

IAF SPACE EXPLORATION SYMPOSIUM (A3)  
Mars Exploration – missions current and future (3A)

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# MARS SAMPLE RETURN – AN OVERVIEW OF THE CAPTURE, CONTAINMENT AND RETURN SYSTEM

## Abstract

The Mars Sample Return campaign aims at bringing back soil and atmospheric samples from Mars to Earth to answer key questions about Mars' biological evolution by means of four missions. The first one, Mars 2020, landed on the red planet on February 18, 2021 and has to date collected a number of samples through the Perseverance rover. The three subsequent missions aim to recover the sample tubes, launch them into Mars orbit and transport them back to Earth. These missions are currently in the planning and design stages of development and represent an international effort comprising NASA, the European Space Agency and many industry partners. The work presented here provides an overview of the current design and concept of operations of the NASA-provided Capture, Containment, and Return System (CCRS), which is the payload of the ESA-provided Earth Return Orbiter (ERO). ERO would rendezvous with the orbiting samples and CCRS would capture them, contain them and robotically insert them into a capsule that would return the samples to Earth, the Earth Entry System (EES). About three days before arrival on Earth, CCRS releases the EES on an Earth entry trajectory, which then passively enters Earth's atmosphere, descends on a highly predictable trajectory and safely lands notionally at the Utah Test and Training Range. The decision to implement Mars Sample Return will not be finalized until NASA's completion of the National Environmental Policy Act (NEPA) process. This document is being made available for information purposes only.