Aliénor Lavergne, Ph.D.
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APPOINTMENTS

Associate Editor, Springer Nature, London, UK (from mid-July 2022)

- Handling manuscripts as an Editor at Communications Earth & Environment journal

Post-Doc Research Associate, School of Archaeology, Geography and Environmental Science, University of Reading, UK (Dec. 2021- July 2022)

- Contributing to the LEMONTREE (Land Ecosystem Models based On New Theory, obseRvations and ExperimEnts) project (PI: Prof Sandy P. Harrison)
- Incorporating carbon isotopes and C_3/C_4 plants competition in the P model (C_3/C_4 PYREALM model)

Research Associate, Departments of Physics & Life Sciences, Imperial College London, UK (Oct. 2017- Nov. 2021)

- Designed, developed and managed (budget, deadlines, research directions) original research projects on understanding long-term forest response to climate variations.
- Performed data analyses and visualization, implemented new carbon isotopic capability into UK land surface model (JULES), evaluated optimal model using isotopic measurements
- Obtained £245,000 (€280,150) in grants for original research from Excellence research programs from UK and European Union.
- Designed and delivered guest lectures and mentored undergraduate and postgraduate students working on land surface models' simulations.
- Research resulted in 9 peer-reviewed publications (4 as first-author), 1 special report and 13 presentations at international scientific conferences, seminars and outreach events.

Lecturer, University of Versailles Saint-Quentin (UVSQ), France (Sept. 2015- Aug. 2016) **& Aix-en-Provence Marseille University, France** (Sept. 2016- Aug. 2017)

- Designed and executed original research projects to reconstruct past temperature variations in southern South America using stable isotopes measurements in tree rings and understand the origin of climate signal recorded therein
- Designed and taught undergraduate and graduate courses in Earth and Environmental Sciences (192 hours/year).
- Research resulted in 4 peer-reviewed publications (2 as first-author) and 8 presentations at international scientific conferences and department seminars.

PhD Researcher, Laboratoire des Sciences du Climat et de l'Environnement (LSCE), UVSQ & Paris-Saclay University, France (Oct. 2012- Jan. 2016)

- Designed and executed PhD research project to evaluate the potential of tree-ring measurements (width, oxygen and carbon isotopes) in Patagonia (Argentina) to reconstruct past climate and understand plant physiology
- Taught undergraduate courses in Earth and Environmental Sciences (128 hours).
- Research resulted in 3 peer-reviewed publications as first author and 4 presentations at international scientific conferences.

EDUCATION

Teaching Qualification from the French National Council of Universities, Panels: 'Meteorology, Oceanography and Physical Environment', 'Solid Earth: geodynamics of upper envelopes, paleobiosphere' and 'Structure and evolution of the earth and other planets' (2017-present)

PhD. in Paleoclimatology and Environmental Sciences, LSCE, UVSQ & University Paris-Saclay, France (2012-2016)

MSc. in Climatology and Environmental Sciences, UVSQ & Ecole Normale Supérieure de Paris, France (2010-2012)

BSc. in Geosciences, University Paris-Sud 11, Orsay, France (2006-2010)

RELEVANT SKILLS

- **Numerical and data analysis:** High-level of programming skills (expert in R – good knowledge of Python – basic knowledge of Matlab, C++ and Fortran). Expert handling large datasets (eddy-covariance, remotely sensed, dendrochronological and meteorological data), including quality control and processing.
- **Fieldwork experience:** Assisted in multiple field campaigns in Patagonia (Argentina) involving extraction of tree-ring cores, setup of meteorological stations for measuring temperature, precipitation or snow cover, and installation of dendrometer sensors.
- **Laboratory experience:** Extensive experience in preparing samples for tree-ring width measurements and stable isotope analyses (dating, cutting, milling and chemical extraction of cellulose, measurement with elemental analyser coupled to a mass spectrometer).
- **Scientific writing:** Scientific papers for peer-reviewed journals. Applications for grant and fellowships. Blog articles.
- **Languages** (spoken and written): French (native), Spanish (bilingual), English (fluent).

