イオプラズマトーラスの突発増光現象におけるエネルギー供給過程の特定

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Identifying the energy supply process for the Io plasma torus during the sudden brightening events.

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The terawatt order radiative emission from the Io plasma torus (IPT) has been observed. To balance with this energy loss, ion pick up mechanism is thought to be a major energy input. Sulfur and oxygen atoms, ejected by the Io's volcanic activity, are ionized and subsequently accelerated to near corotation with the Jovian magnetic field. The kinetic energy of the ions then heats the electrons by coulomb collisions. The energy supply only by this process is insufficient to balance with the observed energy emission. Current energetic models for the IPT introduce *ad hoc* non-pickup energy input. Smith et al. (1988) has suggested that radially inward diffusing hot ions could compensate for the missing input energy. The physical chemistry models of the IPT introduced by such as Delamere and Bgaenal (2003, 2011), are implying that hot electrons are important to maintain the energy balance. However, there are no observational evidence for these non-pickup energy supply processes.

In this study, we identify the energy supply process during sudden brightening events of the IPT observed by Hisaki satellite. The durations of the IPT brightenings were measured using the light curves. Most of the durations were shorter than 25 hours. Based on the calculations regarding relaxation time for coulomb collisions, short-lived events suggest that hot electrons (not ions), which energies are several hundreds of eV, should contribute to the IPT brightening events.