Measuring biogeochemical heterogeneity at the micro scale in soils and sediments

Measuring biogeochemical heterogeneity at the micro scale in soils and sediments

Steep physiochemical gradients and diffusive limitation associated with microscale features such as cracks and pores make soil and sediments remarkably heterogeneous environments, which is reflected on many environmentally important processes. If we are to understand and attempt to control the ecology of the microorganisms which inhabit these environments we must not only characterize their inhabitants, but also the complex biogeochemical landscape they live in. This includes local concentrations of electron acceptors and donors, microbial metabolites and key physical and chemical parameters such as pH and soil structure. To this end, an array of techniques for collecting data at the microscale has been developed, deployed and refined, ranging from microsensor probes to planar sensors. This review provides a general reference for and a critical comparison of microscale techniques available to the fields of soil and sediment microbial ecology. Techniques are evaluated based on their ability to provide spatially resolved data at the microscale, with focus on performance characteristics, potential for repeated measurements, degree of physical disruption they create, and accessibility. Microscale studies have given us many insights, but we outline further progress needed to make the microscale toolkit more accessible and to extend the range of analytes that can be measured simultaneously, so that we may expand our knowledge of the complex environmental microscale heterogeneity and its impact on soil and sediment ecology and functioning.

General information
State: Published
Organisations: Department of Environmental Engineering, Urban Water Engineering, Technical University of Denmark
Contributors: Pedersen, L. L., Smets, B. F., Dechesne, A.
Number of pages: 17
Pages: 122-138
Publication date: 2015
Peer-reviewed: Yes

Publication information
Journal: Soil Biology & Biochemistry
Volume: 90
ISSN (Print): 0038-0717
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 5.63 SJR 2.604 SNIP 1.856
Web of Science (2017): Impact factor 4.926
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 5.17 SJR 2.161 SNIP 1.842
Web of Science (2016): Impact factor 4.857
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 4.48 SJR 2.302 SNIP 1.703
Web of Science (2015): Impact factor 4.152
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 4.84 SJR 2.348 SNIP 1.849
Web of Science (2014): Impact factor 3.932
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 4.96 SJR 2.279 SNIP 1.975
Web of Science (2013): Impact factor 4.41
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 4 SJR 2.276 SNIP 1.747
Web of Science (2012): Impact factor 3.654
ISI indexed (2012): ISI indexed yes