

**Concept of Operations for Emirates Mission to Explore the Asteroid Belt:** H. A. Alblooshi<sup>1</sup>, M. E. Lefevre<sup>2</sup>, M. O. Al Amri<sup>3</sup>, M. H. Salem<sup>4</sup>, <sup>1</sup>UAE Space Agency ([h.alblooshi@space.gov.ae](mailto:h.alblooshi@space.gov.ae)), <sup>2</sup>Laboratory for Atmospheric and Space Physics (LASP) ([mykal.lefevre@lasp.colorado.edu](mailto:mykal.lefevre@lasp.colorado.edu)), <sup>3</sup>UAE Space Agency ([M.AIAmeri@space.gov.ae](mailto:M.AIAmeri@space.gov.ae)), <sup>4</sup>UAE Space Agency ([m.salem@space.gov.ae](mailto:m.salem@space.gov.ae))

**Introduction:** Emirates Mission to Explore the Asteroid Belt is an Emirati interplanetary mission that is part of the Projects of the 50 series of developmental projects being advanced by the government of the United Arab Emirates. The mission is being developed in partnership with the Laboratory for Atmospheric and Space Physics (LASP) at the University of Colorado, Boulder. The mission is an exploration mission that will fly through the inner solar system and then investigate asteroids in the main belt between Mars and Jupiter. The mission launch is planned for 2028. The primary objectives of the program are in the areas of Space Resources technologies and fundamental Science. Additional, high-priority objectives are innovation, public engagement and the development of space sector industry infrastructure in the UAE.

The primary objectives of the program are: 1) Space Resources Technologies and 2) Science. The Science and Resources Traceability Matrix (SRTM) defines the high-level goals and objectives. Additional, high-priority objectives are: 1) innovation, 2) public engagement and 3) space sector industry infrastructure in the UAE. The mission will launch in 2028 and visit, via high-speed flyby encounters, 6 asteroids en route to a rendezvous with a 7th asteroid. The mission goals are: 1) Understand the origins and evolution of water-rich asteroids, 2) Assess resource potential of asteroids, and 3) prepare the way for future asteroid resource use.

**Concept of Operations:** The operational phase of the mission will be divided into several flight phases. Some types of phases happen more than once (planetary gravity assists, cruises, and asteroid flybys). In these cases, phases will be developed so that the differences between phases are, to a reasonable extent, parametric. This will allow the re-use of operational products. The categories of phases are:

- Launch & Early Operations
- Cruise (multiple segments of this phase between encounters)
- Flyby Encounter (6 distinct flybys)
- Planetary Flyby Gravity Assist (Venus, Earth, & Mars)
- Rendezvous & Proximity Operations (RPO) consisting of sub-phases:
  - Arrival
  - Science
  - Decommissioning

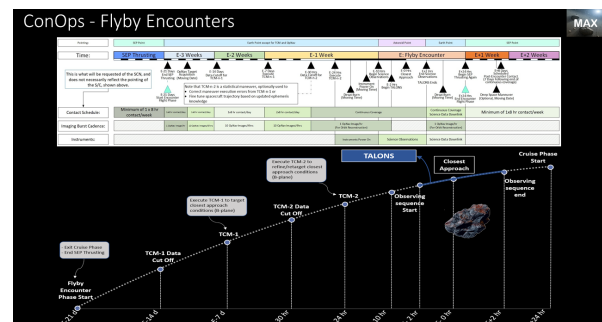
This presentation submission will highlight the Concept of operation only during the flyby phases of the mission.

**List of Bodies:** The mission will visit the following asteroids:

- Flyby: 10253 Westworld (2116 T-2)
- Flyby: 623 Chimaera (A907 BC)
- Flyby: 13294 Rockox (1998 QC105)
- Flyby: 88055 (2000 VA28)
- Flyby: 23871 (1998 RC76)
- Flyby: 59980 (1999 SG6)
- Rendezvous: 269 Justitia (A887 SA)

The presentation will detail out the flyby encounter for the flybys targets and it will show the events and activities that will be conducted. The Explorer will have autonomous tracking system, the operations of this system along with the remote sensing instruments on board of the explorer will be presented in the presentation.

The concept of operation during the flyby encounter phase is presented in the figure below:



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