# Calcium pyroxenes at Mercurian surface temperatures: investigation of in-situ emissivity spectra and thermal expansion.

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**The European Space Agency and Japan Aerospace Agency mission to Mercury, named BepiColombo, will carry on board** the Mercury Radiometer and Thermal Infrared Spectrometer (MERTIS) that will be able to provide surface Thermal Infra-Red (TIR) emissivity spectra from 7 to 14 µm. This range of wavelengths is very useful to identify the fine-scale structural properties of several silicates. For mineral families as pyroxenes, the emissivity peak positions are good indicators of the composition.

A complication in the interpretation of MERTIS data could arise from the extreme daily surface temperature range of Mercury (**70 to 725 K)** that significantly affects the crystal structure and density of minerals and consequently should affect the TIR spectral signature of each single mineral present on the surface of the planet. In preparation for the MERTIS data analysis, we are extensively investigating at high temperatures conditions several mineral phases potentially detectable on the surface of Mercury.

Two *C*2/*c* augitic pyroxenes, with constant calcium content and very different magnesium to iron ratio, were studied by in situ high-temperature thermal infrared spectroscopy (up to 750 K) and in situ high-temperature single-crystal X-ray diffraction (up to 770 K).

The emissivity spectra of the two samples show similar band center shifts of the main three bands toward lower wavenumbers with increasing temperature. Our results indicate that the center position of bands 1 and 2 is strictly dependent on temperature, whereas the center position of band 3 is a strong function of the composition regardless the temperature.

These data suggest that MERTIS spectra will be able to provide indications of *C*2/*c* augitic pyroxene with different magnesium contents and will allow a correct interpretation independently on the spectra acquisition temperature.