

In situ plasma observations of comet Siding Spring encounter to Mars by ASPERA-3

Y. Futaana, M. Holmström, H. Nilsson and S. Barabash
Swedish Institute of Space Physics, Box 812, Kiruna 98128, Sweden (futaana@irf.se)

Abstract

Comet Siding Spring approached Mars with a closest distance of \sim 140000 km in October 2004. Due to expected enough outgas and dust release, it was expected the space environment of Mars would be disturbed. In situ plasma instrument, ASPERA-3, on board ESA's Mars Express in orbit of Mars during the comet encounter, was operated to detect the changes of plasma environment by the comet encounter. Here we will describe the plasma measurements conducted by ASPERA-3.

1. Introduction

In October 2014, the comet Siding Spring approached Mars with a closest distance of \sim 140.000 km. Due to enough expected activity including both gas and dust, and a high relative velocity against Mars, it was expected that the space environment of Mars would be disturbed [e.g. 1-3]. Several measurements near Mars report signatures of comet Siding Spring [e.g. 4-8].

2. Instrument

We will present an overview of the plasma measurements of ASPERA-3 during the comet Siding Spring encounter. The ion mass analyzer (IMA) and electron spectrometer (ELS), parts of Analyser of Space Plasma and EneRgetic Atoms (ASPERA-3) on Mars Express, carried out observations during the comet Siding Spring encounter.

3. Observation

At the time of the closest approach of Siding Spring to Mars (18:28 on 19th October, 2014), the Mars Express was nearly at pericenter. The measured plasma environment was highly disturbed in this

Siding Spring pass. However, two factors complicate the interpretation of this data: 1) a slew manoeuvre of the spacecraft for the Siding Spring campaign, and 2) more importantly, an interplanetary coronal mass ejection (ICME) traveled through the Mars space environment the day before the Siding Spring pass. The ICME was rather strong, with the maximum velocity of 650 km/s on 18th October observed by IMA. Associated disturbances of the upstream conditions lasted a couple of days, and thus the solar wind near Mars was also disturbed.

4. Summary

In this talk, we will describe the plasma measurement conducted by ASPERA-3 carefully in order to discuss and to identify the sources of the measured disturbed signatures.

References

- [1] Gronoff, G., et al., *Geophys. Res. Lett.*, 41(14), 4844–4850, doi:10.1002/2014GL060902, 2014.
- [2] Kelley, M. S. P., et al., *ApJL*, 792(1), L16, doi:10.1088/2041-8205/792/1/L16, 2014.
- [3] Yelle, R. V., et al., *Icarus*, 237, 202–210, doi:10.1016/j.icarus.2014.03.030, 2014.
- [4] Benna, M., et al., *Geophys. Res. Lett.*, 42(12), 4670–4675, doi:10.1002/2015GL064159, 2015.
- [5] Gurnett, D. A., et al., *Geophys. Res. Lett.*, 42(12), 4745–4751, doi:10.1002/2015GL063726, 2015.
- [6] Restano, et al., *Geophys. Res. Lett.*, 42(12), 4663–4669, doi: 10.1002/2015GL064150, 2015.
- [7] Ruhunusiri, S., et al., *Geophys. Res. Lett.*, 42(21), 8917–8924, doi:10.1002/2015GL064968, 2015
- [8] Schneider, N. M., et al., *Geophys. Res. Lett.*, 42(12), 4755–4761, doi:10.1002/2015GL063863, 2015.