

Impact of PFOS, PFOA, PFHxS and PFBS addition in 4 contrasted soils: impact on microbial communities and soil N/C cycles, PFAS dynamics

Crampon Marc^{a*}, Norini Marie-Paule^a, Battaglia-Brunet Fabienne^a, Relic Dubravka^b, Ljesevic Marija^{b,c}, Charron Mickaël^a, Tris Hafida^a, Begoña Jiménez^d, Juan Muñoz Arnanz^d, Pere Colomer Vidal^d, Beskoski Vladimir^b

*m.crampon@brgm.fr

^a Bureau de Recherches Géologiques et Minières (BRGM), Orléans, France, 3 avenue Claude Guillemin, 45100RGM, F45060;

^b University of Belgrade - Faculty of Chemistry, Department of Biochemistry, Studentski trg 12-16, Belgrade, Serbia

^c University of Belgrade, Institute of Chemistry, Technology and Metallurgy, Department of Chemistry, Njegoseva 12, 11000 Belgrade, Serbia

^d Instituto de Química Orgánica General, CSIC, Juan de la Cierva 3. 28006 Madrid

Per- and polyfluoroalkyl substances (PFAS) have emerged as a significant class of pollutants due to their broad environmental and health implications. PFAS have been used in a range of industrial and consumer applications since the 1940s, leading to their widespread presence in the environment, including among others, water sources, soil, and even the human body. Increasing scientific and regulatory attention is being paid to the occurrence and fate of PFAS in drinking water, wastewater, and the environment in general. Particularly, PFAS-contaminated soil has become increasingly reported in many parts of the world, and is now being recognized as a serious environmental hazard. When these chemicals are present in soil, they can infiltrate the groundwater, potentially leading to drinking water and food contamination. Consequently, there is a pressing need to develop, optimize, and implement remediation technologies specifically tailored to PFAS-contaminated soils. The present study aims to present experiments on 4 different soils with different physico chemical properties, artificially contaminated by a mixture of 4 PFAS (PFOS, PFOA, PFHxS and PFBS) at a concentration of 10 mg.kg⁻¹ each.

Each condition was set up with 3 replicates and 3 controls (without PFAS) per soil. The impact of PFAS addition was monitored on carbon cycle (CO₂ release trapped in NaOH), nitrogen cycle (N extraction by K₂SO₄ 0,5M (analysis by ion chromatography) and enzymatic activities. The abundance of 16S rRNA and 18S rRNA genes was monitored during 70 days, and the evolution of bacterial, archaeal and fungal biodiversity over time was monitored by metabarcoding of the 16S rRNA and ITS2 genes. The PFAS concentrations were also quantified at T0 and at the end of the microcosms experiment, highlighting minor changes. Results highlighted contrasted impact of PFAS addition on the 4 studied soils, with an impact of physico chemical properties and contrasted impact on microbial communities.

Keywords: PFAS, soils, microbial ecotoxicology

Please precise on your abstract if the presenting author is:

PhD student

post-doc (< 5 years after PhD)

senior researcher