R005-60
Zoom meeting C ：11/3 AM2 (10:45-12:30)
11:15〜11:30

Response of thunderstorms, rainfalls and snowfalls to global electric circuit in Kanto area using W-band cloud radar FALCON-I

#Hiroyo Ohya[1)],Masashi Kamogawa[2)],Tomoyuki Suzuki[3)],Toshiaki Takano[4)],Kazuomi Morotomi[5)]
([1]Engineering, Chiba Univ.,([2]University of Shizuoka,([3]Education, Gakugei Univ.,([4]Chiba Univ.,([5]Japan Radio Co., Ltd.

Global electric circuit (GEC) is a huge capacitor between the Earth's surface and lower ionosphere. Thunderstorm is main generator of the GEC (e.g., Rycroft et al., 2000). Air current flows upward from a thunderstorm cloud top toward the ionosphere and flows in the lower ionosphere horizontally. Then the air current flows from the lower ionosphere down to the Earth's surface in fair weather and flows in the Earth's surface. The current flows from the ground into the thunderstorm generator, and the GEC closes. The currents are 0.1-6.0 A, with an average between about 0.5 and 1 A per thunderstorm cell (Blakeslee et al., 1989). Correlation between atmospheric electric field in Antarctica and thunderstorm rainfall was 0.54 (Lavigne et al., 2016). In Kanto area, large oscillations in atmospheric electric field with a period of 78 minutes during snowfalls of 24 November, 2016 were reported, which was caused by vertically convective cells in the snowclouds (Ohya et al., Scientific Reports, 2021). However, it is not still clear how clouds affect the GEC quantitatively. In this study, we reveal response of thunderstorms, rainfalls, and snowfalls to the GEC in Kanto area using W-band (95 GHz) cloud radar, FALCON (FMCW radar for cloud observations)-I. FALCON-I is a cloud radar with high spatial and sampling resolution developed at Chiba University, Japan. The field mills at Chiba University (CHB, 35.63N, 140.10E), Kakioka, Ibaraki (KAK, 36.23N, 140.19E), Koganei, Tokyo (KGN, 35.71N, 139.49E), and Musashino, Tokyo (MSS, 35.72 N, 139.57E); the FALCON-I at CHB; and a X-band phased array weather radar (PAWR) operated by Japan Radio Co., Ltd. (XBR, 35.52N, 140.23E), Japan are used in this study. The distances between CHB and KAK, KGN, and MSS are 64.8, 56.4, and 49.5 km, respectively. There were 79 events that the atmospheric electric field largely varied during thunderstorms and snowfalls from June 2016 to June 2018. Around end of precipitations that continued for 11.5 hours, the atmospheric electric field largely decreased at CHB at 23:30 UT on 4 June, 2016. During precipitations on 21 June, 2016, the atmospheric electric field oscillated with a period of about 20 minutes. During snowfall of 27 March, 2017, the atmospheric electric field largely varied, but not oscillated. At that time, the snowclouds had complex structure at heights of 0.5-6.0 km. In this session, we will show the response of these weather phenomena in detail.