EPSC Abstracts
Vol. 7 EPSC2012-490 2012
European Planetary Science Congress 2012

IR and Raman analyses of the two lithologies of the Paris meteorite

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Abstract

We analyzed some fragments from the two lithologies of the Paris chondrite with Infrared and Raman micro-spectroscopy. We found that the two lithologies have suffered the same thermal alteration and do not seem to have suffered a different degree of aqueous alteration.

1. Introduction

The Paris meteorite is a CM chondrite [1] composed of two lithologies one of them being more altered than the other [3]. In this study, we compare the spectroscopic signatures through infrared (IR) and Raman micro-spectroscopy of the two lithologies in order to investigate the type of alteration the "altered" lithology has experienced.

2. Experiment

A few fragments extracted from the matrix of each lithology have been prepared and analyzed separately. Mid and Far-IR spectra were acquired on the SMIS beamline of the SOLEIL Synchrotron (France) using a NicPlan microscope attached to a FTIR spectrometer. Raman spectra were obtained with a spectrometer DXR from Thermo Fisher, we used a 532 nm laser with a power less than 1 mW.

3. Results and conclusion

The characteristics (position, width and intensity) of the Raman features of the aromatic components are very sensitive to thermal metamorphism [2]. Our measurements show that Paris has suffered a low thermal metamorphism but the comparison of the two lithologies does not show significant differences. This seems to indicate that the two lithologies of Paris have suffered the same thermal history.

When looking at the IR spectra of the two lithologies, both show the presence of phyllosilicates, and, to a lesser extent, of carbonates, suggesting a significant aqueous alteration. The IR spectra of the studied fragments are quite similar indicating again no difference in the aqueous alteration state of the two lithologies.

Finally, the results obtained on the few fragments extracted from the two lithologies of the Paris meteorite show no significant difference in the thermal and aqueous alteration state between the examined fragments.

Acknowledgements

The authors are grateful to the SMIS beamline staff of SOLEIL for their help with the Raman and IR spectrometers.

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