EPSC Abstracts
Vol. 8, EPSC2013-906, 2013
European Planetary Science Congress 2013

The Martian Atmosphere as seen by the OSIRIS camera

R. Moissl (1), M.Pajola (2), A. Määttänen (3) M. Küppers (1) and the OSIRIS Team

(1) ESAC, Villanueva de la Cañada, Spain, (2) Center of Studies and Activities for Space, CISAS, `G. Colombo', University of Padova, 35131 Padova, Italy, (3) Université Versailles St Quentin, CNRS-INSU, LATMOS-IPSL, 11 boulevard d'Alembert, 78280 Guyancourt, France

Abstract

Despite the long time that has passed since the observations, only few studies based on the data from the wide- (WAC) and narrow- (NAC) angle camera systems of OSIRIS have been published to date. In this Paper we will present the results on the observations of the Martian Limbs acquired by the OSIRIS [1] instrument on board the ESA mission Rosetta during its swing-by maneuver around February 25th, 2007 on the way to Comet 67P/Churyumov-Gerasimenko, during the onset of the very active dust storm season of Mars year 28 (at Ls ~190). Although OSIRIS did only capture the Planet during a relatively short time interval of several hours, the obtained global view and the spectral coverage, from the UV (245 nm) over the full visible range to the near IR (1000 nm), allow for a valuable global overview over the state of the Martian atmosphere.
The image acquisition started at February 24 around 18:00 UTC from a distance of about 260.000 km and continued until 04:51 UTC on February 25 to a distance of 105.000 km. During the Closest Approach to the Planet at 01:54 UTC on February 25 at a distance of 250 km. All images have been manually co-registered with the help of SPICE data, and vertical profiles have been extracted over the limb in intervals of ~0.5 degrees (see Figures 1 and 2).
In this work we will focus on our findings about the vertical structure of the atmosphere over the Martian limbs and report on the observed altitudes and optical densities of dust and (partially detached) clouds and put the findings in context with data from other satellites in orbit around Mars at the same time (e.g. Mars Express).
Based on previous datasets (MGS/TES, MOd/THEMIS, MRO/MCS, see, e.g., [2], [3] and [4]) we can expect to observe the waning of the South polar hood and the development of the Northern one. Some remains of the aphelion cloud belt might still be visible near the equator. Detached layers have been recently observed at this season by MEx/SPICAM [5] and MRO/MCS [6].

