Paper ID: 84981
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IAF SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Science, Instruments and Technologies (3B)

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RENDEZVOUS WITH ORBITING MARS SAMPLES – SYSTEM DESIGN AND OPERATIONS APPROACH.

Abstract

The Mars Sample Return (MSR) campaign aims to use three flight missions and one ground element to safely bring rock cores, regolith and atmospheric samples from the surface of Mars to Earth to answer key questions about the geologic and climate history of Mars, including the potential for ancient life. Since its landing in Jezero Crater in 2021, the first mission, NASA's Mars 2020, has collected a number of samples on the crater floor and on the delta using the Perseverance rover. A subsequent mission would recover the sealed sample tubes and launch them into Mars orbit. The European Space Agency (ESA) has started the development of its contributions to MSR, which include the Earth Return Orbiter which will capture the sample container and bring it back to Earth. This paper describes the design and operations approach of the detection of the sample container, the orbit matching and the final rendezvous and capture of the valuable Mars samples.