

# Nicolas Perdrial

Environmental Mineralogy  
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## CURRENT POSITION

**Research Assistant Professor**, University of Vermont, Department of Geology, Burlington, VT (08/2013 - CURRENT)

## EDUCATION

- **Ph.D.** (Physic, Chemistry and Biology of the Environment) **Université Louis Pasteur, Strasbourg, France.** 2007.
- **M. S.** (Sedimentology & Geochemistry) **Université de Paris XI - Ecole Normale Supérieure de Paris, France.** 2003.
- **B. S.** (Biology and Geology) **Université de Nantes, France** - Laboratoire de Planétologie & Géodynamique, 2001.

## PROFESSIONAL EXPERIENCE

**Research Assistant Professor**, University of Vermont, Burlington, USA, 2013-Current

**Assistant Research Scientist**, University of Arizona, Tucson, USA, 2012-2014

**Associate Instructor in soil Chemistry**, University of Arizona, Tucson, USA, 2012

**Research Associate**, University of Arizona, Tucson, USA, 2008-2012

**Lecturer (ATER)**, Université Louis Pasteur, Strasbourg, France, 2006-2007

**Teaching Assistant**, Université Louis Pasteur, Strasbourg, France, 2003-2006

**Archaeogeologist**, ARC'Antic Laboratory, Nantes, France, 2002

**Lab assistant**, Planetology & Geodynamic Laboratory, Nantes, France, 2001

## RESEARCH EXPERIENCE

**Research Assistant Professor – University of Vermont.**

- Effects of iron oxides concentration on Pb bioavailability in PO<sub>4</sub> amended soils. (UVM, CAS funded, 2014-2016), PI: Nico Perdrial (UVM). \$2,750.

**Assistant Research Scientist / Research Associate – University of Arizona.**

- Uranium and strontium fate in waste-weathered sediments: Scaling of molecular processes to predict reactive transport. Collaborative project (DOE, SBR funded, 2011-2014), PI: Jon Chorover (UofA), co-PI: Peggy O'Day (UC Merced), Karl Mueller, John Zachara & Wooyong Um (PNNL), Carl Steefel (LBNL) \$1.20 M.
- Interaction of microbial and abiotic processes in soil leading to the (bio)conversion and ultimate attenuation of new insensitive munitions compounds. Collaborative project (SERDP funded, 2012-2015), PI: James Field (UofA), Co-PI: Jon Chorover, Reyes Sierra, Leif Abrell (UofA) \$1.00 M
- Release of aged contaminants from weathered sediments: Effects of sorbate speciation of scaling of reactive transport. Collaborative project (DOE, SBR funded, 2008-2011), PI: Jon Chorover (UofA), co-PI: Peggy O'Day (UC Merced), Karl Mueller, Jeff Serne & Wooyong Um (PNNL), Carl Steefel (LBNL) \$1.35 M.

**Ph.D. 3-years French Ministry of Research Fellowship – Université Louis Pasteur, Strasbourg**

- Nature and role of the solid suspended matter in the dynamic of pollutant transfer. *Advisors: Françoise Elsass (INRA), Nicole Liewig (CNRS)*

**M.S. Ecole Normale Supérieure de Paris, France.**

- Behavior of chemical elements during weathering: mobility and concentrations factors, application to archaeological ceramics. *Advisor: Bruce Velde (CNRS)*

## RESEARCH TOOLS

ICP-MS, IC, TOC, (LA)ICP-MS, Quantitative XRD, SEM, Analytical-TEM, EXAFS, XRF, EMPA, FT-IR

**AWARDS**

Research Grant – 2 years, University of Vermont, CAS (2014-2016) –\$2,750 (PI)  
 Research Grant – 3 years, U.S. Department of Energy (2011-2014) – 1.2 M\$ (co-author – PI: Jon Chorover)  
 Research Grant – 3 years French Ministry of Research Fellowship (2003-2006)  
 Student Travel Grant – CMS 2007 (\$1,000)  
 Student Travel Grant – GFA 2006 (€500)

