

Spatio-Temporal Characteristics of Energetic Lightning in Southeast Asia: Preliminary Statistical Results



Shunsuke Akama, Yasuhide Hobara, Amir Izzani Mohamed, Chandima Gomes, Kazuo Shiokawa, Shu Hirai, Hiroshi Kikuchi, and Michael Stock

Abstract The region of Southeast Asia is known as one of the lightning-prone areas in the world. However, spatial and temporal distributions of high-energy lightning discharges, which cause natural disasters e.g. significant damages to local power grid systems and forest fires, are still unknown. This paper reports initial results on the statistical characteristics of energetic lightning around Malay Peninsula. Highly accurate timing and location as well as lightning peak current (I_p) of lightning strokes were obtained by ENTLN (Earth Networks Total Lightning Network), while the vertical charge moment change Qds as a proxy of high-energy lightning was derived by using ground-based ELF magnetic field observations in Pahang, Malaysia with a small threshold of less than 10 C·km. The characteristics of energetic lightning for both rainy and dry seasons were successfully derived for the first time in this region. The results indicate that highly energetic lightning occur frequently throughout the rainy and dry seasons, mainly over the Malacca Strait. Long-term statistical analysis with an extended data analysis period is necessary to understand further the seasonal and yearly dependences of energetic lightning and their relations with local climate conditions.

Keywords Lightning stroke · ELF · Charge moment change · ENTLN

S. Akama · Y. Hobara (✉) · S. Hirai · H. Kikuchi
The University of Electro-Communications, Chofu, Tokyo 1828585, Japan
e-mail: hobara@ee.uec.ac.jp

A. I. Mohamed
Universiti Malaysia Pahang, 26600 Pekan, Malaysia

C. Gomes
University of the Witwatersrand, Braamfontein, Johannesburg 2000, South Africa

K. Shiokawa
Institute for Space–Earth Environmental Research, Nagoya 4648601, Aichi, Japan

M. Stock
Earth Networks, Germantown, MD 20876, USA