

SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – Part 2 (3B)

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TECHNOLOGICAL DEVELOPMENT AT CNES TOWARDS MARS SAMPLE RETURN

Abstract

There is a general consensus amongst the scientific community that the mission to Mars which would have the single greatest scientific return is one that would return samples from the Martian surface. From a programmatic perspectives, there is now little hope that a such a mission could take place before the mid 2020's. However, several critical technologies to prepare a potential European contribution to this mission need to be prepared now CNES has identified a set of critical issues, and initiated development and demonstration efforts of potential solutions. More specifically, we are currently building-up expertise on :

- Aerodynamics for entry capsules, particularly in the area of radiative flux prediction during Mars atmosphere entry. A dedicated sensor called ICOTOM is under development in collaboration with DLR. It should be implemented on the back-shell of the Entry and Descent Module of ExoMars, currently planned for launch in 2016.

- Rover autonomous navigation. An extensive test campaign demonstrated at the end of last year that the algorithms which have been build up within the frame of our EDRES (for Environnement de Développement pour la Robotique d'Exploration Spatiale) workshop are compliant with the navigation requirements of a set of three instruments of the ExoMars Pasteur payload.

- Rendez-Vous with non cooperative objects : a spectacular demonstration was achieved last year within the frame of CNES' participation to the Prisma mission Prisma stands for Prototype Research Instruments and Space Mission technology Advancement. It has been implemented by SSC to demonstrate critical technologies for enabling various types of proximity operations.

- Seal-proof sample transfer chain, where we investigate in particular the potential of laser welding,
- Mars sample transport and handling on Earth, through the development of a P4 class container aimed at transporting potentially hazardous samples to top class analysis facilities (such as synchrotron, for example).

The proposed paper will present in details the objectives of these developments, and highlight the most recent results that will have been obtained at the time of the conference.