

SPACE EXPLORATION SYMPOSIUM (A3)
Small Bodies Missions and Technologies (4)

Author: Dr. Robert Farquhar
Harbin Institute of Technology, United States, robert.farquhar@kinetx.com

Prof. Wuxing Jing
Harbin Institute of Technology, China, jingwuxing@hit.edu.cn
Dr. Yingjing Qian
Harbin Institute of Technology, China, qianyingjing@gmail.com
Prof. Joseph Veverka
Cornell University, United States, veverka@astro.cornell.edu
Dr. David Dunham
United States, david.dunham@kinetx.com

A UNIQUE MULTI-COMET MISSION OPPORTUNITY FOR CHINA IN 2018

Abstract

An exceptional multi-comet flyby mission opportunity for China is described. This would be China's second space mission to a small body following the 2012 encounter of Chang'e-2 with the near-Earth asteroid 4179 Toutatis. The first encounter with comet 46P/Wirtanen would occur in mid-December 2018 when the comet is near perihelion and less than 0.08 AU from Earth. At this time, Wirtanen is also close to opposition and is ideally positioned for simultaneous telescopic observations from China and other observatories in the Northern Hemisphere. The nominal mission plan calls for the multi-comet spacecraft to utilize a low-energy, 1.4-year Earth-return trajectory in March 2018. When the spacecraft returns to the Earth's vicinity in August 2019, an Earth gravity-assist maneuver would be used to re-target the spacecraft for a second flyby encounter with comet 73P/Schwassmann-Wachmann-3 (SW3) in August 2022. Comet SW3 is noteworthy because of its spectacular breakup in 2006. To maximize the probability for a successful encounter, the spacecraft would be targeted for a stable fragment known as SW3-C. A summary of the proposed multi-comet mission is presented including science objectives, instrumentation, spacecraft requirements, and trajectory design. The possibility of US participation in the multi-comet mission is also examined.