Dear Colleagues,

The 10 doctoral candidate positions part of the Horizon Europe Marie Skłodowska-Curie Action - Doctoral Network FluxBEATS dedicated to global elemental fluxes that control biogeochemical cycles and ore formation at divergent plate boundaries **are still open for applications**.

The successful applicants for all positions should have a Master's degree (or equivalent) in natural sciences, proficient knowledge of English and motivation for mobility. Applicants must not have resided or carried out their main activity (such as studies, work, or research) in the country where the position is based for more than 12 months in the 3 years immediately prior to the call deadline. Successful applicants must relocate to the referred country by the time of employment.

Each position is applied for through the host institution. Therefore, the host institution's requirements apply. **The application templates on the FluxBEATS website must be carefully filled out and attached to the application.** The applicant selected for the project is expected to start on 1st of May, 2025.

See https://www.fluxbeats.eu/positions.html information about the positions, templates and how to apply.

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INDIVIDUAL PhD PROJECTS (main supervisors in bold):

DC1 - Chemical budget of the bulk oceanic crust
The aim of this project is to quantify the primary mass flux from the mantle to the oceanic crust. This will be done by determining the chemical budget for the bulk oceanic crust at suitable modern MOR localities. Host institution: University of Münster. Supervision: **Andreas Stracke** (UM), **Christoph Beier** (UH), and Felix Genske (UM)

DC2 - Fluid inclusion trace element signatures in lavas from divergent plate boundaries
The aim of this project is to analyze fluid and melt inclusion and mineral trace element data from back-arcs, along with whole rock and glass geochemical analyses in active spreading systems of varying compositions, providing a consistent dataset of melt and fluid inclusion geochemistry. Results of the fluid inclusion trace element analyses will be compared to in-situ fluid trace element analyses from active hydrothermal vents and minerals. Host institution: University of Helsinki. Supervision: **Christoph Beier** (UH), **Wolfgang Bach** (UB), and Philipp Brandl (GEOMAR).

DC3 - Alteration of the oceanic lithosphere at different tectonic settings and link to fluxes through geological time
The aim of this project is the to gain understanding of the links between tectonics, bulk alteration and focused hydrothermal activity at actively deforming systems, e.g., active transforms and detachments faults along MOR, in order to estimate the duration and extent of fluid-rock reaction during and after activity. Host institution: Université Claude Bernard Lyon 1. Supervision: **Muriel Andreani** (ULY), **Javier Escartin** (ENS), Philipp Brandl and Lars Rüpke (both GEOMAR

DC4 - Formation of silicic magmas in ophiolites and at modern divergent margins
The aim of this project is to establish a baseline of silicic magma formation along modern MORs and back-arcs and compare these to the two prime Finnish Precambrian ophiolites representing the initial (Jormua) and more advanced

(Outokumpu) ocean magmatism in the Paleoproterozoic. Mineral-melt and mineral-fluid equilibria in plagioclase will be central in modelling element enrichment processes. Host institution: University of Helsinki. Supervision: **Tapani Rämö** (UH), **Philipp Brandl** (GEOMAR), Christoph Beier (UH), and Sven Petersen (GEOMAR).

DC5 - Controls of fluxes of critical metals from the mantle to crust and into the water column at spreading centres
The aim of this project is to create an innovative perspective on the flux of critical metals through magmatic and hydrothermal systems hosted at divergent plate boundaries, also thought to represent potential analogues to some prolific land-mined greenstone belts. The result is a new crust-to-deposit-to-ocean metal budget that will be developed further into a holistic VMS deposit model by integrating compositional data of seafloor massive sulphide ores and fluid samples. Host institution: GEOMAR. Supervision: **Sylvia Sande**r (GEOMAR), **Wolfgang Bach** (UB), Christoph Beier (UH), Philipp Brandl (GEOMAR), and Sven Petersen (GEOMAR).

DC6 - Permeability, temperature and heat flux at hydrothermal systems
The aim of this project is to address the multi-scale permeability-temperature-heat flux tryptic quantification at deep-sea hydrothermal system and its implementation into a "unifying model". This project will include a combination of analytical and numerical hydrothermal modelling constrained with observational work to systematically quantify the effective permeability of hydrothermal systems and its efficiency at extracting heat out of the solid Earth. Host institution: GEOMAR. Supervision: **Lars Rüpke** (GEOMAR), **Thibaut Barreyre** (Geo-Ocean), and Luca Brandt (Polito)

DC7 - Fluxes of bio-essential metals in Archean seafloor hydrothermalsystems
The aim of this projec**t** is to do a detailed field, geochemical and isotopic study on Archean hydrothermal alteration zones in the 3.5-3.2 Ga Barberton and 2.8-2.6 Ga Abitibi Greenstone Belts to characterize fluxes of bio-essential metals and their impact on the evolution of early microbial life in early hydrothermal settings. Host institution: University of Bergen. Supervision: **Desiree Roerdink** (UiB), **Joonas Virtasalo** (GTK), Steffen Leth Jørgensen (UiB), Riikka Kietäväinen (UH), and Wolfgang Bach (UB).

DC8 - Interplay between organic and hydrothermal processes in the formation of metal deposits at different stages of divergent margin evolution
The aim of this project is to study the significance of syngenetic organic-sulphidic compounds and secondary hydrothermal metal enrichment in three different Proterozoic (2.1-1.96 Ga) divergent margin types in Finland from existing rock samples. Host institution: Geological Survey of Finland (GTK). Supervision: **Joonas Virtasalo** (GTK), **Desiree Roerdink** (UiB), **Tuomo Törmänen** (GTK), Bénédicte Menez (IPGP), Sylvia Sander (GEOMAR), and Riikka Kietäväinen (GTK).

DC9 - Impact of Microbial Interaction with Deep Oceanic Crust – Micro-Deep
The aim of this project is to investigate the nature and rate of biotic vs. abiotic alteration of oceanic basalt and quantify to what extent microbial activity influences the dissolution rates of newly formed oceanic basalt and thereby evaluate the potential environmental impact, both past and present. Host institution: University of Bergen. Supervision: **Steffen Leth Jørgensen** (UiB), Co-supervisor: **Riikka Kietäväinen** (UH), **Helen King**, Oliver Plümber, Desiree Roerdink (UiB), Bach (UB), and Sylvia Sander (GEOMAR).

DC10 - Numerical modelling of hydrothermal plumes in the ocean
The aim of this project is the numerical modelling of hydrothermal plumes in the ocean using methods of Computational Fluid Dynamics, in particular, Large Eddy Simulations (LES). We will implement a chemistry module in a numerical model of a hydrothermal plume in the ocean to analyse the behaviour of passive and active tracers and chemical and microbial kinetics in the plumes. Host institution: Polito. Supervision: **Luca Brandt** (Polito), **Ekaterina Ezhova** (UH), Wolfgang Bach (UB), Lars Rüpke and Sylvia Sander (both GEOMAR), and Luca Ridolfi and Carlo Camporeale (both Polito).