**STUDENT ADVISING**

Jennifer Bower (MS) – University of Vermont, Mobility and Speciation of Legacy Lead in Soils (2014-Current)  
 Chandler Noyes (BS) – University of Vermont, Effects of pH on lead mobility in a contaminated soil (2014-Current)  
 Billy Linker (MS) – University of Arizona, Sorption of insensitive munition compounds to soil constituents (2011-2013)  
 Kris A. Ford (BS) – University of Arizona, Lab assistant (2012- 2013)  
 Peirong Cao (BS) – University of Arizona, Lab assistant (2012)  
 Theresa Lau (BS) – University of Arizona, Lab assistant (2011-2013)  
 Kelsie M. LaSharr (BS) – University of Arizona, Lab assistant (2010-2013)  
 Tyler J. Anderson (BS) – University of Arizona, Method development and optimization of XRF measurements (2011)  
 Sarah Verghese (BS) – Biosphere 2, Quantitative-XRD of bio-weathered basalt. (2011)  
 Adrien Bouzouville (MS) – CNRS – BRGM Strasbourg, State of soils in the Strasbourg urban area (2007)  
 Makhlof Nait-Chabanne (BS) – Université de Strasbourg, Characterization of colloids in atmospheric fallout (2007)

**TEACHING EXPERIENCE**UNIVERSITY OF VERMONT

Environmental Geology, undergraduate level  
 Geocomputing, undergraduate level  
 Introduction to Environmental Sciences, undergraduate level

UNIVERSITY OF ARIZONA

Environmental Soil and Water Chemistry  
 Quantitative X-ray diffraction

UNIVERSITY OF STRASBOURG (FRANCE)

External Geodynamic  
 Mineralogy & Petrography  
 Crystal-chemistry and reactivity of fine particles  
 Soil science  
 Orogen of the Alps  
 Fundamentals of Geochemistry  
 Introduction to Geosciences  
 Mapping Camp

**PUBLICATIONS****Journal Articles**

- Perdrial N.**, Thompson A. LaSharr K., Amistadi M.K. and Chorover J. (2015) - Quantifying particulate and colloidal release of radionuclides from saturated analog Hanford sediments. *Journal of Environmental Quality*, **44**, 945-952.
- Zaunbrecher L.K., Elliott W.C., Wampler J.M, **Perdrial N.** and Kaplan D.I. (2015) - Enrichment of Cesium and Rubidium in Weathered Micaceous Materials at the Savannah River Site, South Carolina. *Environmental Science and Technology*, **49**, 4226-4234.
- Linker B., Khatiwada R., **Perdrial N.**, Abrell L., Sierra-Alvarez R., Field J.A. and Chorover J. (2015) - Adsorption of novel insensitive munitions compounds at clay mineral and metal oxide surfaces. *Environmental Chemistry*, **12**, 74-84.
- Perdrial N.**, Thompson A., O'Day P., Steefel C.I. and Chorover J. (2014) - Mineral transformation controls speciation and pore-fluid transmission of contaminants in waste-weathered Hanford sediments. *Geochimica et Cosmochimica Acta*, **141**, 487-507.
- Hayes S., Root R., **Perdrial N.**, Maier R. and Chorover J. (2014) - Surficial weathering of iron sulfide mine tailings under semi-arid climate. *Geochimica et Cosmochimica Acta*, **141**, 240-257.
- Dontsova K., Zaharescu D., Henderson W., Verghese S., **Perdrial N.**, Hunt E. and Chorover J. (2014) – Impact of organic carbon on weathering and chemical denudation of granular basalt. *Geochimica et Cosmochimica Acta*, 139, 508-526.
- Kanematsu M., **Perdrial N.**, Um W., Chorover J. and O'Day P. (2014) - Influence of phosphate and silica on U(VI) precipitation from acidic and neutralized wastewaters. *Environmental Science and Technology*, 48, 6097-6106.
- Perdrial J.N., **Perdrial N.**, Porter C., Vazquez-Ortega A.; Leedy J. and Chorover J, (2014) - Experimental assessment of passive capillary wick sampler suitability for inorganic soil solution constituents, *Soil Science Society of America Journal*, 78, 486-495.
- Perdrial J.N., **Perdrial N.**, Harpold A., Gao X., Gabor R., LaSharr K. and Chorover J. (2012) – Impact of sampling dissolved organic matter with passive capillary wicks versus aqueous soil extraction. *Soil Science Society of America Journal*, 76, 2019-2030.

