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High Definition TV Spectra of 2001 and 2002 Leonids in Visual - Ultraviolet Region

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The Leonid meteor shower is caused by the Earth's encountering dust trails ejected from Comet 55P/Tempel-Tuttle. After the return of this comet in 1998, a theoretical calculation predicted that the peak activities could go up to a `storm' level in next five years. From the latest study of comets, the measurements of the ${¥rm HDO/H_{2}O}$ ratio imply the possibility of delivering volatile materials to the Earth by cometary dust grains. To explore the possibility of delivering water and pre-biotic organics to the Earth, we developed a HDTV spectroscopic observational system. The system was focused on the near - ultraviolet wavelength range (300 nm - 450 nm) by combining reflective grating, UV lens ($f=30$ mm, F1.4), Image Intensifier (I.I.), and High Definition TV camera (HDTV). The field of view (FOV) was $23^{¥circ} ¥times 13^{¥circ}$, and the observable wavelength range was in 300 nm - 900 nm, with resolution of 1.0 - 1.5 nm. By using this system, we carried out spectroscopic observations at the SUBARU Telescope site and the Nobeyama Radio observatory site in 2001. In 2002, we participated in NASA's Leonid Multi - Instrument Aircraft Campaign (Leonid MAC), which had started since 1998. This mission concept is to bring together world-wide scientists from different disciplines and cooperatively observe the Leonid meteors using a wide range of techniques. Scientists were divided into two airplanes. The one was the NASA DC-8 Airborne Laboratory, and the other one was FISTA (US Air Force aircraft). The author got on FISTA. The primary advantages of this mission of two airplanes were triangulation by their parallel flight in the 13 km altitude, which enabled us to measure meteors' altitudes. The route of the both aircrafts was from Torrejon, Spain to Offutt, Nebraska in order to encounter two predicted peaks. This observation also could decrease air extinction and Rayleigh scattering in the ultraviolet region.

From the spectra data obtained after the calibration in two years, OH (308 nm $A^{2}$$¥Sigma^{+}$- $X^{2}$$¥Pi$) bands features were detected in the meteors.

We report the performance of the instrument, comparative study of the spectral features in two years, and discuss the delivery mechanism of OH and CN (387.9 nm $B^{2}$$¥Sigma^{+}$ - $X^{2}$$¥Pi$) from comet.