EMSL: A DOE Scientific User Facility for Earth System Science Research

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EMSL, a DOE national user facility in Richland WA, provides integrated experimental, computational, and modelling and simulation resources and expertise for scientific studies and discovery in Earth Systems Science to users free of charge. EMSL host numerous capabilities that are relevant for such research. I) Next generation imaging and surface characterization experimental capabilities can be used to provide the spatially resolved elemental analysis, oxidation state determination, chemical speciation, mineral identification, and microbe-mineral associations necessary for understanding the chemical fate and mobility of contaminants in the biogeochemical environment or microbial communities and nutrient cycling in the rhizosphere. II) Advanced spectroscopic capabilities are used for determining the speciation of metal ions and complexes on surfaces, in solution, or incorporated into mineral phases. III) Advanced mass spectrometry platforms for proteomics/metabolomics, whole transcriptome analysis, gene expression profiling, small RNA analysis, novel transcript identification, and many genome- and epigenome-directed applications provide EMSL users extensive capabilities for unravelling the interplay between microbes, plants, soil, and geochemistry. IV) integrated computational and experimental subsurface flow and transport facilities provide data from the micron to the intermediate scale. Experts assist users with pre-experiment modelling to hydraulic characterization, numerical modelling, and post-process analysis on custom-built flowcells. V) EMSL's Plant Ecosystem Lab offers different types of plant growth facilities to grow and investigate plants under environmentally controlled conditions with defined temperature, humidity, light intensity, and CO_2 levels.