

Global Occurrence Rates and Distributions of Lightning and TLEs Derived from JEM-GLIMS Nadir Observations

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JEM-GLIMS is carrying out continuous nadir observations of lightning discharges and TLEs from the ISS since Nov. 20, 2012. For the period between Dec. 2012 and Nov. 2014, JEM-GLIMS succeeded in detecting a total of ~4,820 lightning events including ~530 TLEs. It is found that most of these events occurred in continental regions, that is, central Africa, Southeast Asia, North America, and the northern part of South America. It is also found that the lightning activities tend to be enhanced in the local summer hemisphere. These characteristics are comparable to those derived from the MicroLab-1/OTD and TRMM/LIS measurements. Using the JEM-GLIMS optical data, we have estimated the preliminary global occurrence rates of lightning discharges and TLEs. The global occurrence rate of lightning discharges is estimated to be 1.5 events/s, which is smaller than that derived from the previous satellite missions (~50 events/s). This discrepancy may be caused by the low detection efficiency of JEM-GLIMS due to the high trigger threshold level and the low telemetry speed and by the limited LT area (20-04 LT) where JEM-GLIMS can conduct the optical observations. The global occurrence rate of TLEs, that include both sprites and elves, is also estimated and is calculated to be 9.8 events/min. At the presentation, we will show more detailed global occurrence distributions and rates of lightning discharges and TLEs.

Keywords: lightning, sprites, ISS