The Global Distribution and Photometric Characteristics of the Intense Lightning and Their Association With Transient Luminous Events

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Lightning is one of the electrical-discharge phenomena in the lower atmosphere, say stratosphere, and also the main initiator of the transient luminous events (TLEs) occurring in the middle or upper atmosphere. In the past decade, the distribution and occurrence rate of lightning were surveyed by the ground radio detection or spaceborne optical observation. But the spectrophotometric characteristics of lightning were still unrevealed by the limit of the existing ground and space observations. The ISUAL experiment onboard the Taiwanese satellite FORMOSAT-2 is the first space mission dedicated to the study of the TLEs. In addition to the ~42,000 TLEs registered in the ISUAL 12-year mission lifetime, approximately 300,000 intense lightning was also recorded by an intensified imager and a six-bands photometer. Therefore the ISUAL serves only as a TLE but also an intense lightning survey. The valuable spectrophotometric data can help to identify the geographic variation of the lightning characteristics. The exploration of the association with the TLE observed simultaneously, as well as the other lightning surveys, also provide another view on the connection of the TLEs and their parent lightning and will be discussed in this presentation.

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