- Perdrial N.**, Rivera N., Thompson A., O'Day P.A. and Chorover J. (2011) – Trace contaminant concentration affects mineral transformation and pollutant fate in hydroxide-weathered Hanford sediments. *Journal of Hazardous Materials*, **197**, 119-127.
- Rivera N., Choi S., Strepka C., Mueller K., **Perdrial N.**, Chorover J. And O'Day P.A. (2011) – Cesium and strontium incorporation into zeolite-type phases during homogeneous nucleation from caustic solutions. *American Mineralogist*, **96**, 1809-1820.
- Chang H.-S., Um W., Rod K., Serne R.J., Thompson A., **Perdrial N.**, Steefel C.I. and Chorover J. (2011) – Strontium and cesium release mechanisms during unsaturated flow through waste-weathered Hanford sediments. *Environmental Science and Technology*, **45**, 8313-8320.
- Perdrial N.**, Perdrial J.N., Delphin J.-E., Elsass F., Liewig N. (2010) – Temporal and spatial monitoring of mobile nanoparticles in a vineyard soil: evidence of nanoaggregate formation. *European Journal of Soil Science*, **61**, 456-468.
- Thompson A., Steefel C.I., **Perdrial N.** and Chorover J. (2010) – Contaminant desorption during long-term leaching of hydroxide-weathered sediments. *Environmental Science and Technology*, **44**, 1992-1997.
- Perdrial J.N., Warr L.N., **Perdrial N.**, Lett M.-C. and Elsass F. (2009) – Interaction between smectite and bacteria: Implications for bentonite as backfill material in the disposal of nuclear waste. *Chemical Geology*, **264**, 281-294.
- Perdrial N.**, Liewig N., Delphin J.-E. and Elsass F. (2008) – TEM evidence for intracellular accumulation of lead by bacteria in subsurface environments. *Chemical Geology*, **253**, 196-204 .
- Perdrial N.**, Elsass F. and Liewig N. (2008) – New technique for in-situ sampling of particulate matter and colloids in soil and atmospheric fallout. *Colloids Surf. A.*, **317**, 742-746.
- Muller D., Medigue C., Koechler S., Arsene-Ploetze F., Barakat M., Barbe V., Bonnefoy V., Carapito C., Chandler M., Cournoyer B., Cruveiller S., Heymann M., Krin E., Leize E., Lieutaud A., Lievreumont D., Makita Y., Nitschke W., Ortet P., **Perdrial N.**, Siguier N., Simeonova D.D., Rouy Z., Talla E., Turlin E., Vallenet D., Van Dorsseleer A., Weiss S., Weissenbach J., Lett M.C., Danchin A., Bertin P.N. (2007) – A tale of two oxidation states: Bacterial colonization of arsenic-rich environments. *PLoS Genetics*, **3** (4), e53.

### Book Section

- Muller D., Carapito C., Koechler S., Weiss S., Salmeron A., **Perdrial N.**, Lièvreumont D., Arsène-Ploetze F., Bertin Ph. and Lett M.-C. (2007) – Arsenic stress in bacteria: involvement in the colonization of arsenic-contaminated environments? in: Zhu Y., Lepp N. & Naidu R. eds, Biochemistry of trace elements : environmental protection, remediation and human health. Tsinghua University Press. p 544-545. ISBN : 978-7-302-15627-7

### Manuscripts in preparation

- Perdrial N.**, Vazquez-Ortega A., Kanematsu M., Reinoso-Maset E., Wang G., Um W., Steefel C.I., O'Day P.A. and Chorover J. Impacts of mineral transformation and sorbate aging on Uranium Speciation in acidic systems. For submission to: *Geochimica et Cosmochimica Acta*.
- Deng., Y.-T., **Perdrial N.** and Thompson A. Quantifying cesium and strontium bearing NO<sub>3</sub>-feldspathoid dissolution in hyperalkaline-weathered Hanford sediments. For submission to: *Environmental Science and Technology*.

