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Lava flows composition of the Daedalia Planum

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Daedalia Planum is a large lava plain, consisting of more than 1500 km lava flows emplaced over an almost flat terrain in the south-east area of Arsia Mons. The morphology of this region has been studied by Giacomini et al. (Planet.SpaceSci., 2009) and revealed the presence of various features indicative of inflation mechanisms. Thirteen morphologic units have been delineated and the stratigraphic relationships among these units have been established by the authors.
Several compositional data indicate that most of the Mars surface appears to consist of tholeiitic basalts where rocks previously identified as andesite may be basaltic rocks coated with alteration rinds (McSween et al., Science, 2009). Some primitive alkaline olivine-rich basaltic rocks have been also recognized by rover exploration (McSween et al., J.Geophys.Res., 2006).
The visible and near-infrared reflectance spectra contain electronic absorptions characteristic of mafic minerals including pyroxenes and olivine. These minerals, together with plagioclase, are the major components of lava's rocks. We have analyzed data acquired by the OMEGA orbiter spectrometer of the Mars Express mission. Several OMEGA's images have been studied collecting sets of spectra from each of the thirteen geological units. The spectra indicate a relatively uniform composition of the lavas, characterized by two wide absorption bands (I and II) at about 1000 and 2000 nm, respectively. These spectral features are diagnostic of the presence of pyroxenes, and the continuum removed spectra permit us to recognize the presence of two different pyroxenes . The precise minima positions of band I, between 950 and 1000 nm, and of band II, between 1800 and 2000 nm, suggest the presence in this region of low calcium and subcalcium clinopyroxene, like pigeonite and augite, with variable relative abundances. The presence of these types of pyroxenes suggests a tholeiitic composition of the Daedalia Planum long lava flows, in agreement with the Mars prevalent composition recognized by McSween et al. (Science, 2009).