Mafic mineralogy of large impact basins

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Abstract. Several sub km-scale regions on the Moon appear olivine-rich based on Moon Mineralogy Mapper (M^3) and Kaguya Spectral Profiler data[1,2]. These regions mostly lie within small craters in close proximity to large impact basins including Imbrium, Frigoris, Humorum and South Pole-Aitken. While these instruments are able to detect olivine in limited amounts, emissivity spectra derived from Diviner Lunar Radiometer Experiment (Diviner) data may help establish constraints on absolute abundance. We evaluated some of these areas using an olivine index based on both the Christiansen frequency of olivine (> 8.5 μm) and the spectral shape of olivine within Diviner channels 3 to 5 (Fig 1). While the CF ranges of olivine and pyroxene have some overlap, their Diviner spectral slopes are distinct. A concavity parameter c, measures the difference in slope change within the 3 channels (Fig 2). Pyroxene tends to have a high value of this index, indicating a strongly concave down spectral feature, while olivine has a low value. An additional index was developed for olivines which have a CF's longward of Diviner channel 5 and a concave up spectral shape. The CF's were adjusted using an optical maturity index before the olivine index was calculated.

Fig 1.

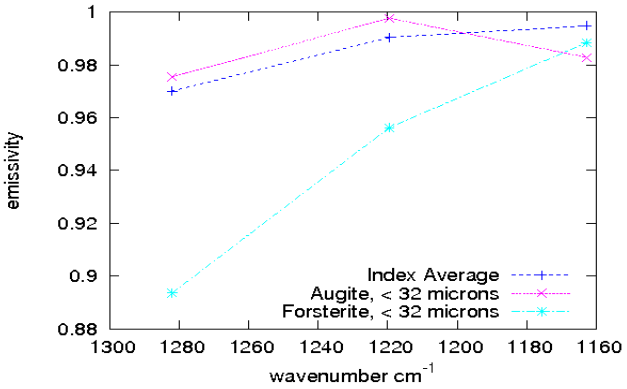
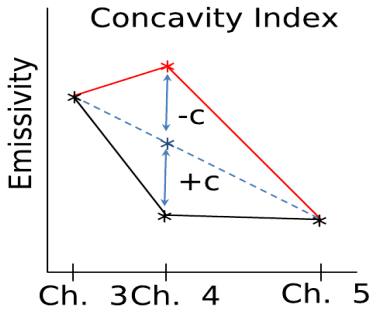


Fig 2.



[1]Yamamoto et al., *LPSC abstract* (2010).

[2]Issacson et al., *LPSC abstract* (2010).