GRANTS & AWARDS

- Marie Sklodowska-Curie Individual Fellowship 838739 ECAW-ISO - *Past, present and future Exchanges of CArbon and Water between the vegetation and the atmosphere: new insights from analysis and modelling of stable carbon ISOtope data* (MSC Actions, European Union) 2019-2021 (€212,934 for 2 years)
- Newton International Fellowship NF170082 TEBIOC - *Advancing the understanding of TErrestrial BIOsphere responses and feedbacks to environmental Change* (The Royal Society, London, UK), 2017-2019 (£58,500 for 2 years)
- MSC Actions Seal of Excellence award (European Union) (2017 and 2018).
- 100 Talents 2016 of L'Oréal-UNESCO For Women in Science foundation (France) award.
- Symposium grants from AFEQ CNF-INQUA (France) to participate to EGU conference (2014) and TRACE conference (2016)
- PhD thesis merit scholarship (UVSQ, France) - €57,000 for 3 years (2012-2015).

TEACHING AND SUPERVISION EXPERIENCES

Supervisor/Mentor, Imperial College London, UK (2020-2021)

- Undergraduate UROP project (main supervisor) 'Historical and future changes in the coupled terrestrial carbon and water cycles as predicted by CMIP6 models' (July-September 2021)

- Master SPIN project (co-supervision) 'Exploring changes in trees carbon isotopic discrimination across UK using a data-model approach' (June-September 2021)
- Undergraduate UROP project (main supervisor) 'Investigating and interpreting global carbon isotopic discrimination variations predicted by CLM5 within CMIP6 for different scenarios of future (2015-2100) CO_2 emissions' (July-August 2020)

Guest lecturer, Imperial College London, London, UK (2019, 2021-2022)

- Designing and delivering a 2-hours lecture for the Dendrochronology Intensive Summer Courses organised by University of Arizona, Tucson, US on *"Modelling and interpreting stable carbon isotopes for studying land-atmosphere carbon and water flux exchanges"* (2021-2022)
- Designing and delivering a 4-hours lecture for Third year 'Global Change Biology' module (BSc., Biological Sciences) on *"Climate change: science and policy"* and a one-hour lecture for the eChange summer school (MRes, Ecosystem and Environmental Changes) on *"Stable isotope measurements in tree-rings*" (2019)

Lecturer, Aix-Marseille University, Marseille, France (2016-2017)

- Designing and delivering lectures, practical and tutorial sessions for courses in Geosciences in MSc. and BSc. levels for groups of up to 40 undergraduate or postgraduate students
- Responsible for development of suitable resources in collaboration with other tutors and lecturers, coursework organisation, delivery and marking
- *"Ocean structure and evolution" (lecture and practical), "Statistics" (practical), "Land surface dynamics" (lecture and practical), "Scientific project in Geosciences" (mentoring), "The Earth in the Universe" (practical), "Computing tools" (practical)* – total of 192 hours

Lecturer and tutor, University Versailles Saint-Quentin, Versailles, France (2013-2016)

- Delivering lectures, practical and tutorial sessions for courses in Biology and Environmental Science in BSc. Level for groups of up to 35 undergraduate students
- Organisation and delivery of sessions and coursework marking and feedback
- *"Introduction to Earth surface environments" (lecture and practical), "Applications in Environmental Sciences and Geosciences" (lecture and practical), "Geology introduction" (practical), "Endogen petrology" (practical), "Geology and field campaign" (practical), "Biophysics" (lecture and practical)* – total of 320 hours

VISITING SCHOLAR

Imperial College London (Department of Physics, London, UK)

- Visiting researcher (December 2021-present)

UK Centre for Ecology and Hydrology (Wallingford, UK)

- Visiting scientist (1 month, October 2019)

Instituto Argentino de Nivologia, Glaciologia y Ciencias Ambientales (Mendoza, Argentina)

- PhD visiting scientist (1 year, 2012-2013)
- MSc. Research Thesis (6 months, 2012)

British Antarctic Survey (Cambridge, UK)

- MSc. Research Project (6 months, 2011)

