Geophysical Research Abstracts
Vol. 14, EGU2012-10127, 2012
EGU General Assembly 2012

Mars hemispherical albedo map: absolute value and interannual variability inferred from OMEGA data.

M. Vincendon (1), J. Audouard (1), Y. Langevin (1), F. Poulet (1), G. Bellucci (2), J.-P. Bibring (1), and B. Gondet (1)

(1) Institut d Astrophysique Spatiale, Orsay, France (mathieu.vincendon@ias.u-psud.fr), (2) INAF, IFSI, Rome, Italy

The surface reflectance integrated over all directions and solar wavelengths ("hemispherical albedo") controls the radiative budget at the surface of Mars, and hence its climate. Reference albedo maps are usually derived from nadir observation of surface reflectance through clear atmospheric conditions. However, the atmosphere of Mars is permanently loaded with a significant amount of aerosols (typical visible optical depths of 0.5 under clear atmospheric conditions), which impacts the evaluation of "aerosol free" surface reflectances from remote sensing data. Moreover, the Martian surface is usually assumed to be Lambertian, both for simplicity and due to the lack of robust constraints about its bidirectional properties.

We used OMEGA visible and near-IR measurements, with an appropriate UV extrapolation, to calculate as a function of space and time the hemispherical surface albedo of Mars. The contribution of aerosols is removed using a radiative transfer model and recent aerosols properties. Uncertainties associated with this procedure are calculated. The aerosols correction increases the bright/dark surfaces contrast. Typical, mean bidirectional reflectance properties of the martian surface are estimated using MER surface measurements and CRISM remote "EPF" observations. From these constraints, we have derived a typical relationship that makes it possible to convert single nadir measurements of the reflectance into hemispherical albedo. Accounting for the BRDF of the martian surface typically modify by $\pm$ 15% the derived albedo, depending on solar zenith angles.

We will present our methods and preliminary results regarding seasonal and interannual variations of the surface albedo of Mars during years 2004-2011.