

IAC-18,A3,3B,11,x42992

COMARS+ Instrumentation Package of the ExoMars Schiaparelli Lander and its Flight Performance

Ali Guelhan^{a*}, Thomas Thiele^a, Frank Siebe^a, Thorn Schleutker^a

^a *Department of Supersonic and Hypersonic Technologies, Institute of Aerodynamics and Flow Technology, German Aerospace Center (DLR e.V.), Linder Hoehe, 51147 Cologne, Germany, ali.guelhan@dlr.de*

* Corresponding Author

Abstract

The instrumentation package COMARS+ was part of the back cover instrumentation of the ExoMars Schiaparelli lander and consisted of three COMARS sensors and one broadband radiometer. The aerothermal sensors called COMARS combine four discrete sensors measuring static pressure, total heat flux, temperature and radiative heat flux. The Schiaparelli capsule was launched on top of a Proton launcher on 14th March 2016. The entry into the Martian atmosphere took place on 25th October 2016. All COMARS+ sensors operated nominally during the complete entry phase. But the complete flight data package is not available due to an anomaly that led to the failure of Schiaparelli shortly before landing. Nevertheless, a subset of the COMARS+ flight data was transmitted real-time during the entry phase and was received by the ExoMars 2016 orbiter, with the exception of the plasma blackout phase. The radiative heat flux on the back cover close to the vehicle shoulder was measured successfully for the first time on a Mars entry vehicle. The measured maximum radiative contribution was 61 % of the total heat flux at the first measurement point after the blackout phase and 33 % for the next measured trajectory point 10 seconds later. These measurements confirm recent findings that radiative heating can be a significant portion of the total heating on the back cover during Mars entry.

Keywords: ExoMars 2016, Schiaparelli, Martian Entry, COMARS+, Post Flight Data Analysis

—