

Global distributions of lightning charge moment changes obtained from ISS

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Global lightning distributions are obtained in general by an optical observation on-board satellite, however electrical properties of lightning discharges have not been derived from optical data. Commonly, electrical properties of lightning discharges are derived by a ground-based observation of electromagnetic radiations from lightning current. In this paper, we focus on lightning charge moment Qds which is believed to be the vital information to determine damages due to intensive lightning.

We derive for the first time the statistical distributions of lightning Qds over the globe only from the optical observations in JEM GLIMS mission installed in the International Space Station (ISS). We use the positive straightforward relationship between the lightning integrated irradiance from high speed PHotometers (PHs) on-board GLIMS and the lightning charge moment changes by ground-based ELF observation based on the lightning events around Japan. We successfully derived global distributions of the lightning with Qds with their statistical differences between three major thunderstorm active regions for CGs. Our results indicate the possibility of deriving lightning electrical properties with uniform and high detection sensitivity all over the world.

Keywords: ISS, lightning charge moment change, optical observations, global distribution