PROFESSIONAL SERVICES

- **Reviewer of Scientific journals, Research proposals and Book chapter:** Nature Plants, Global Change Biology, New Phytologist, Journal of Geophysical Research-Biogeosciences, Geophysical Research Letters, Forest Ecology and Management, Climatic Dynamic, Climate of the past, Science of the Total Environment, Climatic Change, Forests, Dendrochronologia, Global Ecology and Biogeography, Tree Physiology, Journal of Advances in Modeling Earth Systems (2017-present). Project from Estonian Research Council (2020). Book about Tree-ring research (2020)
- **Co-convener of scientific sessions at International Conferences**
  - 'Present and future global vegetation dynamics and carbon stocks from observations and models', BG 3.2, European Geophysical Union (EGU) conference (April 2021 and May 2022; Vienna, Austria)
  - 'Ecophysiological interpretations of stable isotopes in dendroecology' and 'Dendrogeochemistry: moving beyond potential', Ameridendro conference 2022 (June 2022, Montreal, Canada)
  - 'Optimality approaches to vegetation modelling', Mathematical Models in Ecology and Evolution (MMEE) conference (July 2022, Reading, UK)
- **Workshop organizer**, 'Best practices for using tree-ring stable isotopes of carbon and oxygen in paleoclimate and ecophysiology', Ameridendro 2022 (June 2022, Montreal, Canada)
- **Member of working group**, Royal Society briefing on the IPCC Special Report on Climate Change and Land, Royal Society, London, UK (2019)
- **Seminar Organizer**, Weekly Ecology and Evolution seminar series, Imperial College London, UK (2018-2019), Monthly seminars, LSCE, France (2014-2015)
- **Panelist,** Fellowship application symposium **(invited)** organized by Department of Chemical Engineering, Imperial College London on H2020 Marie Curie Actions (June 2020); panel discussion speaker **(invited)** at event on the IPCC Special Reports organized by the Royal Meteorological Society and Grantham Institute in London (November 2019)
- **Representant of Research Associates and/or PhD students**, Space and Atmospheric Science group, Physics Department, Imperial College, UK (2020-2021); LSCE, France (2013-2016); Council of the Environmental Sciences Doctoral School, France (2013-2015)

PROFESSIONAL TRAINING

- UNIque, for University Women, Personal development, EJW Solutions, UK, 2021.
- Science Communication: Reaching a Wider Audience, Imperial College London, UK, 2020.
- Planning Success Beyond Postdoc Workshop, Imperial College London, UK, 2019.
- Leadership Effectiveness, Royal Society, UK, 2019.
- Residential Communication and Media Skills, Royal Society, UK, 2018.
- Public Engagement Workshop, Royal Society, UK, 2017.
- Innovative teaching, University of Versailles Saint-Quentin, France, 2015.

PUBLICATIONS

Peer-reviewed Scientific Articles: Google scholar (Citations: 312*;* h-index: 11; i10 index: 12) – Scopus (Citations: 235*;* h-index: 10). Update June 17th, 2022

[18] **Lavergne, A.**, Harrison, S. P., Atsawawaranunt, K., Dong, N. and Prentice, I.C. (submitted) A semi-empirical model for primary production, isotopic discrimination and competition of C_3 and C_4 plants

[17] Palmer, L., Robertson, I., **Lavergne, A.**, Hemming, D., Loader, N., Young, G., Davies, D., Rinne-Garmston, K., Los, S. and Williams, J. (submitted) Spatio-Temporal Variations in Carbon Isotope Discrimination Reconstructed from Tree Rings and Predicted by the JULES Land Surface Model

[16] Hermoso de Mendoza, I., Boucher, E., Gennaretti, F., **Lavergne, A.**, Andreu-Hayles, L. and Field, R. D. (2022) A new snow module improves predictions of isotope-enabled MAIDENiso forest growth model, *Geoscientific Model Development*, 15, 1931–1952, 10.5194/gmd-15-1931-2022.

[15] **Lavergne, A.**, Hemming, D., Prentice, I.C., Guerrieri, R., Oliver, R.J. and Graven, H. M. (2022) Global decadal variability of plant carbon isotope discrimination and its link to gross primary production, *Global Change Biology*, 28, 524–541, 10.1111/gcb.15924.

