FRANÇOIS KECK

I am a community ecologist interested in using large datasets and computational methods to investigate ecological questions in the field of limnology. Broadly, my research activities are focussed on the links between environmental variation and community dynamics in diatoms. Because diatoms are important biological indicators, a significant part of my work involves developing ideas, methods and scientific principles to support environmental monitoring and management.

View this CV online with links at *www.francoiskeck.fr*

EDUCATION

2016 | 2013

Ph.D. Biodiversity, Ecology and Environment
University of Grenoble-Alpes

2011 | 2009

M.S. Ecology, Evolution and Biometry
University of Lyon

2009 | 2006

B.S. Biology and Population Ecology
University of Lyon

PROFESSIONAL EXPERIENCE

2022 | 2020

Postdoctoral researcher
Eawag

Macroinvertebrate diversity in small catchments varying in agricultural land use intensity

2019

Postdoctoral researcher
INRA

Changes in lake micro-eukaryotic communities during the Anthropocene.

2018 | 2016

Postdoctoral researcher
SLU

Diatom ecological niches and community structure.

2016 | 2013

PhD. Degree
University of Grenoble-Alpes

Assessing the links between phylogeny and ecological traits: new perspective for rivers bioassessment.

2012

Ecological engineer
Charpentier Consultants

Digital cartography of wetlands and methodological developments.

CONTACT

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francoiskeck.fr
+33 678 111 271

LANGUAGES

French (native speaker)
English

SKILLS

Advanced statistics and programming with R Hypothesis testing - Multivariate statistics - Inferential modelling - Machine learning

Data visualization Static and interactive graphics - Interactive dashboards (Shiny).

GIS and spatial analysis ArcGIS - QGIS - R

Database management MS Access - MySQL (basics)

Image editing and processing: Photoshop/Gimp - Illustrator/Inkscape - ImageJ

Last updated on 2022-12-09.

2011

Ecological engineer

University of Lyon

Analyses of ecological data as part of the Rhône river restauration project.

2008

Ecological engineer

Charpentier Consultants

Impact study as part of the Saône river restauration

PUBLICATIONS

Meta-analysis shows both congruence and complementarity of DNA and eDNA metabarcoding to traditional methods for biological community assessment

Keck, F., Blackman, R. C., Bossart, R., Brantschen, J., Couton, M., Hürlemann, S., Kirschner, D., Locher, N., Zhang, H., Altermatt, F. (2022). *Molecular Ecology*, 31(6), 1820-1835.

Paleoreconstructions of ciliate communities reveal long-term ecological changes in temperate lakes

Barouillet, C., Vasselon, V., **Keck, F.**, Millet, L., Etienne, D., Galop, D., Rius, D., Domaizon, I. (2022). *Scientific Reports*, 12(1), 7899.

A triad of kicknet sampling, eDNA metabarcoding, and predictive modeling to assess richness of mayflies, stoneflies and caddisflies in rivers

Keck, F., Hürlemann, S., Locher, N., Stamm, C., Deiner, K., Altermatt, F. (2022). *Metabarcoding and Metagenomics*, 6, e79351.

Co-occurrence, ecological profiles and geographical distribution based on unique molecular identifiers of the common freshwater diatoms Fragilaria and Ulnaria

Kahlert, M., Maaria Karjalainen, S., **Keck, F.**, Kelly, M., Ramon, M., Rimet, F., Schneider, S., Tapolczai, K., Zimmermann, J. (2022). *Ecological Indicators*, 141, 109114.

Management of DNA reference libraries for barcoding and metabarcoding studies with the R package refdb

Keck, F., Altermatt, F. (2022). *Molecular Ecology Resources*.

Navigating the seven challenges of taxonomic reference databases in metabarcoding analyses

Keck, F., Couton, M., Altermatt, F. (2022). *Molecular Ecology Resources*.

The potential of exact sequence variants (ESVs) to interpret and assess the impact of agricultural pressure on stream diatom assemblages revealed by DNA metabarcoding

Tapolczai, K., Selmeczy, G. B., Szabó, B., B-Béres, V., **Keck, F.**, Bouchez, A., Rimet, F., Padisák, J. (2021). *Ecological Indicators*, 122, 107322.

DNA metabarcoding reveals differences in distribution patterns and ecological preferences among genetic variants within some key freshwater diatom species

Pérez-Burillo, J., Trobajo, R., Leira, M., **Keck, F.**, Rimet, F., Sigró, J., Mann, D. G. (2021). *Science of The Total Environment*, 798, 149029.

Assessing the response of micro-eukaryotic diversity to the Great Acceleration using lake sedimentary DNA

Keck, F., Millet, L., Debroas, D., Etienne, D., Galop, D., Rius, D., Domaizon, I. (2020). *Nature Communications*, 11(1), 3831.

Handling biological sequences in R with the bioseq package

Keck, F. (2020). *Methods in Ecology and Evolution*, 11(12), 1728-1732.

