



**HAL**  
open science

## **Raman Spectroscopy of Carbonaceous Materials geothermometry: a reliable method to investigate thermal history of foreland basins.**

Abdeltif Lahfid, Brice Lacroix, Guilhem Hoareau, Sylvain Delchini, Xavier  
Bourrat

► **To cite this version:**

Abdeltif Lahfid, Brice Lacroix, Guilhem Hoareau, Sylvain Delchini, Xavier Bourrat. Raman Spectroscopy of Carbonaceous Materials geothermometry: a reliable method to investigate thermal history of foreland basins.. 11th International GeoRaman Conference, Jun 2014, Saint-Louis, United States. hal-00984464

**HAL Id: hal-00984464**

**<https://hal-brgm.archives-ouvertes.fr/hal-00984464>**

Submitted on 28 Apr 2014

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

**Raman Spectroscopy of Carbonaceous Materials geothermometry: a reliable method to investigate thermal history of foreland basins.** A. Lahfid<sup>1</sup>, B. Lacroix<sup>2</sup>, G. Hoareau<sup>3</sup>, S. Delchini<sup>1</sup>, and X. Bourrat<sup>1</sup>.

<sup>1</sup> BRGM, 3 avenue Claude Guillemin, 45060 Orléans Cedex 2, France ([a.lahfid@brgm.fr](mailto:a.lahfid@brgm.fr), [s.delchini@brgm.fr](mailto:s.delchini@brgm.fr), [x.Bourrat@brgm.fr](mailto:x.Bourrat@brgm.fr)), <sup>2</sup> Department of Earth and Environmental Sciences University of Michigan 2534 C. C. Little Building 1100 North University Avenue Ann Arbor, MI 48109-1005 ([lacroixb@umich.edu](mailto:lacroixb@umich.edu)), <sup>3</sup> Laboratoire des Fluides Complexes et leurs Réservoirs, UMR CNRS TOTAL 5150, Université de Pau et des Pays de l'Adour, I.P.R.A., Avenue de l'Université BP 1155, 64013 Pau Cedex ([guilhem.hoareau@univ-pau.fr](mailto:guilhem.hoareau@univ-pau.fr)).

**Introduction:** To investigate the thermal evolution of foreland basins, many classical methods including clay mineralogy, vitrinite reflectance, fluid inclusions and illite cristalinity are used. These methods are probably not perfectly reliable taken individually, but provides a robust estimate when they give a coherent results.

Raman Spectroscopy of Carbonaceous Materials (RSCM) could be an alternative method to constrain paleotemperatures of rocks. This method has been calibrated firstly in the range 330-640°C [1] then in the range 200-350° [2].

The aim of this study is to extend the applicability of this method towards palotemperatures lower than 200°C. For this purpose, we discuss a new fitting procedure which would allow us to define a new Raman parameter R3. This parameter is different of RA1 [1] and R2 [2] used previously to characterize the thermal evolution of the Carbonaceous Materials.

Raman spectra measured and treated are obtained by analysing samples from turbiditic deposits of different basins located in the western part of the South Pyrenean Zone. The thermal history of these samples, that underwent diagenesis, is well known using a various techniques. These methods are vitrinite reflectance, fluid inclusion thermometry, low-T thermochronology, index mineralogy and illite cristallinity.

Although our results are preliminary, they suggest that the RSCM geothermometer could be a reliable method to constrain the thermal history of foreland basins. We are currently working on the acquisition of more data to determine temperatures of the basin that underwent diagenesis conditions during the Pyrenean activity.

**References:**

- [1] Beyssac O. et al. (2002) JMG 20, 859–871.
- [2] Lahfid A. et al. (2010) Terra Nova 22, 354–360.