Observation of Leonids 2002 at Canary Islands: UV-visible spectroscopy of meteors

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We can see Leonids in mid November every year, and meteor storms occur in every 33 years, which corresponds to the return of its parent comet, 55P/Tempel-Tuttle. Some researchers had predicted we could see meteor storms in 1998 - 2002, after the perihelion passage of the comet, and in fact, meteor storms occurred from 1998 to 2001. Year 2002 was the last chance to observe Leonid meteor shower in this return.

From spectroscopy of meteors in near IR - visible wavelength, many emission lines of atoms and molecules contained in the atmosphere has detected. Many of these also have emission lines in UV wavelength, so UV spectroscopy of meteors is important to reveal the true character of meteors and meteor persistent trains.

The entry speed of Leonid meteoroids is so high, about 70km/s, that many fireballs cause meteor persistent trains, the long enduring emission along the meteor path. The production and emission mechanism of meteor trains is still unknown, because it is so difficult to observe them for their rare appearance.

From observations of comets, CN emission band has been detected at about 300 nanometers. If this band is also detected in meteor spectra, you may say that some organic matter as the origin of life on the earth could come down from space without breaking out. In this point, UV spectroscopy of meteors is quite important.

We carried out the observations at several places in the world. Hiramatsu and Fuji observed at Canary Islands, Yano, Abe, Sugimoto and Kasuga over the Atlantic Ocean, as the members of NASA Leonid MAC (Multi-Instruments Aircraft Campaign), Watanabe in US, and Ebizuka at Nobeyama, Japan. Here we report the results from Canary Islands.

We observed Leonids at Mt. Teide, Tenerife Island in Canary Islands, Spain. Target of our observation is spectroscopy of meteors in UV-visual wavelength. Our observation site has some advantages for this observation. First, some researchers had predicted the first storm of Leonids in 2002 was best seen in Europe and western Africa. Second, our observation site is at high altitude, about 2150m, so we can expect lower UV absorption by the atmosphere.

Our observation system consists of two proprietary instruments. One is UV-visible wavelength objective spectrometer with UV lens, UV image intensifier and a sensitive CCD video camera (See Ebizuka et al. 'High sensitivity HDTV camera and objective spectrometer from UV to visible wavelength for meteor observations' in this session). The other is a visible wavelength image intensifier and a DV camera.

We obtained about 20 spectra of meteors and 1 spectrum of a persistent train during 2 hours around the peak time, 4:00 19th, Nov. (UT). In this session, we report the results of the spectroscopic analysis and compare with past results.

References

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S. Abe, H. Yano, N. Ebizuka and J. Watanabe, 'First results of High-definition TV Spectroscopic Observations of the 1999 Leonid Meteor Shower', Moon and Planets, 82-83, 369-377, (2000).

Related web sites

Leonid meteor shower (Nippon Meteor Society): http://www.nms.gr.jp/nmsleo0.html

Spectroscopy of meteors, Grism: http://atlas.riken.go.jp/~ebizuka/ebi.html

NASA Leonid MAC: http://leonid.arc.nasa.gov/