



## **Can we calculate the value of Rock-Eval parameters for the 0-50 layer from the measured values on the layers 0-30 and 30-50 cm?**

Eva Kanari (1,2), Pierre Barré (1), Lauric Cécillon (1,3), Laure N. Soucémarianadin (1), Nicolas Bouton (4), Florence Savignac (2), and François Baudin (2)

(1) Laboratoire de Géologie de l'ENS, PSL Research University, CNRS UMR 8538, 75005, Paris, France, (2) Sorbonne Université-UPMC-Univ Paris 06, Institut des Sciences de la Terre de Paris, 75005 Paris, France, (3) Université Grenoble Alpes, Irstea, UR LESSEM, 38402 St-Martin-d'Hères, France, (4) Vinci Technologies, 92022 Nanterre, France

Current studies investigating soils use different sampling methods. Generally, soils are sampled in different soil horizons and the sampling depths may vary across studies or according to the soil profile composition. For some soil properties such as soil organic carbon stock, it is possible to calculate the organic carbon content of a soil profile by adding the values measured in each horizon. Soil organic carbon stock is therefore independent from the sampling strategy. In the recent years, Rock-Eval has been proposed as a reliable method to investigate soil organic carbon stock and its stability. The objective of this study is to determine, whether Rock-Eval parameters of soil organic matter in a given soil horizon, can also be calculated from Rock-Eval parameters measured in subhorizons; an idea which would greatly facilitate the comparison of results of studies using different sampling methods.

In this study, samples from 10 French forest sites encompassing a variety of pedoclimates were used. At each site, samples were collected from two depth ranges, 0-30 and 30-50 cm. To test the linearity of the mixing of RE indicators, binary mixtures of surface and deep soil were composed for each site using five different mixing ratios (10:90, 25:75, 50:50, 75:25, 90:10). All 70 samples were then analysed using Rock-Eval, resulting in five classical RE parameters for each sample. The values of the RE parameters measured on composite samples were generally in good agreement with theoretical values, which were calculated using values measured on 0-30 cm and 30-50 cm according to the mixing equation. This is particularly the case for the following parameters: TOCRE6, PC, RC and OI. However, for HI the relationship between measured and calculated values is unsatisfactory. For sites with a clay-rich deep soil horizon layer and a surface layer with a coarser texture the variation was the highest. Retention of hydrocarbons by clay minerals is a common mineral matrix effect in pyrolysis methods and could explain this observation. Future research should include quantification of the mineral matrix effect for different soil types and calculation of a correction factor for the addition of parameters in a soil profile. Therefore, we conclude that in most temperate soils, most classical RE parameters of a soil profile can be indeed calculated as a sum of the different horizons.