

# Maximilien Mathian

## Ph.D. in Mineralogy

Driving Licence

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## Education



- 2015-2018** **Ph.D.**, Unraveling paleoclimatic events in laterites using the Electron Paramagnetic Resonance dating methodology on kaolinites, Sorbonne Université (Paris 6), France. Supervisor: CNRS Research Director Thierry Allard.
- 2013-2015** **M. Sc.** in Clay Science (Master National Argiles), with honors (1<sup>st</sup>), University of Poitiers, France
- 2010-2013** **B. Sc.** in Geology (Licence Terre et Environnement), with honors (2<sup>nd</sup>), University of Poitiers, France

## Research experience



- 2021-2022** **Contractual Associate Professor, ISEA (Université de Nouvelle Calédonie), New Caledonia**
- ☞ Laterite profiles and mangrove sediments direct sampling (New Caledonia)
  - ☞ Mineralogical characterizations of phyllosilicates: X-ray diffraction, Scanning Electron Microscopy, Transmission Electron Microscopy, MIR-spectroscopy, Raman spectroscopy
  - ☞ *Supervisor:* Pr. Cyril Marchand
- 2018-2020** **Post doctoral position, Total, GEOPS (Université Paris Sud), France**
- ☞ Tropical regolith profiles exploration and sampling in Malawi (Southeast Africa)
  - ☞ Complete laterite and duricrust samples characterization: X-ray diffraction, Scanning Electron Microscopy, Optical microscopy, Visible NIR-spectroscopy, Electron Paramagnetic Resonance spectroscopy, fission tracks mapping, Total chemistry
  - ☞ (U-Th)/He dating of iron oxides and EPR dating of kaolinites applied on the same regolith profiles
  - ☞ Regular contacts and meetings with the supervisors of the French oil company *Total*
  - ☞ *Supervisors:* Pr. Cécile Gautheron, Pr. Cécile Quentin, Dr. Thierry Allard, Dr. Jean-Noël Ferry
- 2015-2018** **Ph.D., IMPMC (Sorbonne Université, Paris 6), France**
- ☞ Complete preparation and characterization of samples coming from different laterite profiles: X-ray diffraction, MIR-spectroscopy, Visible NIR-spectroscopy, Electron Paramagnetic Resonance spectroscopy, fission tracks mapping, Total chemistry
  - ☞ Improvement and use of the EPR dating of kaolinites methodology
  - ☞ Hydrothermal kaolinite synthesis
  - ☞ *Supervisor:* Dr. Thierry Allard
- 2015 (1 month)** **Research officer, IC2MP (University of Poitiers), France**
- ☞ Use of a NIR-based semi-quantitative methodology to determine kaolinite/smectite ratio of Nil organic and inorganic rich sediments
  - ☞ *Supervisors:* Pr. Daniel Beaufort and Dr. Sabine Petit
- 2015 (6 months)** **Internship for M. Sc. degree, IC2MP (University of Poitiers), France**

- ☞ Characterization of field samples coming from the laterite regolith of the Ity gold mine (Ivory coast): X-ray diffraction, Scanning Electron Microscopy, Optical microscopy, MIR-spectroscopy, Total chemistry
- ☞ Development of an NIR based semi-quantitative methodology based on clay minerals binaries mixtures
- ☞ Regular contacts with the supervisors of the la Mancha mining group
- ☞ *Supervisors:* Pr. Daniel Beaufort, Dr. Jean-Luc Lescuyer and Renan Furic

- 2014 (3.5 months)**      **Internship for M. Sc. degree, Australian Resources Research Center (CSIRO), Australia**
- ☞ Characterization of iron ores using a large analytical toolset: X-ray diffraction, Visible NIR-spectroscopy, Raman spectroscopy, Scanning Electron Microscopy, X-ray Fluorescence mapping, Optical microscopy
  - ☞ *Supervisors:* Dr. Erick Ramanaidou and Dr. Martin Wells
- 2013 (1 month)**      **Internship for B. Sc. degree, IC2MP (University of Poitiers), France**
- ☞ Synthesis of Ni and Mg-rich 1:1 and 2:1 clay minerals at different pH
  - ☞ Characterization of these phases using NIR and MIR spectroscopy
  - ☞ *Supervisors:* Dr. Fabien Baron and Dr. Sabine Petit

## Additional experiences

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- 2021-2022**      **Contractual Associate Professor at Université de Nouvelle Calédonie**
- ☞ First, second and third year students: general geology, mineralogy, petrology, structural geology, hydrology
- 2015-2018**      **Teaching assistant at Sorbonne Université (Paris 6)**
- ☞ First, second and third year students: general geology, cartography, tectonic, sedimentology, FTIR, XRD
- 2017**      **Supervision of an undergraduate student for M. Sc. degree internship**

## Scientific skills

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**Scientific knowledge** – Regolith evolution and formation, Kaolinite EPR dating, Goethite and Hematite (U-Th)/He dating, Artificial irradiation of phyllosilicates, Samples characterization (mineralogy, petrographic organization, geochemistry), Mineral semi-quantification (XRD, NIR and chemistry-based methodologies), Clay minerals synthesis, Clay mineralogy, Geological mapping (basis)

**Analytical tools** - Field and Laboratory VNIR and MIR Spectroscopy, EPR spectroscopy, X-Rays Diffraction (powders, oriented preparation, fitting), Fission Tracks Mapping, Scanning Electron Microscopy, Optical Microscopy, XRF-Mapping, ICPMS (basis), Data statistics (basis)