3. Figures

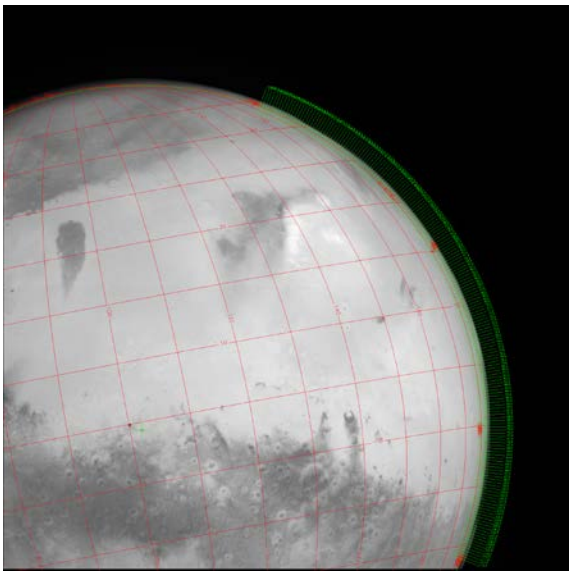

Figure 1: OSIRIS Image with Orange filter

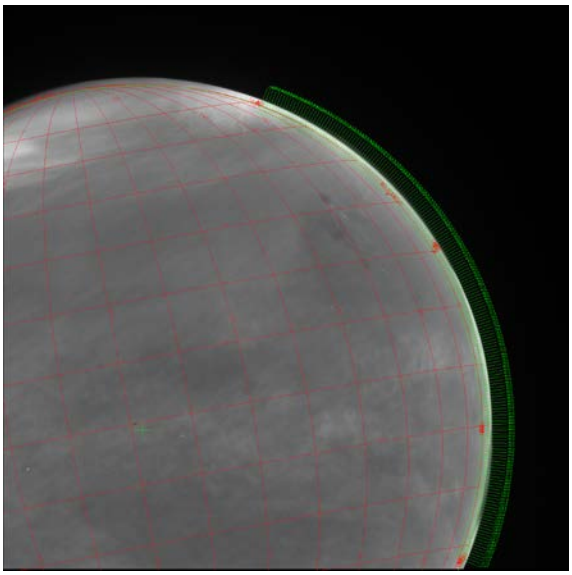

Figure 2: Image with Near-UV filter (same image set)

4. Tables

All Images used in this work have been acquired on February 24 2007 between 21:30 – 22:10 UTC.

Table 1: List of NAC image sets used in this analysis

NAC Image Set	Distance range (km)	Image scale Range (m/px)
56013000	130609 - 130127	2460 - 2451
56018000	124905 - 124443	2352 - 2344
57009000	111455 - 111041	2099 - 2091

References

[1] H. U. Keller, C. Barbieri, P. Lamy, H. Rickman, R. Rodrigo, K.-P. Wenzel, H. Sierks, M. F. A'Hearn, F. Angrilli, M. Angulo, M. E. Bailey, P. Barthol, M. A. Barucci, J.-L. Bertaux, G. Bianchini, J.-L. Boit, V. Brown, J. A. Burns, I. Büttner, J. M. Castro, G. Cremonese, W. Curdt, V. Da Deppo, S. Debei, M. D. Cecco, K. Dohlen, S. Fornasier, M. Fulle, D. Germerott, F. Gliem, G. P. Guizzo, S. F. Hviid, W.-H. Ip, L. Jorda, D. Koschny, J. R. Kramm, E. Kührt, M. Küppers, L. M. Lara, A. Llebaria, A. López, A. López-Jimenez, J. López-Moreno, R. Meller, H. Michalik, M. D. Michelena, R. Müller, G. Naletto, A. Origné, G. Parzianello, M. Pertile, C. Quintana, R. Ragazzoni, P. Ramous, K.-U. Reiche, M. Reina, J. Rodríguez, G. Rousset, L. Sabau, A. Sanz, J.-P. Sivan, K. Stöckner, J. Tabero, U. Telljohann, N. Thomas, V. Timon, G. Tomasch, T. Wittrock, and M. Zaccariotto: **Osiris - The Scientific Camera System onboard Rosetta**, *Space Sci. Rev.*, **128**,433–506, doi:10.1007/s11214-006-9128-4, 2007.

[2] Michael D. Smith**: THEMIS observations of Mars aerosol optical depth from 2002–2008**. Icarus 202, pp. 444–452(2009).

[3] Benson, J.L., Kass, D.M., Kleinböhl, A., McCleese, D.J., Schofield, J.T., Taylor, F.W., 2010. **Mars' south polar hood as observed by the Mars Climate Sounder**. J. Geophys.Res.115,E12015. http://dx.doi.org/10.1029/2009JE003554.

[4] Benson, J.L., Kass, D.M., Kleinböhl, A., 2011. **Mars' north polar hood as observed by the Mars Climate Sounder.**J.Geophys.Res.116,E03008. http://dx.doi.org/10.1029/2010JE003693.

[5] Anni Määttänen, Constantino Listowski, Franck Montmessin, Luca Maltagliati, Aurélie Reberac, Lilian Joly, Jean-Loup Bertaux: **A complete climatology of the aerosol vertical distribution on Mars from MEx/SPICAM UV solar occultations**. Icarus 223, pp. 892–941, 2013

[6] E. Sefton-Nash, N.A. Teanby, L. Montabone, P.G.J. Irwin, J. Hurley, S.B. Calcutt: **Climatology and first-order composition estimates of mesospheric clouds from Mars Climate Sounder limb spectra**. Icarus 222, pp. 342–356,2013