

Discovery of Sprites and Elves Induced by Winter Lightnings in the Hokuriku District

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Sprites and elves had been observed on the ground only in North America and Australia. However, the Hokuriku district in Japan has been considered to be the most preferential candidate producing the sprites due to the large positive discharge up to 300 C in the winter season. We conducted the optical and VLF observations from December, 1998 to February, 1999 at two sites: the Dodaira observatory (36.0N, 139.2E) located 200-300 km southeast of Hokuriku and the Aoba-yama campus (34.7N, 135.4E) of Tohoku university in Sendai, 400-500 km ENE of Hokuriku. We succeeded in observing 21 sprites and several tens of elves for the first time with multi-anode array photometers and an image intensified CCD camera on 4 nights when a cold front passed Japan.

Sprites and elves, the luminous events in the middle and upper atmosphere induced by cloud to ground discharges, had been observed on the ground only in North America and Australia. However, the Hokuriku district in Japan has been considered to be the most preferential candidate producing the sprites due to the large positive discharge up to 300 C in the winter season. In order to observe the sprites and elves occurring over the Hokuriku district, we conducted the optical and VLF observations from December, 1998 to February, 1999 at two sites: the Dodaira astronomical observatory (36.0 N, 139.2 E) located 200-300 km southeast of Hokuriku district and the Aoba-yama campus (34.7 N, 135.4 E) of Tohoku university in Sendai, 400-500 km ENE of Hokuriku. We succeeded in observing 21 sprites and several tens of elves for the first time with multi-anode array photometers and an image intensified CCD camera on 4 nights when a cold front passed Japan.