

Origins of the Martian Aurorae Observed by SPICAM on Board Mars Express

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During orbit 716 of Mars Express mission, the clear identification of an auroral type emission has been done by SPICAM UV spectrometer [1]. A significant increase of the measured emission has been observed during 7 seconds on the Martian nightside. This increase of the emission is not similar than the already well-identified nightglow emission [2]. It is composed of the CO ($A^1\Pi - X^1\Sigma^+$) 4P bands, of the C 156.1 and 165.7 nm, of the CO ($a^3\Pi - X^1\Sigma^+$) Cameron bands, of the CO₂⁺ ($\tilde{B}^2\Sigma_u^+ - \tilde{X}^2\Pi_g$) doublet and of the O (297.2 nm) emissions which classically composed the Martian dayglow.

Thanks to the property of SPICAM spectrometer we have been able to estimate the position and altitude of this emission along SPICAM field of view. The very high correlation between this position and the presence of the highest crustal magnetic field structures identified at Mars [3] strongly suggests the role of these structures in driving the incident electrons at the origin of these emissions. It is a strong identification of very localized peak of ion density on the Martian nightside in the region of crustal magnetic field and also of the importance of the crustal field in driving the nightside ionosphere.

I will describe the results of a new analysis of the observed emission thanks to a better calibration of SPICAM UV channel and the use of all spectral information obtained during this observation. Several possibilities for the origin of these emissions will be presented and discussed based on the particular geometry of the observation as well as the global present coverage of the Martian nightside by SPICAM UV channel.

[1] Bertaux, J.-L., F. Leblanc, O. Witasse, E. Quémerais, J. Lilensten, A. S. Stern, B. Sandel, and O. Korabiev, Discovery of aurora on Mars, *Nature*, 435, 790-794, 2005.

[2] Bertaux, J.-L., F. Leblanc, S. Perrier, E. Quemerais, O. Korabiev, E. Dimarellis, A. Reberac, F. Forget, P. C. Simon, A. S. Stern, and B. Sandel, First observation of nightglow in the upper atmosphere of Mars: the NO bands in UV and implications for atmospheric transport, *Science*, 307, 566-569, 2005.

[3] Acuña, M. H., *et al.* Magnetic field of Mars: Summary of results from the aerobraking and mapping orbits, *Journal of Geophysical Research*, 106, 23, 403-23, 417, 2001.