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Observations of the Martian neutral atmosphere with the Radio Science Experiment MaRS on Mars Express

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The Radio Science Experiment MaRS on Mars Express is sounding the Martian atmosphere and ionosphere with the spacecraft radio signals at X-band and S-band in Earth occultation geometry.

Ionospheric electron density profiles and vertical profiles of pressure, temperature and density in the neutral atmosphere can be derived with an altitude resolution of only a few hundert metres.

The MaRS experiment retrieved about 100 vertical profiles of pressure, temperature and neutral number density from near the surface to about 50 km altitude during the first occultation season from April to mid August 2004 in the northern hemisphere at an average solar longitude of about 47˚. Thirty-two profiles have been obtained during the second occultation season (December 2004) in the southern polar latitudes at an average solar longitude of about 130˚ and approximately another 200 profiles from the third season again in the northern high latitudes at a solar longitude of about 271˚ (July - December 2005).

The elliptical orbit of Mars Express allows to examine a large range of local times and locations and can therefore be used to investigate latitudinal, diurnal and seasonal variations. The data set covers many daytime profiles, the development of the atmosphere in the early morning and in the polar night which could hardly be seen before by any other mission to this extent.

The data will be compared with a Martian General Circulation Model (GCM) devel-

oped by the Laboratoire de Météorologie Dynamique de C.N.R.S. (LMD).