to July 2004. It is found based on frequency analysis that lightning activities shows ~30 day periodicity while convective activities ~40 day periodicity. And cross spectrum of these data have ~30 day periodicity. At the presentation, we will show these results.

Keywords: lightning, Maritime Continent, climate change, ELF, reanalysis data