



Mineralogy of the Moon investigated from spectral analysis of Clementine UVVIS and NIR data

J.-Ph. Combe (1), S. Le Mouélic (2), G. Y. Kramer, T. B. McCord (1)

(1) Bear Fight Center, Box 667, Winthrop WA 98862

(jean-philippe_combe @ bearfightcenter.com / phone: 509 996 3933)

(2) Laboratoire de Planétologie et Géodynamique, CNRS UMR 6112, Université de Nantes, France

The mineralogy of the Moon is investigated through the multispectral UltraViolet-Visible and Near-Infrared (UVVIS-NIR) data from the Clementine spacecraft. We use both newly calibrated data [1] and a special dataset of the Aristarchus area [2]. These data are analyzed by a Multiple-Endmember Linear Spectral Unmixing Model (MELSUM) [3]. The objective is to account for mixtures of materials and surface maturity. The MELSUM explores unmixing results for all possible combinations of spectral endmembers and retains the best fit provided by positive coefficients only involving a maximum of four components. Two approaches are developed: 1) Use of a reference spectral library of minerals that are combined with synthetic spectra that account for surface maturity and different grain sizes and illumination variations. 2) Building a reference library by collecting spectral endmembers from the image. In this way, the unmixing is constrained to provide a sum of image fractions equal to one, and thus retrieves image fractions close to actual proportions. The use of the very discriminative infrared bands is helping to improve the abundance estimates and composition identifications with respect to previous analyses that relied on the UVVIS only [e.g. 2, 4, 5, 6].

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