Thermal maturity estimation of carbonaceous material from proterozoic organic-walled microfossil assemblages (DRCongo, Mauritania and Australia) by using Raman spectroscopy.

B.K. BALUDIKAY[1*], C. FRANÇOIS[1], M.C. SFORNA[1], J. BEGHIN[1], Y. CORNET[1], J.Y. STORME[1], N. FAGEL[2], F. FONTAINE[2], B. KROOSS[3], D. BAUDET[4], D. DELVAUX[4] & E.J. JAVAUX[1]

[1] PPP Lab, UR GEOLOGY, University of Liege, Belgium (* bkbaludikay@ulg.ac.be).
[2]AGEs Lab, UR GEOLOGY, University of Liege, Belgium.
[3]EMR Group, RWTH Aachen University, Germany.
[4]Geodynamics & Mineral Resources Service, Royal Museum for Central Africa, Belgium.

Three shallow marine sedimentary sequences with ages variying from late Mesoproterozoic to early Neoprotetozoic were investigated. These are Mbuji-Mayi Supergroup (DRCongo), Atar/El Mreïti Group (Mauritania) and Kanpa Formation (Australia) [1,2,3], each containing exquisitely preserved organic-walled microfossil assemblages.

The varying color of organic material into a same sample, the thickness of microfossil walls as well as the lack of vitrinite macerals in proterozoic succession make irrelevant classical thermal maturity indicators used in palynological studies such as "Thermal alteration index" (TAI) or vitrinite reflectance (vR_o%). Thus, we performed Raman spectroscopy on microfossils and amorphous organic matter in both isolated kerogen and thin sections. In both instance, we obtained the same results. Raman geothermometry [4] and temperature estimate based on Raman reflectance [5] indicates a low-grade thermal maturity (150–250°C). To validate this temperature range, kerogen pyrolysis (Rock-Eval) and Illite Cristallinity analyses were performed.

Given that our results are consistent in all geological contexts under investigation, we propose Raman spectroscopy instead of TAI for thermal maturity estimation of proterozoic microfossil assemblages preserved in shales.

[1] Baludikay et al. (2016) *Prec. Res*. **281**, 166–184. [2] Beghin et al. (2017) *Prec. Res.* **291**, 63–82. [3] Cornet et al. (*in prep.*). [4] Kouketsu et al. (2014) *Island Arc* **23**, 33–50. [5] Liu et al. (2013) *Chin. Sci. Bull.* **58** No.11, 1285–1298.