
[EE] Evening Poster | M (Multidisciplinary and Interdisciplinary) | M-IS Intersection

[M-IS04]Thunderstorms and lightning as natural hazards in a changing climate

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Lightning and thunderstorm are markers of severe weather, often accompanied by precipitation, hail and strong winds that can create significant natural hazards, especially in disaster-prone area. Lightning is also a strong indicator of convection, with tropical storms (typhoons and hurricanes) being of major importance. As the climate warms in the first decades of the 21st century, the intensity and frequency of thunderstorms is projected to increase. The need for detecting and monitoring the development of thunderstorms and lightning activities on local and regional scales is therefore clear and urgent.

This session seeks observational and theoretical contributions on thunderstorm microphysics and dynamics, convective systems and tropical storms. Present patterns and distributions of lightning and extreme weather events derived from the ground-based networks and satellites, as well as forecasts of future trends, are also of interest. Lightning detecting and monitoring system performance and validation, and early-warning schemes are requested, either in operational or planning phase. The session will highlight regional and global lightning and atmospheric electricity networks and invites contributions on technological innovations in this field.

[MIS04-P04]Global Occurrence Rates of Lightning, Elves, and Sprites and Their LT/Monthly/Seasonal Dependences Derived from JEM-GLIMS Observations

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In order to clarify the occurrence rates of TLEs and to estimate their local time (LT), monthly, and seasonal variations quantitatively, JEM-GLIMS carried out the three-year nadir observations from the ISS. In this observation period, JEM-GLIMS succeeded in detecting 6404 lightning events, 42 sprite events, and 504 elves events. The global occurrence rates of lightning, sprites and elves are estimated to be 90 ± 1 , 0.59 ± 0.09 , and 7.1 ± 0.3 events/min. The estimated LT variation of sprites shows gradual increase from 20LT to 05LT, while that of elves shows slight decrease from 20LT to 23LT and the following gradual increase after 00LT. These results imply that both sprites and elves tend to frequently occur in the early morning sector. The similarities and discrepancies between the JEM-GLIMS results and previous results derived from the satellite measurements, such as OTD, LIS, ISUAL, and ground-based observations are discussed at the presentation more in detail.