Estimation of relationship between tropical cyclone intensity and electrical properties of lightning

*Shunsuke Niwa[1], Mitsuteru Sato[1], Yukihiro Takahashi[1], Hisayuki Kubota[1]

1. Department of Cosmoscience, Hokkaido University

Tropical cyclone (TC) causes serious damage to human society every year. For reduction of its risk, TC forecast is important. TC track forecast is improving year by year but intensity forecast is not improving. Prediction of TC intensity is a big problem. Lightning is an good indicator of updraft intensity and TC is intensified by strong updraft. Thus lightning can be use to monitoring TC intensity. Previous studies suggested that lightning activity in TC can be a predictor of TC intensity. All previous studies used only frequency as an indicator of lightning activity. Electrical properties (EP) of lightning should be also related to updraft intensity, so using EP will help us to get more understand the relationship between TC intensity and lightning activity. Using ELF (1-100 Hz) magnetic field, we can estimate EP such as Peak current, Charge moment change and Charge amount. In this study, World Wide Lightning Location Network (WWLLN) and Global ELF Observation Network (GEON) were used to analyze lightning activity and the relationship between maximum sustained wind and EP in 4 TCs over the North Western Pacific Ocean in 2013. By comparison the relationship between each EP and TC intensity, it was found that Charge amount was the most likely to be a predictor of TC intensity. In this presentation, we will show result of this analysis more in detail.

Keywords: Typhoon, Lightning, ELF, CMC, intensity forcast

