



## **A new approach to analyse radio-occultation data**

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Highly-valuable information on the planetary environments can be obtained using the radio-occultation technique. Since 2004, the Mars Express Radio-Science (MaRS) experiment has enabled to perform several hundreds of soundings of the Martian ionosphere and neutral atmosphere. To analyse such measurements, the classical method is based on an inversion which requires strong assumptions on the planetary environment and which provides partial information on the retrieved atmospheric and ionospheric profiles. In this work, we developed a novel method for radio-occultation data analysis based on a direct approach. It consists in simulating a given radio-occultation experiment performed by Mars Express using a numerical model of the Martian envelope and computing the propagation of the radio waves between the spacecraft and the ground station on Earth. Not only does this approach remove some of the limiting assumptions necessary to apply the classical inversion method, but it also couples the neutral and the ionised regions of the Martian environment, thus giving physical constraints on the retrieved profiles. We present our analysis obtained with this new method for different occultation configurations, and we discuss the interests and the remaining limitations of such a method compared to the standard analysis.

Reference: Grandin, M., P.-L. Blelly, O. Witasse, and A. Marchaudon, (2014), Mars Express radio-occultation data: A novel analysis approach, *J. Geophys. Res. Space Physics*, 119, doi:10.1002/2014JA020698.