[14] Field, R. D., Andreu-Hayles, L., D'Arrigo, R.D., Oelkers, R., Luckman, B.H., Morimoto, D., Boucher, E., Gennaretti, F., Hermoso, I., **Lavergne, A.** and Levesque, M. (2021) Tree-ring cellulose $\delta^{18}O$ records similar large-scale climate influences as precipitation $\delta^{18}O$ in the Northwest Territories of Canada, *Climate Dynamics*, 10.1007/s00382-021-05932-4

[13] Harrison, S.P., Cramer, W., Franklin, O., Prentice, I.C., Wang, H., Brännström, Å., de Boer, H., Dieckmann, U, Joshi, J., Keenan, T.F., **Lavergne, A.**, Manzoni, S., Mengoli, G., Morfopoulos, C., Peñuelas, J., Pietsch, S., Rebel, K.T., Ryu, Y., Smith, N.G., Stocker, B.D. and Wright, I. (2021) Eco-evolutionary optimality as a means to improve vegetation and land-surface models, *New Phytologist*, **231**, 6, 2125-2141, 10.1111/nph.17558.

[12] Hare, V.J. and **Lavergne, A.** (2021) Differences in carbon isotope discrimination between angiosperm and gymnosperm woody plants, and their significance over geological timescales, *Geochimica et Cosmochimica Acta,* 300, 215-230, 10.1016/j.gca.2021.02.029.

[11] **Lavergne, A.**, Sandoval, D., Hare, V.J., Graven, H. and Prentice, I.C. (2020) Impacts of soil water stress on the stomatal limitation of photosynthesis: insights from stable carbon isotope data, *Global Change Biology* **26**, 7158-7172, 10.1111/gcb.15364.

[10] Belmecheri, S. and **Lavergne, A.** (2020) Compiled records of atmospheric CO_2 concentration and stable carbon isotopes to reconstruct climate and derive plant ecophysiological indices from tree rings, *Dendrochronologia* **63**, 125748, 10.1016/j.dendro.2020.125748.

[9] **Lavergne, A.**, Voelker, S., Csank, A., Graven, H., de Boer, H.J., Daux, V., Robertson, I., Dorado-Linan, I., Martinez-Sancho, E., Battipaglia, G., Bloomfield, K.J., Meinzer, F.C., Camarero, J.J., Fang, Y., Clisby, R., Menzel, A., Still, C.J., Keen, R.M., Roden, J.S., Dawson, T.E. and Prentice, I.C. (2020) Historical changes in the stomatal limitation of photosynthesis: empirical support for an optimality principle, *New Phytologist* **225**, 6, 10.1111/nph.16314.

[8] **Lavergne, A.**, Graven, H., De Kauwe, M.G., Keenan, F.T., Medlyn, B.E. and Prentice, I.C. (2019). Observed and modelled historical trends in the water use efficiency of plants and ecosystems, *Global Change Biology* **25**, 2242-2257, 10.1111/GCB.14634.

[7] Daux, V., Michelot, A., **Lavergne, A.**, Pierre, M., Stievenard, M., Bréda, N. and Damesin, C. (2018). Comparisons of the performance of $\delta^{13}C$ and $\delta^{18}O$ of *F. sylvatica*, *P. sylvestris* and *Q. petraea* in the record of past climate variations, *Journal of Geophysical Research – Biogeosciences* **123**, 1-16, 10.1002/2017JG004203.

[6] **Lavergne, A.**, Daux, V., Pierre, M., Stievenard, M., Srur, A.M. and Villalba, R. (2018). Past summer temperatures inferred from dendrochronological records of *Fitzroya cupressoides* on the eastern slope of the

northern Patagonian Andes, *Journal of Geophysical Research – Biogeosciences* **123**, 32-45, 10.1002/2017JG003989.

[5] Allen, K., Villalba, R., **Lavergne, A.**, Palmer, J.G., Cook, E.C., Fenwick, P., Nichols, S.N., Drew, D.M., Turney, C.S.M. and Baker, P. (2018). A comparison of some simple methods used to detect unstable temperature responses in tree-ring chronologies, *Dendrochronologia* **48**, 52-73, 10.1016/j.dendro.2018.02.002.

[4] **Lavergne, A.**, Gennaretti, F., Risi, C., Daux, V., Boucher, E., Savard, M., Naulier, M., Villalba, R., Bégin, C. and Guiot, J. (2017). Modelling tree-ring cellulose $\delta^{18}O$ variations in two temperature-sensitive tree species from North and South America, *Climate of the Past* **13**, 1515-1526, 10.5194/cp-13-1515-2017.