### Reports

- Chorover J., **Perdrial N.**, Mueller K., Strepka C., O'Day P., Rivera N., Um W., Chang H.S., Steefel C. and Thompson A. (2012) – Release of aged contaminants from weathered sediments: Effects of sorbate speciation on scaling of reactive transport. DOE/ER/64615, US DOE SC Office of Biological and Environmental Research, 16pp.
- Elsass P., Bouzouville A., Elsass F., Fourniquet G., Gorsy P., Liewig N., Morvan G. and **Perdrial N.** (2006) – Etude de synthèse des sols sur le territoire de la Communauté Urbaine de Strasbourg. Rapport final BRGM RP-54829-FR, 50 p.

### Selected Abstracts

- Perdrial N.**, Vasquez-Ortega A., Reinoso-Maset E., O'Day P.A. and Chorover J., (2014) – Acid-weathering and uranium speciation: Reaction kinetics and phosphate addition. Goldschmidt Conference, June 8-13, Sacramento, CA, USA.
- Perdrial N.**, Kanematsu M., Wang G., Um W., O'Day P. and Chorover J. (2013) - Process coupling between mineral transformation and U speciation in acid waste weathered sediments. American Geophysical Union's 46th Annual fall meeting.
- Perdrial N.**, O'Day P. and Chorover J. (2012) – Strontium fate in Hanford sediments – A multi-scale synchrotron X-Ray investigation. SSRL/LCLS Users' Conference, Oct 3-6, Menlo Park, CA, USA. *Invited speaker*
- Kanematsu M., **Perdrial N.**, Chorover J., O'Day P.A. (2012) – Characterization of UVI mineral phases formed by homogeneous nucleation from acidic crib waste. GSA Annual Meeting, Nov 4-7, Charlotte, NC, USA.
- Hayes S.M., Root R., **Perdrial N.** and Chorover J. (2012) – Oxidative mineral weathering of mine tailings: Coupled mineral and toxic metal transformations at the Iron King Superfund Site. 243rd ACS National Meeting & Exposition Mar 25- 29, San Diego, CA, USA.