Key Questions for Next-Generation Biomonitoring

Makiola, A., Compson, Z. G., Baird, D. J., Barnes, M. A., Boerlijst, S. P., Bouchez, A., Brennan, G., Bush, A., Canard, E., Cordier, T., Creer, S., Curry, R. A., David, P., Dumbrell, A. J., Gravel, D., Hajibabaei, M., Hayden, B., van der Hoorn, B., Jarne, P., Jones, J. I., Karimi, B., **Keck, F.**, Kelly, M., Knot, I. E., Krol, L., Massol, F., Monk, W. A., Murphy, J., Pawlowski, J., Poisot, T., Porter, T. M., Randall, K. C., Ransome, E., Ravigné, V., Raybould, A., Robin, S., Schrama, M., Schatz, B., Tamaddoni-Nezhad, A., Trimbos, K. B., Vacher, C., Vasselon, V., Wood, S., Woodward, G., Bohan, D. A. (2020). *Frontiers in Environmental Science*, 7.

Biodiversity patterns of Arctic diatom assemblages in lakes and streams: Current reference conditions and historical context for biomonitoring

Kahlert, M., Rühland, K. M., Lavoie, I., **Keck, F.**, Saulnier-Talbot, E., Bogan, D., Brua, R. B., Campeau, S., Christoffersen, K. S., Culp, J. M., Karjalainen, S. M., Lento, J., Schneider, S. C., Shaftel, R., Smol, J. P. (2020). *Freshwater Biology*.

Ecosystems monitoring powered by environmental genomics: A review of current strategies with an implementation roadmap

Cordier, T., Alonso-Sáez, L., Apothéloz-Perret-Gentil, L., Aylagas, E., Bohan, D. A., Bouchez, A., Chariton, A., Creer, S., Frühe, L., **Keck, F.**, Keeley, N., Laroche, O., Leese, F., Pochon, X., Stoeck, T., Pawlowski, J., Lanzén, A. (2020). *Molecular Ecology*.

Ecological correlates of riverine diatom and macroinvertebrate alpha and beta diversity across Arctic Fennoscandia

Brittain, J. E., Heino, J., Friberg, N., Aroviita, J., Kahlert, M., Karjalainen, S.-M., **Keck, F.**, Lento, J., Liljaniemi, P., Mykrä, H., Schneider, S. C., Ylikörkkö, J. (2020). *Freshwater Biology*.

Community phylogenetic structure reveals the imprint of dispersal-related dynamics and environmental filtering by nutrient availability in freshwater diatoms

Keck, F., Kahlert, M. (2019). *Scientific Reports*, 9(1), 1-8.

Benthic Diatom Communities in an Alpine River Impacted by Waste Water Treatment Effluents as Revealed Using DNA Metabarcoding

Chonova, T., Kurmayer, R., Rimet, F., Labanowski, J., Vasselon, V., **Keck, F.**, Illmer, P., Bouchez, A. (2019). *Frontiers in Microbiology*, 10.

Molecular versus morphological data for benthic diatoms biomonitoring in Northern Europe freshwater and consequences for ecological status

Bailet, B., Bouchez, A., Franc, A., Frigerio, J.-M., **Keck, F.**, Karjalainen, S.-M., Rimet, F., Schneider, S., Kahlert, M. (2019). *Metabarcoding and Metagenomics*, 3, e34002.

Connecting the morphological and molecular species concepts to facilitate species identification within the genus Fragilaria (Bacillariophyta)

Kahlert, M., Kelly, M. G., Mann, D. G., Rimet, F., Sato, S., Bouchez, A., **Keck, F.** (2019). *Journal of Phycology*.

Diatom DNA Metabarcoding for Biomonitoring: Strategies to Avoid Major Taxonomical and Bioinformatical Biases Limiting Molecular Indices Capacities

Tapolczai, K., **Keck, F.**, Bouchez, A., Rimet, F., Kahlert, M., Vasselon, V. (2019). *Frontiers in Ecology and Evolution*, 7.

Disentangling the processes driving the biogeography of freshwater diatoms: A multiscale approach

Keck, F., Franc, A., Kahlert, M. (2018). *Journal of Biogeography*, 45(7), 1582-1592.

Boosting DNA metabarcoding for biomonitoring with phylogenetic estimation of operational taxonomic units' ecological profiles

Keck, F., Vasselon, V., Rimet, F., Bouchez, A., Kahlert, M. (2018). *Molecular Ecology Resources*, 18(6), 1299-1309.

The potential of High-Throughput Sequencing (HTS) of natural samples as a source of primary taxonomic information for reference libraries of diatom barcodes

Rimet, F., Abarca, N., Bouchez, A., Kusber, W.-H., Jahn, R., Kahlert, M., **Keck, F.**, Kelly, M. G., Mann, D. G., Piuz, A., Trobajo, R., Tapolczai, K., Vasselon, V., Zimmermann, J. (2018). *Fottea*, 18(1), 37-54.

River biofilm community changes related to pharmaceutical loads emitted by a wastewater treatment plant

Chonova, T., Labanowski, J., Cournoyer, B., Chardon, C., **Keck, F.**, Laurent, É., Mondamert, L., Vasselon, V., Wiest, L., Bouchez, A. (2018). *Environmental Science and Pollution Research*, 25(10), 9254-9264.

