



## **The neutral atmosphere of Mars at ionospheric heights: A method to derive neutral atmospheric parameters from MaRS electron density profiles**

Kerstin Peter (1), Martin Pätzold (1), Gregorio Molina-Cuberos (2), Olivier Witasse (3), Silvia Tellmann (1), Bernd Häusler (4), and Michael Bird (5)

(1) Rheinisches Institut für Umweltforschung an der Universität zu Köln, Abteilung Planetenforschung, Köln, Germany (kerstin.peter@uni-koeln.de), (2) Universidad de Murcia, Murcia, Spain, (3) Research and Scientific Support Division of ESA, ESTEC, Noordwijk, The Netherlands, (4) Institut für Raumfahrttechnik, Universität der Bundeswehr München, Munich, Germany, (5) Argelander-Institut für Astronomie, Bonn, Germany

The radio-science experiment MaRS (Mars Radio Science) on the Mars Express spacecraft sounds the atmosphere and ionosphere of Mars since 2004. More than 600 vertical profiles of the Mars ionospheric electron density and lower atmosphere neutral density and temperature have been acquired. These simultaneous soundings of the ionosphere and the lower neutral atmosphere make it possible to get information on the behavior of the Mars neutral atmosphere at ionospheric heights, which is directly not accessible by radio sounding but indirectly from the observed ionospheric electron density profiles. A simple 1D neutral atmospheric model is combined with a 1D ionospheric model for altitude ranges from 80 km to 160 km. The start-scenario of the model neutral atmosphere depends on the observed neutral atmospheric density at lower altitudes. The modelled neutral atmosphere profile as input for the ionospheric model is iterated until an agreement with the true observed electron density has been achieved. Information on the state of the upper neutral atmosphere are derived from the agreement between the modeled and observed electron density profiles.