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First detection of daytime tweek atmospherics observed at Moshiri and Kagoshima, Japan

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It is well known that tweek atmospherics can be observed only at night except for solar eclipse days, because daytime attenuation rate of the tweeks is much larger (~70 dB/1000 km) than that in nighttime (~3 dB/1000 km). In this presentation, we firstly report detection of daytime tweeks at Moshiri (Geographic coordinate: 44.37^{o}N, 142.27^{o}E) and Kagoshima (31.48^{o}N, 130.72^{o}E), Japan, on non-solar eclipse days in December, 1980. The daytime tweeks were observed both before and during a large magnetic storm during 16-20 December, 1980. The minimum Dst value was -240 nT at 04:00 UT on 20 December. The average occurrence numbers of the daytime tweeks at Moshiri and Kagoshima were 2.7 and 0.3 tweeks per minute, respectively. The local times (LT) when the daytime tweeks occurred were through 07:00 - 17:00 LT at Moshiri, while they were 07:00 - 09:00 LT and 15:00 - 17:00 LT at Kagoshima. All the daytime tweeks show clear frequency dispersion. The average duration was 18.94 ms, while that of nighttime tweeks is ~50 ms. The average reflection heights of daytime tweeks at Moshiri and Kagoshima were 86.2 km and 94.7 km, respectively. The average reflection heights of nighttime tweeks at Moshiri and Kagoshima in same period were 87.1 km and 92.1 km, respectively. The variation of the daytime tweek reflection height was higher than that of nighttime tweeks. The horizontal propagation distance in daytime cannot be estimated from the dispersion, because the duration was too short to estimate the distance.

We found through a theoretical consideration that the VLF/ELF attenuation on the D-region ionosphere depends not only on the ionospheric height, but also the sharpness of electron density profiles, β. The β is a conventional parameter proposed by Wait and Spies [1964]. When the β increases, the attenuation decreases. Even daytime, when the β is occasionally large, the attenuation would become less down to be able to observe the tweeks. In this talk, we will show the results of the daytime tweeks and discuss their occurrence mechanism.