

1st FreshProject



EuroRun - Assessing CO₂ Fluxes from European Running Waters

EuroRun project was awarded as the 1st FreshProject by the EFFF (European Federation for Freshwater Sciences), a joint initiative with EFYR (European Fresh and Young Researchers) and FBFW (Fresh Blood for Freshwater) and was co-founded by the Leibniz-Institute of Freshwater Ecology and Inland Fisheries, Berlin. The project ran from February 2016 to April 2018 and integrated 16 teams from 11 European countries, with a total of 47 young freshwater researchers conducting sampling at 34 stream sites.

Inland waters contribute to global CO₂ emissions with values comparable to the total CO₂ uptake of the oceans, while running waters emit the largest proportion with about 70%. The processes that influence CO₂ fluxes in running waters are complex and include physical and biological factors that can influence the CO₂ concentration in the water and vary on a diurnal and seasonal scale. However, the magnitude and mechanisms of CO₂ fluxes in running waters are still not adequately quantified or understood, contributing to a high uncertainty in upscaling approaches. EuroRun aimed towards a better estimation and understanding of CO₂ fluxes in European running waters. The major focus of EuroRun was laid on estimating diurnal and seasonal differences of CO₂ fluxes from European running waters and represented the first coordinated European-wide study to examine fluvial CO₂ fluxes. To get a spatially and temporally resolved dataset, a group of early career scientists from across Europe measured day and nighttime CO₂ fluxes every three months for a one-year period.

The framework of the EuroRun project offered a great opportunity for associated projects. The PIs of EuroRun always encouraged other researchers to use the structure of EuroRun and think about their own ideas. In collaboration with Andrea Garcia Bravo, additional samples from 27 out of 34 sampling sites were collected during the first sampling campaign in October 2016. The major aim of this study was to examine the influence of dissolved organic matter composition, catchment characteristics and water chemistry to predict total mercury, methylmercury concentrations, and the percentage of methylmercury out of total mercury in European running waters. The EuroRun network offered the opportunity to take samples in a large number of running waters across Europe and thereby represents one of the first assessments of mercury concentrations of European running waters.

List of publications

In the course of these years, a total of five peer-reviewed papers were published, including the main manuscript on day-night differences in CO₂ fluxes at the air-water interface in European streams published in *Communications Earth & Environment*. In addition, there were three non-peer-reviewed articles about the project in national newsletters.

Peer-reviewed

- 1) Attermeyer, K., J. P. Casas-Ruiz, T. Fuss, A. Pastor, S. Cauvy-Fraunié, D. Sheath, A. C. Nydahl, A. Doretto, A. P. Portela, B. C. Doyle, N. Simov, C. Gutmann Roberts, G. H. Niedrist, X. Timoner, V. Evtimova, L. Barral-Fraga, T. Bašić, J. Audet, A. Deininger, G. Busst, S. Fenoglio, N. Catalán, E. de Eyto, F. Pilotto, J.-R. Mor, J. Monteiro, D. Fletcher, C. Noss, M. Colls, M. Nagler, L. Liu, C. Romero González-Quijano, F. Romero, N. Pansch, J. L. J. Ledesma, J. Pegg, M. Klaus, A. Freixa, S. Herrero Ortega, C. Mendoza-Lera, A. Bednařík, J. A. Fonvielle, P. J. Gilbert, L. A. Kenderov, M. Rulík, P. Bodmer (2021) Carbon dioxide fluxes increase from day to night across European streams. *Communications Earth & Environment* 2: 118.
- 2) Nagler, M. N. Praeg, G. H. Niedrist, K. Attermeyer, N. Catalán, F. Pilotto, C. Gutmann Roberts, C. Bors, S. Fenoglio, M. Colls, S. Cauvy-Fraunié, B. Doyle, F. Romero, B. Machalett, T. Fuss, A. Bednařík, M. Klaus, P. Gilbert, D. Lamonica, A.C. Nydahl, C. Romero González-Quijano, L. Thuile Bistarelli, L. Kenderov, E. Piano, J.-R. Mor, V. Evtimova, E. de Eyto, A. Freixa, M. Rulík, J. Pegg, S. Herrero Ortega, L. Steinle, P. Bodmer (2021) Abundance and biogeography of methanogenic and methanotrophic microorganisms across European streams. *Journal of Biogeography* 48(4): 947-960.
- 3) Bodmer, P., K. Attermeyer, A. Pastor, N. Catalán (2019) Collaborative projects: Unleashing Early Career Scientists' Power. *Trends in Ecology and Evolution* 34(10): 871-874.
- 4) Bravo, A. G., D. N. Kothawala, K. Attermeyer, E. Tessier, P. Bodmer, D. Amouroux (2018) Cleaning and sampling protocol for analyses of mercury and dissolved organic matter in freshwater systems. *MethodsX* 5: 1017-1026.
- 5) Bravo, A. G., D. N. Kothawala, K. Attermeyer, E. Tessier, P. Bodmer, J.L.J. Ledesma, J. Audet, J.P. Casas-Ruiz, N. Catalán, S. Cauvy-Fraunié, M. Colls, A. Deininger, V. Evtimova, J.A. Fonvielle, T. Fuss, P. Gilbert, S. Herrero Ortega, L. Liu, C. Mendoza-Lera, J. Monteiro, J.-R. Mor, M. Nagler, G.H. Niedrist, A.C. Nydahl, A. Pastor, J. Pegg, C. Gutmann Roberts, F. Pilotto, A.P. Portela, C. Romero González-Quijano, F. Romero, M. Rulík, D. Amouroux (2018) The interplay between total mercury, methylmercury and dissolved organic matter in fluvial systems: A latitudinal study across Europe. *Water Research* 144: 172-182.

Non-peer-reviewed

- 6) Attermeyer, K., Bodmer, P. (2017) EuroRun – Assessing CO₂ fluxes from European running waters. *Freshwater Biological Association News*, 73: 10-12.
- 7) Fenoglio, S., Doretto, A., Baltieri, M. (2017) Il respiro del fiume. *L'Orsa del Pellice*, 3: 66-67.
- 8) Doretto, A., Fenoglio, S., Baltieri, M. (2017) Il respiro del fiume. *Fly Line - Ecosistemi fluviali*, 32: 65-71.

Outreach activities

EuroRun was presented at three conferences, one Mini-Symposium and one student day of SIL-Austria. At the Symposium for European Freshwater Sciences (SEFS) in Olomouc, Czech Republic, the PIs of EuroRun organized a special session (SS06) on “Spatial and temporal heterogeneity of greenhouse gas fluxes in inland waters”, a topic related to the EuroRun project.

List of conferences/symposia

- 25th October 2017 Student day SIL-Austria in Innsbruck, Austria, Talk by Georg H. Niedrist
- 4 th July 2017 Symposium for European Freshwater Sciences 10 in Olomouc, Czech Republic, Talk by Katrin Attermeyer
- 7 th June 2017 Mini-Symposium for Early Career Researchers in Uppsala, Poster presentation by Katrin Attermeyer
- 23rd March 2017 Flow Country Conference IV in Thurso, Scotland, Talk by Peter Gilbert
- 26th – 30th September 2016 Joint conference of the Austrian and German limnological societies in Vienna, Austria, Poster presentation by Katrin Attermeyer

Web page: <https://freshproject-eurorun.iimdfree.com/eurorun/project-eurorun/>