[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-P03]Relation between Lightning Electrical Parameters and Intensity of Typhoon Haiyan

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Keywords:lightning discharges, typhoon, intensity prediction

Tropical cyclones often bring serious damage on human lives and their socio-economic activities. As many Southeast Asian countries suffer from the direct hit of tropical cyclones (typhoons) and related severe weather events, they have a strong demand for the intensity prediction of these phenomena. Since 1990s, the prediction error of the typhoon location and course has been drastically improved. However, the prediction error of the typhoon intensity, such as maximum wind speed and minimum pressure, has not been improved, or rather, is getting worse and worse. In contrast, recent studies revealed that the intensity development of typhoon could be easily predicted when the lightning activities at the typhoon are monitored. They showed that there is clear relation between the occurrence number of lightning discharges and the maximum wind speed and minimum pressure of a typhoon. Although many studies focus on the relation between typhoon intensity and lightning occurrence number, there is no study focusing on the relation between typhoon intensity and electrical parameters of lightning discharges, such as charge moment change (CMC) and peak current (Ip). In this study, we analyzed the world wide lightning location network (WWLLN) data to count the occurrence number of lightning discharges occurred in typhoon Haiyan, and analyzed 1-100 Hz magnetic field waveform data obtained by the ELF observation system at Syowa station, Antarctica to calculated CMC and Ip. It is found that the number of lightning discharges occurred within 1000 km range from the center of Haiyan is highly correlated with the maximum wind speed of Haiyan (R=0.82). It is also found that the temporal changes of CMC and Ip values are also correlated with the maximum wind speed and that the correlation coefficient is 0.52

and 0.61, respectively. At the presentation, we will show the estimated results more in detail.