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# Mineralogy with VIS/OMEGA

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The Martian terrains exhibit variation in their degree of alteration. This diversity can indicate different environment conditions during formation of these terrains. For this reason one of the ideas of this paper is to characterized the Martian terrains on the basis of 0.4 $\mu$m absorption (B1) that is a good estimate of the degree of oxidation and subsequently on the basis of the behaviour of two other absorptions near 1.0 (B2) and between 2.0 and 2.3 $\mu$m (B3). The co-registration between the OMEGA VIS channel and the OMEGA NIR is needed in order to use the 1 $\mu$m band and to compare our results with the published mineral maps. In these paper we present some preliminary results about 5 regions, where some important minerals have been found: Valles Marineris, Aram Chaos, Terra Meridiani, Syrtis Major, Mawrth Vallis.
For the B1 we use the area enclosed by a horizontal line tangent to the spectrum at the VIS reflectance peak and the spectrum that we call A1. We use the horizontal line tangent because it is not possible to determinate the continuum. For B2 we use the area enclosed by the continuum (at the reflectance peaks in the VIS and near-IR) and the spectrum: A2. For B3 we use the area enclosed by a horizontal line tangent to the spectrum at the near-IR reflectance peak and the spectrum: A3. From RGB map (R=A1, G,=A2, B=A3) we can point out the more important spectral classes as olivine, ferric terrains and pyroxenes.
In general, the visible spectrum of Mars is dominated by an intense and featureless ferric absorption edge from UV (0.400 $\mu$m) to a marked peak reflectance near 0.750 $\mu$m; a decrease in reflectivity toward longer wavelengths respect to this maximum; and changes in slope at 0.550 and 0.680 $\mu$m with the result that the spectrum seems concave until 0.550 $\mu$m, convex from 0.550 to 0.680 $\mu$m and again slightly concave until 0.750 $\mu$m.
It is possible also distinguish the ferric phase and the ferrous one from the shape and position of Fe absorption between the VIS and IR channels. However, we cannot resolve the position of the band minimum at these wavelengths because it falls in the regions of the VIS channel and near-IR channel where the S/N is low.
For this reason we have introduced other spectral parameters in the visible wavelengths that exhibit variations with mineralogy. Although the index spectral maps show limitations due to atmospheric effects and spatial resolution that can affect the results, however some VIS spectral indexes reproduce minerals map of other authors with good approximation.
Ferric oxides, as hematite located in Terra Meridiani and Aram Chaos, are evident if we use the ratio between the right and left shoulders of the 1 $\mu$m band.
The ratio R685/(0.5*R625+0.5*R782) seems to be sensitive to the olivine (Syrtis Major).
An other spectral index seems to be sensitive to the hydrated minerals as those located in Aram Chaos and Capri Chasma regions. It is given by: R751/(0.5*R677+0.5*R863).