- Perdrial N.**, Thompson A. and Chorover J. (2011) – Quantifying particulate and colloidal release of radionuclides from analog Hanford sediments. Fall Meeting, AGU, Dec 5-9, San Francisco, CA, USA.
- Zaunbrecher L.K., Elliott W.C., **Perdrial N.** Wampler M., Krogstad, E.J., and Bargar J. (2011) – The natural enrichment of stable Cesium in weathered micaceous materials at the Savannah River Site, SC, and its implications for Cs<sup>137</sup> sorption. Fall Meeting, AGU, Dec 5-9, San Francisco, CA, USA.
- Perdrial N.**, Thompson A., Rivera N., Deng Y.-T., O'Day P. and Chorover J. (2011) – Predicting the fate of radionuclides at the Hanford tank farm using analog sediments. Goldschmidt Conference, August 14-19, Prague, Czech Rep.
- Perdrial N.**, Thompson A. and Chorover J. (2010) – Mineral transformations and contaminant release dynamics under wetting-drying cycles in simulated Hanford sediments. Goldschmidt Conference, June 13-18, Knoxville, TN, USA.
- Thompson A., Steefel C., **Perdrial N.** and Chorover J. (2010) – Transient-stage (<200 PV) modelling of Sr, Cs and I desorption from hyper-alkaline weathered Hanford sediments. ASA, CSSA & SSSA Int. annual meeting, Oct 31 - Nov 4 2010, Long Beach, CA, USA.
- Perdrial N.**, Thompson A. and Chorover J. (2009) – Effects of mineral transformation, contaminant concentration and CO<sub>2</sub> pressure on contaminant speciation and mobility in simulated Hanford sediments. 46th Annual Meeting of the CMS, June 5-11, Billings, MT, USA.
- Perdrial N.**, Elsass F., Liewig N. (2007) – TEM evidence for lead transport by bacteria in atmospheric deposition. Goldschmidt Conference, August 19-24, Cologne, Germany.
- Perdrial N.**, Elsass F., Liewig N. (2007) – TEM investigation on the nature, distribution and factors affecting clays and nanoparticles in the soil system. 44th Annual Meeting of the CMS, June 2-7, Santa Fe, NM, USA.
- Berger J. N., Warr L. N., Lett M.-C., **Perdrial N.** (2007) – Monitoring smectite hydration in the presence of bacteria. 44th Annual Meeting of the CMS, June 2-7, Santa Fe, NM, USA.
- Berger J. N., Warr L. N., Lett M.-C. and **Perdrial N.** (2006) – Smectite hydration, solution chemistry and bacterial activity: interactions in a confined volume system. 43rd Annual Meeting of the CMS - 4ème colloque du GFA, 3-7 juin, Ile d'Oléron, France.
- Perdrial N.**, Elsass F., Liewig N. and Gelhaye, D. (2006) – Aerosol particles over a french forest: size and composition of minerals and microbes. 43rd Annual Meeting of the CMS - 4ème colloque du GFA, 3-7 juin, Ile d'Oléron, France.
- Perdrial N.**, Elsass F., Lievreumont D., Berger J. and Liewig N. (2006) – Role of bacteria in controlling the toxicity and mobility of arsenic in soils. Proc. EGU General Assembly, April. 02-07 2006, Vienna, Austria.
- Elsass F., **Perdrial N.**, Bouzouville A. and Liewig N. (2006) – Soil contamination in an urban area through rainfall and particle deposition. Proc. EGU General Assembly, April. 02-07 2006, Vienna, Austria.
- Perdrial N.**, Elsass F., Liewig N., Delphin J.-E. and Morvan G. (2005) – Typologie quantitative des particules environnementales. suivi spatio-temporel dans un sol sous vignoble. 3ème colloque du GFA, May 18-19 2005, Paris, France.
- Perdrial N.**, Elsass F., Liewig N., Delphin J.-E. and Morvan G. (2004) – Caractérisation physico-chimique des matières en suspension dans les eaux d'infiltration des sols. Proc. 20th RST, sept. 20-25 2004, Strasbourg, France.
- Perdrial N.**, Bossiere G. and Frere D. (2002) – Analyses comparatives de céramiques archaïques, du 6ème siècle BC, de Gaule du sud et d'Etrurie. Proc. 19th RST, apr. 09-12 2002, Nantes, France.

#### REVIEWER SERVICE:

#### FUNDING AGENCIES

- Agence National de la Recherche (French National Research Agency) – Grant proposal external reviewer.
- Fundacao para a Ciencia e a Tecnologia (Portuguese Foundation for Science) – Grant proposal external reviewer.
- Canadian Lightsource. – Beamtime proposal external reviewer

#### JOURNALS

Chemosphere,	Journal of Hazardous Materials,
Clays and Clay Minerals,	Journal of Nuclear Materials,
Environmental Chemistry,	Soil Biology and Biochemistry,
Environmental Science & Technology,	Soil Science,
Geochimica et Cosmochimica Acta,	Soil Science Society of America Journal.
Geoderma,	

#### MEMBERSHIPS:

University of Vermont, Sustainability Fellow (2014-2015)  
 Member, Clay Mineral Society of America (2007-present)  
 Member, Critical Zone Exploration Network (2009-present)  
 Member, European Geochemical Association (2010-present)  
 Member, American Geophysical Union (2011-present)