A JOVIAN BOLIDE MONITORING IN UEC. K. Imai[1], R. Kamei[1] and M. Yanagisawa[1]. Univ. Electro-Communications (1-5-1 Chofugaoka, Chofu-shi, Tokyo 182-8585, JAPAN, k.imai@uec.ac.jp)

Background: The probability of cometary impacts on Jupiter as the Shoemaker-Levy 9 (SL9) in 1994 has been thought to be once in hundred years [1]. However, a probable impact scar was found on the jovian surface in 2009. It is thought that the scar was made by a 100-500m diameter object. Furthermore, in 2010, two jovian bolides were observed in three months [2, 3]. These observations suggest that impact rates on Jupiter would be higher than it has been thought. Our objective is deriving the frequency of jovian bolides by long-term observations.

Observation: A Schmidt-Cassegrain telescope (C11: aperture = 280mm, focal length = 2800mm) with a Powermate (Tele Vue) has an effective focal length of 6160mm (see Fig. 1). Analog signals from a 3CCD video camera (SONY XC-003) are converted into digital signals through a TV monitor/converter (SONY GV-D1000). The digital signals are captured in PC, and our jovian bolide detection program searches for bolides in real time in the G signals (green) of the camera.

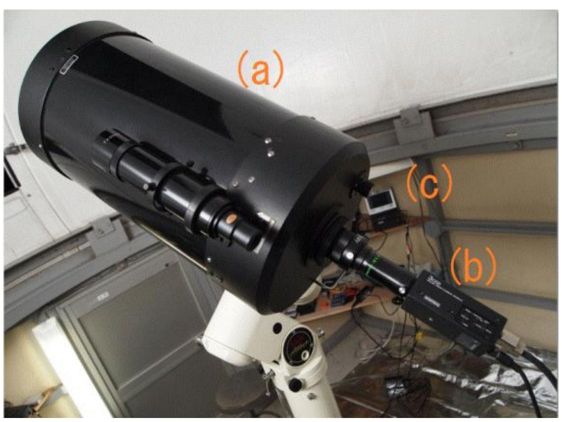

Figure 1. A jovian bolide monitoring system in UEC consists of a telescope of 280mm in aperture (a), a video camera (b) , a TV monitor with AD converter (c), and a personal computer.

Result: We operated our system for about 60 hours from November 17, 2011 to January 17, 2012 in the University of Electro-Communications (Tokyo, Japan). Jovian bolides were not detected. Detection limits in magnitude were estimated from the brightnes of Jupiter and the images of background stars. The limits were calculated every 5 minutes during the observations. They were then converted into meteorid diameters, assuming an impact velocity of 60km/s and a radiation efficiency in [4].

Observationl periods, when bolides larger than the limit diameters should be detected, were added up for the limit diameters, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0 and 4.5m. The upper limit of the cumulative impact rate on Jupiter was calculated for each diameter and shown in Fig. 2. Three lines in Fig. 2 are cumulative cometary impact rates mainly based on the crater size distribution on Europa (Case A), on Triton (Case B), and the collisional evolution model for TNO (Case C). Our results are not consistent with Case C.

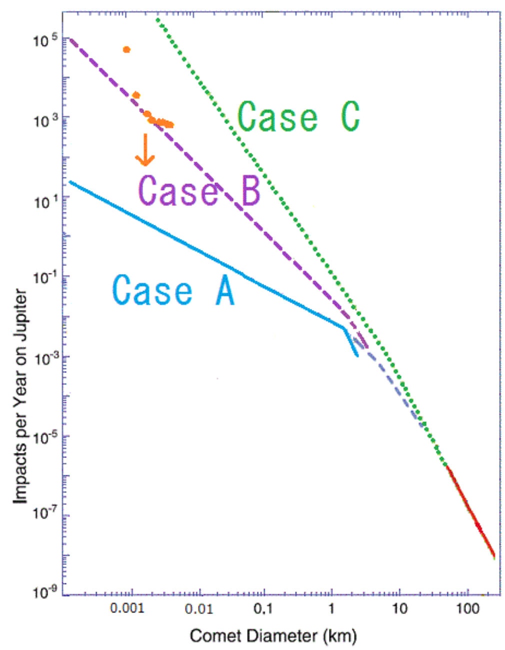

Figure 2. Cumulative cometary impact rates on Jupiter are plotted against comets diameters (modified from Zahnle et al. 2003 [5]). Eight dots in the upper left show the upper limits derived from our observasions.

This research was supported by JSPS KAKENHI (23540501).

References: [1] Zahnle K. et al. (2003) *Icarus, 163*, 263-289. [2] Hueso R. et al. (2010) *The Astrophysical Journal Letters*, *721*, L129-L133. [3] Tabe I. (2010) www.libra-co.com/mastro/J2010augevent.html. (last accese 2012/2/22). [4] Brown P. et al. (2002) *Nature*, *420*, 294-296.