Characteristics of daytime tweek atmospherics observed at Moshiri and Kagoshima, Japan

Hiroyo Ohya[1]; Kazuo Shiokawa[2]; Yoshizumi Miyoshi[2]
[1] Engineering, Chiba Univ.; [2] STEL, Nagoya Univ.

It is known that tweek atmospherics can be observed only at night, except for special cases such solar eclipses, because the attenuation due to solar ionization is much greater in daytime. Tweeks at frequencies of 1.5-10.0 kHz originate from lightning discharge and propagate over several mega meters in the Earth-ionosphere waveguide reflecting between the bottom edge of the ionosphere and the Earth‘s surface. Daytime tweeks have been not reported at all except for solar eclipses. However, a few tweeks were observed in daytime at Moshiri and Kagoshima, Japan, at 06:50-15:52 JST on 15-20 December, 1980. A magnetic storm occurred with Dst minimum value of ˜240 nT on 19-20 December, 1980. A solar eclipse did not occur in the period. The sunset and sunrise times at 60 km height at Moshiri were 16:47 and 06:05 JST, respectively, while the sunset and sunrise times at Kagoshima were 18:00 and 06:24 JST. The average and standard deviation of the occurrence rate at Moshiri in daytime were 0.6 tweeks per minute and 2.5 tweeks per minute, respectively, while the average and standard deviation of the occurrence rate at Kagoshima were 0.3 tweeks per minute and 1.0 tweeks per minute. The average and standard deviation of the tweek reflection height at Moshiri in daytime were 86.2 +/- 7.1 km, while they were 95.3 +/- 8.8 km at Kagoshima. The average and standard deviation of the nighttime reflection height at Moshiri in the same storm period were 86.9 +/- 3.1 km. At Kagoshima, they were 92.1 +/- 2.8 km. Both at Moshiri and Kagoshima, the daytime reflection heights were not much different from the nighttime one, although the standard deviation of the nighttime reflection height was smaller than that of the daytime one. The average and standard deviation of the horizontal propagation distance at Moshiri at night were 6841.6 +/- 1908.3 km. At night in the same period, they were 7359.8 +/- 1346.8 km. At Kagoshima, the daytime and nighttime distances were 7144.7 +/- 2076.9 km and 6268.0 +/- 705.3 km, respectively. The daytime propagation distance is almost same with the nighttime one. The average signal durations in daytime at Moshiri and Kagoshima were 18.0 ms and 10.9 ms, respectively, which were shorter than those in nighttime (about ˜50 ms). The difference of the duration may depend on the attenuation due to the solar ionization. The daytime tweeks described above are new phenomena that have been not reported so far. We investigate whether the daytime tweeks are associated with the storm time or the latitude of the observation site. In the presentation, we discuss the cause for the daytime tweek observations.