

SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Science, Instruments and Technologies (3B)

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IRENA, DEMONSTRATING RE-ENTRY TECHNOLOGIES FOR MARS AEROCAPTURE

Abstract

IRENA (for International Re-Entry demoNstrator Action) is an action performed by an international consortium aiming at defining two technology demonstrator projects to validate advanced entry/re-entry technologies. In addition, IRENA shall create the ground for the implementation of these two projects in an international framework, such as promotion to ISECG, or next step in Horizon 2020 program. This action has received funding from the European Union's Horizon 2020 research and innovation programme, under the strategic objective COMPET-2014. It has started in January 2015, and will finish in April 2016. To achieve these objectives, IRENA relies on an international and complementary team: four major European and international space agencies (CNES, DLR, NASA, JAXA), the two European industry leaders in entry/re-entry and space exploration (Airbus Space and Defence, Thales Alenia Space) and a research institute expert in dissemination and exploitation (Demokritos). To maximise the chances of the projected demonstrators materialising in the future, the international dimension is essential, which explains why two key non-European actors (NASA and JAXA) have been invited to join a team based otherwise on the most prominent European actors in the field. Advances in re-entry systems and related technologies will enhance of scientific missions in the solar system and prepare future human exploration by developing the following capacities: - Aerocapture on Mars or other atmospheric bodies, - Return of non-terrestrial samples, which need high velocity re-entry capsules, - Precision landing, in particular on Mars, - High mass landing, in particular in view of future Martian infrastructure needed for human sustenance. This paper will present the results of IRENA with a particular focus on the two flight demonstrators which have been studied thoroughly in the final part of the study : - Mars aerocapture demonstrator, at Mars - Earth aerocapture demonstrator, in preparation to Mars aerocapture We will present how and why these two demonstrators were selected amongst a large number of candidates within the frame of a trade-off that was work carried out at a workshop in the Concurrent Design Facility of CNES, Toulouse. We will then elaborate the technical design of both demonstrators, and the way forward defined by the IRENA team to implement them in terms of governance, funding, and international cooperation.