# (Preliminary) Results of Coordinate Multiwavelength Observational Campaign of Two Jupiter-Family Comets

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**Abstract**. In the three years between 2016 and 2018 three small Jupiter-family comets (JFCs)—45P/ Honda-Mrkos-Pajdušáková (HMP), 41P/Tuttle-Giacobini-Kresák (TGK), and 46P/Wirtanen—will pass within 0.15 au of Earth, affording a unique opportunity to study the inner coma of these objects at unprecedented resolution. After the 2018 apparition of 46P we expect no similar opportunity to observe JFCs at close range until 2038. Small JFCs have been proposed as potential targets of comet sample return missions; thus, understanding the inner coma processes including interaction with the nucleus is important for understanding the behavior of these bodies as mission targets. We present preliminary results of a coordinated, multiwavelength observing campaign involving optical, infrared, radar, and radio telescopes to characterize the near nucleus and inner coma regions of comets 45P/HMP and 41P/TGK.

Studying the inner comae of these JFCs reveals cometary surface activity patterns, compositional uniformity, and the rotation states (whether rotating uniformly or tumbling). Ground-based telescopic measurements provide information about gas physics processes and interaction between the solid, central nucleus surface and the inner coma.

Comets 45P/HMP and 41P/TGK passed sufficiently close to Earth to observe structures in the near nucleus region. From these high resolution observations short lived molecular species can be detected [1] and, from radial distribution models, used to constrain the photochemical evolution of short lived or multiple source molecular species [2]. The observation campaign includes data from a global network of amateur observers, as well as a course at the University of Arizona on hands-on observational comet astronomy.

Our observational campaign includes temporal monitoring of comet dust and also volatiles using narrow band imaging [3], as well as radio measurements of OH production [4,5] and planetary radar measurements of shape, rotation, and dust distribution [6,7]. Narrowband temporal monitoring data has been obtained over the course of 60+ nights of observations from telescope facilities of Steward Observatory at the University of Arizona as well as the Vatican Advanced Technology Telescope. Radar and radio measurements were obtained from the Green Bank Radio Telescope and Arecibo Observatory.

**References:** [1] Samarasinha, N. H. et al. (2011) *ApJ Lett, 734*, L3. [2] Harris, W. M. et al. (1997) *Science, 277*, 676-681. [3] Samarasinha N., et. al. (2015) *Plan. Space Sci., 118*, 127. [4] Schloerb F. P., De Vries C. H., Lovell A. J., Irvine W. M., Senay M., and Wooten H. A. (1999) *Earth, Moon, and Planets, 78,* 45-51. [5] Lovell A. J. and Howell E. S. (2009) AAS/DPS meeting 41, abstract #15.06. [6] Harmon J. K. et al. (2004) *Comets II,* 265-279. [7] Howell et al. (2014) AAS/DPS meeting 46, abstract #209.24.