[3] **Lavergne, A.**, Daux, V., Villalba, R., Pierre, M., Stievenard, M. and Srur, A.M. (2017). Improvement of isotope-based climate reconstructions in Patagonia through a better understanding of climate influences on isotopic fractionation in tree rings. *Earth and Planetary Science Letters* **459**, 372-380, 10.1016/j.epsl.2016.11.045.

[2] **Lavergne, A.**, Daux, V., Villalba, R., Pierre, M., Stievenard, M., Srur, A.M. and Vimeux, F. (2016). Are the oxygen isotopic compositions of *Fitzroya cupressoides* and *Nothofagus pumilio* cellulose promising proxies for climate reconstructions in northern Patagonia? *Journal of Geophysical Research - Biogeosciences* **121**, 10.1002/2015JG003260.

[1] **Lavergne, A.**, Daux, V., Villalba and Barichivich, J. (2015). Temporal changes in climatic limitation of tree-growth at upper treeline forests: contrasted responses along the west-to-east humidity gradient in Northern Patagonia. *Dendrochronologia* **36**, 49-59, 10.1016/j.dendro.2015.09.001.

Special Report, Theses, Model code and Data:

- Lavergne, A. (2022). C_3/C_4 PYREALM model
- Dong, N., I. C. Prentice, L. Tedersoo, A. Lavergne, S. P. Harrison and F. Q. Brearley (2022). Global Datasets of carbon isotope composition ($\delta^{13}C$) for Ecological and Earth System Research (Version v1) [Data set]. Zenodo. https://doi.org/10.5281/zenodo.6556096
- Lavergne, A. (2022). JULES vn5.6 with a new carbon isotopic modelling capability https://code.metoffice.gov.uk/trac/jules/browser/main/branches/dev/alienorlavergne/vn5.6_jules_Cisotopes
- Hermoso de Mendoza, I., **Lavergne, A.**, Gennaretti, F., & Boucher, E. (2020, October 16). MAIDENiso (Version v20200907). Zenodo. http://doi.org/10.5281/zenodo.4095541
- Brown, J., Diaz, S., Friedlingstein, P., Krebs, J, **Lavergne, A.**, Mace, G. (Chair) and Malhi, Y. (2019) Climate change and land: opportunities and challenges for the UK, The Royal Society
- Evaluation of tree-ring natural archive as paleoclimate tracer in north Patagonia (2016). Global Changes, *Université Paris-Saclay,* English. NNT: 2016SACLV004. *Ph.D. Thesis available at https://tel.archives-ouvertes.fr/tel-01368294/document*

Selected first author oral presentations or virtual PICO (since 2020):

- Investigating C_3/C_4 plants competition using carbon isotopes and optimality principles, May 2022, EGU meeting, Vienna, Austria
- Futures modelling: Pathways towards sustainable futures **(invited)**, February 2022, UNEP-WCMC, Cambridge, UK

- Exploring the role of the terrestrial biosphere in regulating the coupled carbon and water cycles and in mitigating climate change **(invited)**, January 2022, Division of Biological and Environmental Science, University of Stirling, UK
- Vegetation-climate interactions and feedbacks **(invited)**, December 2021, Department of Geography, University of Sheffield, UK
- Modelling stable carbon isotopes in JULES for studying land carbon uptake **(invited)**, July 2021, the Met Office science seminar series, UK
- Global decadal variability of plant carbon isotope discrimination and its link to gross primary productivity in JULES **(invited)**, June 2021, JULES vegetation module meeting, UK
- Exploring the role of forests in regulating the terrestrial coupled carbon and water cycles in the context of climate change **(invited)**, June 2021, School of Geography, Queen Mary University, UK
- Stable carbon isotopes as powerful tools for studying land-atmosphere flux exchanges and improving land surface models, May 2021, EGU meeting, Vienna, Austria
- Implementation of stable carbon isotopes into JULES model: A novel approach for evaluating the coupled carbon and water cycles as represented in UKESM, December 2020, AGU meeting, San Francisco, USA
- Disentangling the relative contributions of atmospheric demand for water and soil water availability on the stomatal limitation of photosynthesis, May 2020, EGU, Vienna, Austria
- Implementation of stable carbon isotopes into JULES: A novel approach for evaluating the coupled carbon and water cycles in UKESM, September 2020, JULES meeting, UK