Small body exploration in China

Jiangchuan Huang\textsuperscript{1,2}, Xiaojing Zhang\textsuperscript{3}, Tong Wang\textsuperscript{1}, Zhuoxi Huo\textsuperscript{2}, Xian Shi\textsuperscript{3}, and Linzhi Meng\textsuperscript{1}

\textsuperscript{1}China Academy of Space Technology
\textsuperscript{2}Qianxuesen Laboratory of Space Technology, China Academy of Space Technology
\textsuperscript{3}Max Planck Institute for Solar System Research

The past twenty years have seen an evolution in the definition and categorization of small bodies in the Solar System. While new types of bodies are being discovered at an increasing pace, objects familiar to us have been rediscovered with traits previously unknown, resulting in “hybrid” bodies like “Main-belt comets” or “active asteroids” [1]. New knowledges of small bodies are essential to further our understanding of the solar system as they directly shed light on planetary formation and evolution scenarios, the distribution and migration of water, and the emergence of life. To get a full picture of these small bodies, it is necessary to carry out detailed and comprehensive investigations, especially with dedicated space missions. As demonstrated by the success of a number of such missions recently completed and ongoing, a growing consensus is emerging that future missions should: 1) cover a diversity of targets, especially those never visited before; 2) characterize the structure and composition of the target body with highest possible resolution. The first Chinese small body mission is designed to take on both challenges by performing sample return from a quasi-satellite of the Earth—2016 HO3 and visiting for the first time a ”main-belt comet”--133P/Elst-Pizarro.

In April 2019, CNSA released an open call of onboard opportunity for an asteroid exploration mission [2] which encourages international cooperation. This asteroid exploration mission is characterized by multi-task, multi-target and multi-mode (e.g. joint exploration by multiple devices, landing and sampling etc.). On the basis of feasibility demonstration, design research and key techniques research, various work of the mission is currently in progress, such as the scientific research of small celestial particles, that is, combining remote sensing and surface in-situ measurement data and features of different scales (sub-millimeter to decimeter) to obtain clues of composition and evolution of small bodies.