Freshwater biomonitoring in the Information Age

Keck, F., Vasselon, V., Tapolczai, K., Rimet, F., Bouchez, A. (2017). *Frontiers in Ecology and the Environment*, 15(5), 266–274.

Can we predict diatoms herbicide sensitivities with phylogeny? Influence of intraspecific and interspecific variability

Esteves, S. M., **Keck, F.**, Almeida, S. F. P., Figueira, E., Bouchez, A., Rimet, F. (2017). *Ecotoxicology*, 26(8), 1065-1077.

Phylogenetic signal in diatom ecology: Perspectives for aquatic ecosystems biomonitoring

Keck, F., Rimet, F., Franc, A., Bouchez, A. (2016). *Ecological Applications*, 26(3), 861–872.

Linking phylogenetic similarity and pollution sensitivity to develop ecological assessment methods: a test with river diatoms

Keck, F., Bouchez, A., Franc, A., Rimet, F. (2016). *Journal of Applied Ecology*, 53(3), 856–864.

phylosignal: an R package to measure, test, and explore the phylogenetic signal

Keck, F., Rimet, F., Bouchez, A., Franc, A. (2016). *Ecology and Evolution*, 6(9), 2774–2780.

Separate treatment of hospital and urban wastewaters: A real scale comparison of effluents and their effect on microbial communities

Chonova, T., **Keck, F.**, Labanowski, J., Montuelle, B., Rimet, F., Bouchez, A. (2016). *Science of The Total Environment*, 542, 965-975.

R-Syst::diatom: an open-access and curated barcode database for diatoms and freshwater monitoring

Rimet, F., Chaumeil, P., **Keck, F.**, Kermarrec, L., Vasselon, V., Kahlert, M., Franc, A., Bouchez, A. (2016). *Database*, 2016, baw016.

Linking Diatom Sensitivity to Herbicides to Phylogeny: A Step Forward for Biomonitoring?

Larras, F., **Keck, F.**, Montuelle, B., Rimet, F., Bouchez, A. (2014). *Environmental Science & Technology*, 48(3), 1921-1930.

Can we predict nutrient limitation in streams and rivers?

Keck, F., Lepori, F. (2012). *Freshwater Biology*, 57(7), 1410–1421.

Effects of Atmospheric Nitrogen Deposition on Remote Freshwater Ecosystems

Lepori, F., **Keck, F.** (2012). *AMBIO: A Journal of the Human Environment*, 41(3), 235-246.

SELECTED PRESENTATION

From DNA sequences to operational reference databases. An opinionated approach using R

1st DNAqua-net conference (online, 2021).

Patterns and drivers of phylogenetic diversity in freshwater diatom communities of Sweden

25th International Diatom Symposium (Berlin, Germany, 2018).

Developing phylogenetically based biomonitoring methods: a test with diatoms

9th Use of Algae for Monitoring RIvers and comparable habitats (Trentino, Italy, 2015).

Linking phylogenetic similarity and pollution sensitivity to develop ecological assessment methods: a test with diatoms

9th Symposium for European Freshwater Sciences (Geneva, Switzerland, 2015).

Linking Diatoms Ecological Preferences To Phylogeny: New Perspectives for Aquatic Ecosystems Bioassessment

Joint Aquatic Sciences Meeting (Portland, Oregon, 2014).

Linking diatoms polluosensitivity to phylogeny: New perspectives for aquatic ecosystems bioassessment

7th Central European Diatoms meeting (Thonon-les-Bains, France, 2013).

Can we predict nitrogen limitation in streams and rivers? A meta-analysis

7th Symposium for European Freshwater Sciences (Gerona, Spain, 2011).

SOFTWARE DEVELOPMENT

Lead developer of two R packages available on CRAN

- *rleafmap*: Interactive maps with R and leaflet.
- *phylosignal*: Assessing and exploring the phylogenetic signal with R.

Other open source contributions: https://github.com/fkeck

Invited at the R hackathon Hackout 2: Graphical Resources for Infectious Disease Epidemiology in R (Imperial College, London, 2015).

ACTIVITY AS REVIEWER

Scientific articles

The ISME journal, Environmental Science & Technology, BMC Evolutionary Biology, Freshwater Science, Molecular Ecology , Metabarcoding & Metagenomics, Journal of Biogeography, Harmful Algae.

Research proposals

Funding scheme HARMONIA for the National Science Centre of Poland.

PRIZES & AWARDS

Best student presentation award. 7th Central European Diatoms Meeting.

Outstanding Ph.D. thesis award. University of Grenoble-Alpes (1500 €).

Best ECR oral presentation. 1st DNAqua-net conference (500 €).

REFERENCES

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UMR CARRTEL, 75 avenue de Corzent, 74200 Thonon-les-Bains – France
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Senior Researcher, SUPSI
Institute of Earth Sciences, Via Trevano, Blocco, 6952 Canobbio – Switzerland
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