

Observation examples of upper atmospheric luminescence detected by amateur observers

Masa-yuki Yamamoto[1]; Satoshi Uehara[2]; Yoichi Okamoto[3]; Yukihiro Takahashi[4]; Kazuo Shiokawa[5]; Mitsuteru Sato[6]; Masayuki Toda[2]; Yoshihiro Higa[2]; Takuya Ohkawa[7]

[1] Kochi University of Technology; [2] NMS; [3] Showa Kaken; [4] Dept. Geophysics, Tohoku University; [5] STE Lab., Nagoya Univ.; [6] Dept. of Geophysics, Tohoku Univ; [7] AstroArts Inc.

Due to the drastic development of the imaging technology, observation of upper atmospheric luminescence in mesosphere, thermosphere, and ionosphere have increased. Amateur observers recently reported the detections of these phenomena. The observation of bright meteors by Japan Fireball Network (Shimoda et al., 1998-) as well as the internet broadcasting of stellar image using high-sensitivity video camera (Okamoto, 1998-) have been operated by amateur astronomers. Amateur observers play a significant role in the coordinated multiple-sites observations of extremely rare phenomena. For example, observation campaign of persistent meteor trains (Yamamoto et al., 1998-) brought many meteor train images of Leonids (e.g. Toda et al., 2003). Continuous monitoring of stellar images has successfully detected meteor events; moreover, upper atmospheric luminescence of low-latitude aurora, airglow, and sprites became observable recently.

Stellar live camera at Yatsugatake using panchromatic storage CCD camera (SS-10/XC-75) with time lapsed video recorder provides stellar images on web sites in real time. Northward looking camera at Yatsugatake detected upper atmospheric luminescence on Oct. 29, 2003 (UT) when low-latitude aurora was observed in northern part of Japan. Sequence of each 8 s exposure images revealed eastward drift of faint meridian luminescence belts. All-sky imager of OI (630.0 nm) at Rikubetsu observatory of STEL, Nagoya University detected bright low-latitude aurora at the same time, namely, saturation of northern half of the field of view. It was suggested that the luminescence detected at Yatsugatake was short time fluctuation of luminescence induced by low-latitude aurora.

Another observation result was obtained by a new combined system of high-sensitivity video camera (WAT-100N) and auto detection software (UFOCapture). Auto detection of bright meteors became available using the combined capturing system in 2003; moreover, a dozen of the sprite events were detected by an amateur observer at Osaka on Dec. 16, 2003 (Uehara, 2004). The sprite events are confirmed by another observation at Iitate observatory of Tohoku University. Simultaneous observation of the both results will reveal 3-dimensional structures of sprites.

The detection of upper atmospheric luminescence by amateur observers may increase in near future. The discussion about optimum observation method as well as the beneficial feedback from scientists to amateur observers will produce scientifically worthy data by these observations. Moreover, the development of public outreach of upper atmospheric science field is expected by the research activities with observers in public. In this paper, recent observation examples by amateur observers will be reported. Topics of observation network by amateur observers and future cooperated works of upper atmospheric science by professional scientist with amateur observers will be discussed.

Acknowledgement: The authors express sincere thanks to Mr. SonotaCo who created the auto detection software of UFOCapture.

References:

- Okamoto, Y., Stellar image in Yatsugatake (in Japanese), <http://www.fsinet.or.jp/%7Eimage/>, 1998-.
- Shimoda C., and the members of JN, Japan fireball network (in Japanese), <http://www3.cnet.ne.jp/c-shimo/index.html>, 1998-.
- Toda et al., Yamamoto, M.-Y., Higa, Y., and Fujita, M., Meteor train observation (METRO) campaign in Japan I: Evolution of the campaign and observation results during 1998-2001, *Inst. Space Astro. Sci. Rep. SP, 15*, 229-236, 2003.
- Uehara S., 'Fairy' was taken by meteor video camera: The first sprites detection by amateur observers in Japan, *Gekkan Hoshinavi*, 5, No.3, 13, 2004.
- Yamamoto, M.-Y., Toda, M., and Higa, Y., Meteor train observation campaign (in Japanese), http://www3.plala.or.jp/MY_Yamamoto/campaign/, 1998-.