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Faculté des géosciences et de l'environnement
Secrétariat du master en biogéosciences
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Espace pour les illustrations (p.e. images)

Projet de travail de Masters

Assessment of critical Oxygen concentration and facultative bacteria behavior in natural waters

Context :

Hypoxic regions in global surface waters are becoming more widespread as a indirect effect of global change. These regions are typically inhabited by many facultative bacteria, able to switch between aerobic and anarobic respiration depnding on sorrounding geochemical conditions and O₂ concentration, who may largely contribute to different ecological functions, such as nutrients reminarilization and loss. The critical O₂ concentration determining the facultative metabolism switch is still largely uncertain. Understading and modeling the role played by O₂ is key to interpret the fundamental contribution of bacteria in ecosystems and to improve the exploitation of biological processes (such as denitrification) for wastewater treatment and soil remediation engineering.

Scope of the study:

This study aims to quantitatively characterize the metabolism of facultative bacterial strains along O₂ gradients typically observed in natural systems. Bacteria avilable in the lab stocks or sampled in a natural waters will be cultivated in well-mixed batch reactors in a controlled atmosphere (from oxygen saturated to anoxic ones). Bacterial methabolism and the corresponding oxygen consuption will be monitored in real time using thenewest and most advanced sensors, namely the STOX and planar optodes. The chosen bacterial sample will be investigated by using microfluidics devices and microscopy to mimic flowing systems such as groundwater. The information collected will pose the basis to implement a model through widely-used geochemical software.

Required skills and working methods:

The ideal candidate is strongly motivated to work in the laboratory with a precise and organized working approach.He/She is highly interested in geochemistry, microbiology, and multi-disciplinary approaches. Good knowledge of multiple environmental sciences is highly appreciated. Good knowledge of English is mandatory.

Collaboration:

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Mots clé: geochemistry, facultative metabolism, bacterial cultivation, microfluidics, oxygen sensors, sampling, microscopy, modeling.

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Place de travail: UNIL-Geopolis

Références:

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