

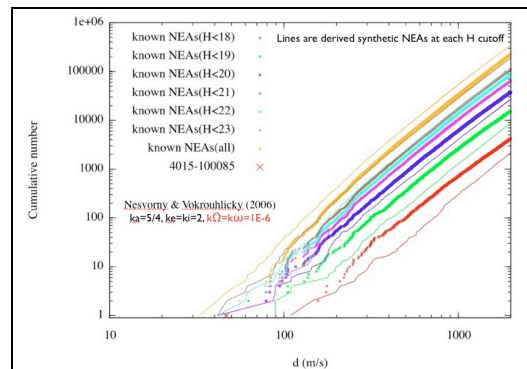
## 研究課題名 近地球型小惑星の起源と進化

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利用カテゴリ 汎用PC

### (1) Pan-STARRS all sky survey for detecting Near-Earth Asteroids

The Panoramic Survey Telescope And Rapid Response System “Pan-STARRS” is a project, initiated by the Institute for Astronomy (IfA) University of Hawaii, to repeatedly survey covering three quarters of the entire sky. Since 2010 the prototype single-mirror telescope “Pan-STARRS-1 (PS1)” has been operating on Mt. Haleakala in Hawaii. Its scientific research program is being undertaken by the PS1 Science Consortium – a collaboration between 10 research organizations in 4 countries including National Central University Taiwan. To turn NEO candidates to discoveries, follow-up observations of NEOs have been conducted. We have established our own follow-up procedure using remote telescopes in Arizona and in Taiwan. Our effort of follow-up of PS1 NEO candidates have succeeded to discover more than 15 new NEOs and 30 Main-belt objects per month. My regular contribution to the discovery of NEOs is now contributing to NASA NEOO (Near-Earth Objects Observations) program. Among these discoveries, I computed their orbital integrations to check the similar orbital evolution for finding NEO pairs. A paper (S.Abe, M. Granvik, R. Jedicke, R. Wainscoat, D. Tholen, L. Denneau(IfA), T. Grav(JHU), D. Kinoshita, C.-K. Chang, W.-P. Chen & W.-H. Ip(NCU), 2011), “the first discovery of disrupted NEO pair” has been gone through *Nature* review. However, this paper was decided to publish in another journal (to be submitted to *Icarus*).



(2) HAYABUSA is the first spacecraft ever to land on and lift off from any celestial body other than the moon and returning asteroid samples to the Earth while overcoming various troubles. The mission ended on June 13, 2010, with the planned atmospheric re-entry. I observed the HAYABUSA using imaging and spectroscopic cameras in 2010. Synthetic molecular spectra were carried out using the SPRADIAN numerical code (Fujita & Abe 1997) to examine physical conditions such as temperature, density and abundances in the gaseous plasma. Vibration and rotation temperatures as well as column density were parameters to simulate synthetic spectra using CfCA computer facility. A strong shock layer of HAYABUSA spacecraft was rapidly formed at heights between 93 km and 83 km which was confirmed by a detection of  $N_2^+(1-)$  bands with a vibration temperature of  $\sim 13000$  K. A paper (S. Abe, K. Fujita, Y. Kakinami, O. Iiyama et al.) was submitted to PASJ in June 2011.