**Computing** - MS Office, KaleidaGraph, QGIS, Origin, MatLab (basis), Illustrator (basis), R (basis)

**Languages** – English (fluent), French (native)

## Affiliation

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**French Clay Society (GFA-Groupe Français des Argiles)**



## Publications

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**Mathian, M., Chassé, M., Calas, G., Griffin, W.L., O'Reilley, S.Y., Allard, T., Kaolinite dating reveals the impact of Miocene climate on regoliths from Southeast Australia, Geochimica et Cosmochimica Acta (IF: 4.25), in preparation**

Allard, T., Pereira, L., **Mathian, M.**, Balan, E., Taitson Bueno, G., Falguères, C., do Nascimento, N., *Dating kaolinites from the Neogene Içá formation and overlying laterites, central Amazonia, Brazil: constraints for a stratigraphic correlation*, Palaeogeography, Palaeoclimatology, Palaeoecology (IF: 2.61), 109818, in press

**Mathian, M.**, Taitson Bueno, G., Balan, E., Fritsch, E., do Nascimento, N.R., Selo, M., Allard, T., *Kaolinite dating from Acrisol and Ferralsol: a new key to understanding the landscape evolution in NW Amazonia (Brazil)*, Geoderma (IF: 4.34), vol. 370, 114354

**Mathian, M.**, Aufort, J., Braun, J.J., Riotte, J., Selo, M., Balan, E., Fritsch, E., Bhattacharya, S., Allard, T., *Unraveling weathering episodes in Tertiary regoliths by kaolinite dating (Western Ghats, India)*, 2019, Gondwana Research (IF: 6.47), vol. 69, pp. 89-105

Allard, T., Beaufort, D., **Mathian, M.**, Morichon, E., Uri, F., Quirt, D., *Radioactivity recorded by clay minerals in the Shea Creek area, Athabasca Basin (Canada): implications for uranium transfers and exploration*, 2018, Journal of Geochemical exploration (IF: 3.47), vol. 188, pp. 340-349.

**Mathian, M.**, Hebert, B., Baron, F., Petit, S., Lescuyer, J.L., Furic, R., Beaufort, D., *Identifying the phyllosilicate minerals of hypogene ore deposits in lateritic saprolites using the near IR spectroscopy second derivative methodology*, 2018, Journal of Geochemical exploration (IF: 3.47), vol. 186, pp. 298-314.

Murat, A., Beaufort, D., Hebert, B., Baudin, F., Bernasconi, S., Ducassou, E., Lelievre, C., Poizot, E., **Mathian, M.**, Grauby, O., *Post-depositional evolution over a time scale of 1 million years of eastern Mediterranean organic-rich and organic poor sediments: new insights on the debromination and layer silicate markers*, 2017, Bulletin de la Société Géologique de France (IF: 1), vol. 188 (4) 21.

## Oral communications



**Mathian, M.**, Taitson Bueno, G., Balan, E., Selo, M., Fritsch, E., Allard, T., *Investigating the Acrisol/Ferralsol transition in Amazonia: new insights from EPR dating of kaolinites*, 2019 Euroclay Meeting, Paris (France), 2019

**Mathian, M.**, Aufort, J., Braun, J.J., Riotte, J., Selo, M., Balan, E., Fritsch, E., Bhattacharya, S., Allard, T., *EPR dating of Indian regoliths (Karnataka Plateau): Record of the Asiatic monsoon evolution*, 55<sup>th</sup> annual meeting of the Clay Minerals Society, Urbana Champaign (Illinois, USA), 2018

**Mathian, M.**, Aufort, J., Allard, T., Fritsch, E., Riotte, J., Braun, J.J., *Dating Western Ghats (India) laterite from radiation-induced defects of kaolinite*, RST, Caen (France), 2016

Ramanaidou, R., Nguyen, J., **Mathian, M.**, Carey, R., Honey, F., Goddey, N., Wells, M., *Total iron ore characterisation by combining hyperspectral imaging, Raman spectroscopy and x-ray fluorescence mapping*, IMA 2014 Johannesburg, South Africa, 2014.

## Poster presentations



Pineau, M., Baron, F., **Mathian, M.**, Le Deit, L., Rondeau, B., Allard, T., Mangold, N., *Estimating kaolinite crystallinity using near-infrared spectroscopy*, 51<sup>st</sup> Lunar and Planetary Science Conference, 2020

**Mathian, M.**, Baby, G., Ferry, J.N., Guillocheau, F., Allard, T., Chindandali, P., Ruffet, G., Quantin, C., Pinna Jamme, R., Gautheron, C., *First proofs of preservation of a Mesozoic paleorelief in Southeast Africa: Insights from the (U)Th/He dating of iron oxides from Malawian duricrusts*, EGU 2020, Vienne (Austria), 2020

**Mathian, M.**, Allard, T., Fritsch, E., Riotte, J., Braun, J.J., *Soil evolution through climate changes: insights from the EPR dating of Western Ghats (India) laterites*, Goldschmidt 2017, Paris (France), 2017

**Mathian, M.**, Allard, T., Riotte, J., Braun, J.J., *Datations des latérites des Ghâts (Inde de l'ouest) à l'aide des défauts d'irradiation des kaolinites*, 14<sup>ème</sup> colloque du GFA, Poitiers (France), 2016

**Mathian, M.**, Beaufort, D., Lescuyer, J.L., Furic, R., *Étude des minéraux argileux du Mont Ity (Côte d'Ivoire) et caractérisation des différents faciès argileux par spectrométrie infrarouge*, 13<sup>ème</sup> colloque du GFA, Clermont-Ferrand (France), 2015