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Mars Exploration – Science, Instruments and Technologies (3B)

Author: Mr. Gabriel Pont
Centre National d'Etudes Spatiales (CNES), France, gabriel.pont@cnes.fr

Dr. Roger Wiens
Los Alamos National Laboratory, United States, rwiens@lanl.gov
Dr. Sylvestre Maurice
Institut de Recherche en Astrophysique et Planétologie (IRAP), France, sylvestre.maurice@cesr.fr
Dr. Olivier Gasnault
Institut de Recherche en Astrophysique et Planétologie (IRAP), France, olivier.gasnault@cesr.fr
Mr. Scott Robinson
Los Alamos National Laboratory, United States, shr@lanl.gov
Mrs. Pernelle Bernardi
LESIA - Observatoire de Paris, France, pernelle.bernardi@obspm.fr
Mr. Philippe Caïs
Laboratoire d'astrophysique de Bordeaux, Univ. Bordeaux, CNRS, France, philippe.cais@u-bordeaux.fr
Mr. Tony Nelson
Los Alamos National Laboratory, United States, tenelson@lanl.gov
Mrs. Muriel Deleuze
Centre National d'Etudes Spatiales (CNES), France, Muriel.Deleuze@cnes.fr
Dr. Jean-Michel Rees
LESIA - Observatoire de Paris, France, jean-michel.reess@obspm.fr
Prof. Fernando Rull
Spain, rull@fmc.uva.es
Mr. Raymond Newell
Los Alamos National Laboratory, United States, raymond@lanl.gov
Dr. Ivair Gontijo
Caltech/JPL, United States, ivair.gontijo@jpl.nasa.gov
Dr. Peter Willis
Jet Propulsion Laboratory - California Institute of Technology, United States, peter.a.willis@jpl.nasa.gov
Mr. Vishnu Sridhar
Caltech/JPL, United States, vishnu.sridhar@jpl.nasa.gov

SUPERCAM ON ITS WAY TO MARS

Abstract

Following the footsteps of the ChemCam instrument, which has been successfully operated on Mars for more than seven years as part of NASA Curiosity rover instrument suite, an improved instrument, called SuperCam, has been developed and integrated on the NASA Mars 2020 rover.

SuperCam is a suite of five different remote techniques in order to identify the chemical composition of rocks and soils, and also their molecular composition. In addition to the elemental characterization offered by Laser-Induced Breakdown Spectroscopy (LIBS) already implemented on ChemCam, time resolved

Raman (TRR) and infrared spectrometry (IR) have been added for a complete mineralogical and chemical characterization of the samples at remote distances (1.5 – 7 m for laser-induced techniques, up to infinity for the passive techniques). A context color imaging capability (RMI) is also implemented to place the analyzed samples in their geological context, as well as a microphone (MIC) that provides information on the hardness of the targets when coupled to LIBS, and acoustic data from the wind and rover-induced sounds.

SuperCam consists of three units. The "Body Unit" built by LANL (Los Alamos National Laboratory) in the US, the "Mast Unit" built by a French consortium of 7 laboratories and institutes (IRAP, LESIA, LATMOS, OMP, LAB, IAS, and CNES) funded by the French Space Agency (CNES), and a "Calibration Target Unit" under the responsibility of the University of Valladolid in Spain.

The Flight Model was delivered to JPL (Jet Propulsion Laboratory, USA) in June 2019 and integrated into Mars2020 mission rover. It went successfully through the ATLO (Assembly, Tests and Launch Operations) test campaign and demonstrated excellent performance during the Thermal tests at Mars pressure.

The rover is now at KSC (Kennedy Space Center, USA) and will be launched to Mars in July 2020. The landing is planned on February 18th, 2021, and will be quickly followed by the first tests of the various instruments, including SuperCam.

The paper will focus on the instrument design and development and will give an overview on the operations organization.