



Metagenomic and geochemical changes following rainfall at a legacy radionuclide waste disposal site

14th February 2017

Never Stand Still

Faculty of Engineering

Water Research Centre

Xabier Vázquez-Campos

Introduction

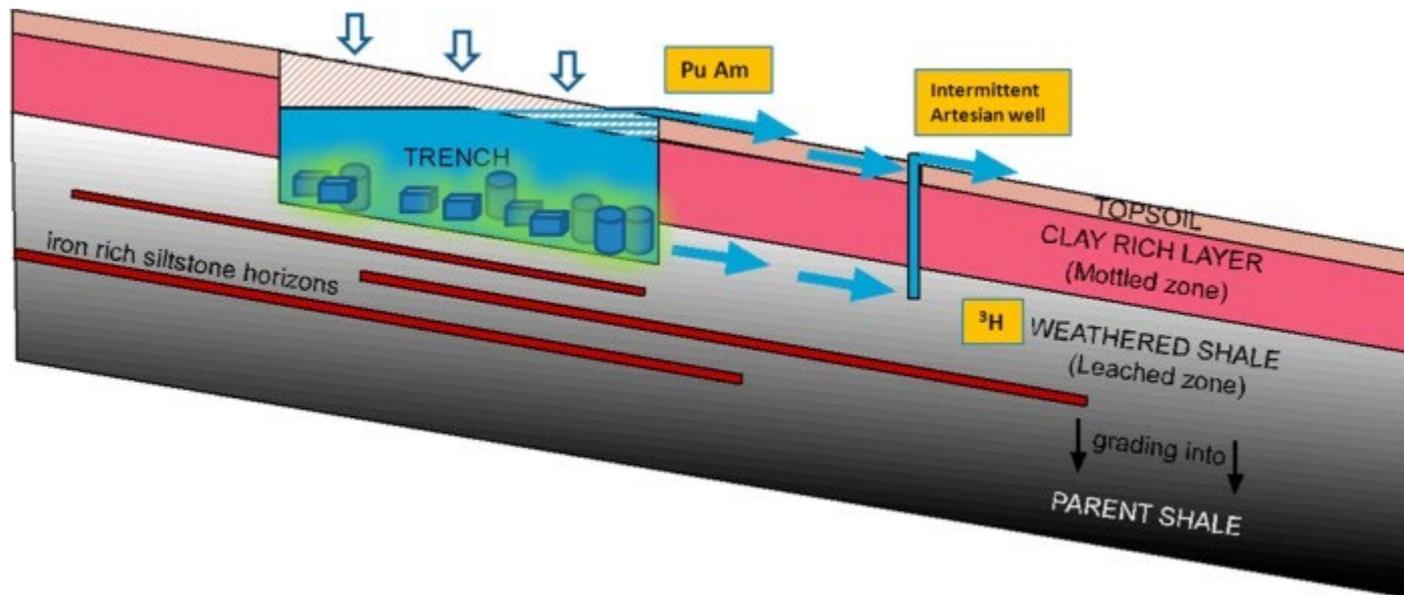
- Radioactive legacy disposal site 1960-68
- 3 m deep trenches
- Mixed waste including $^{239+240}\text{Pu}$, ^{241}Am ,...



Sources: Hakin *et al.* (2012); Payne (2012)

Introduction

- Low permeability clay soil matrix ensures rapid in filling of trenches with water during intense rainfall events, often resulting in trench overflow ('bathtub like') and contaminant export



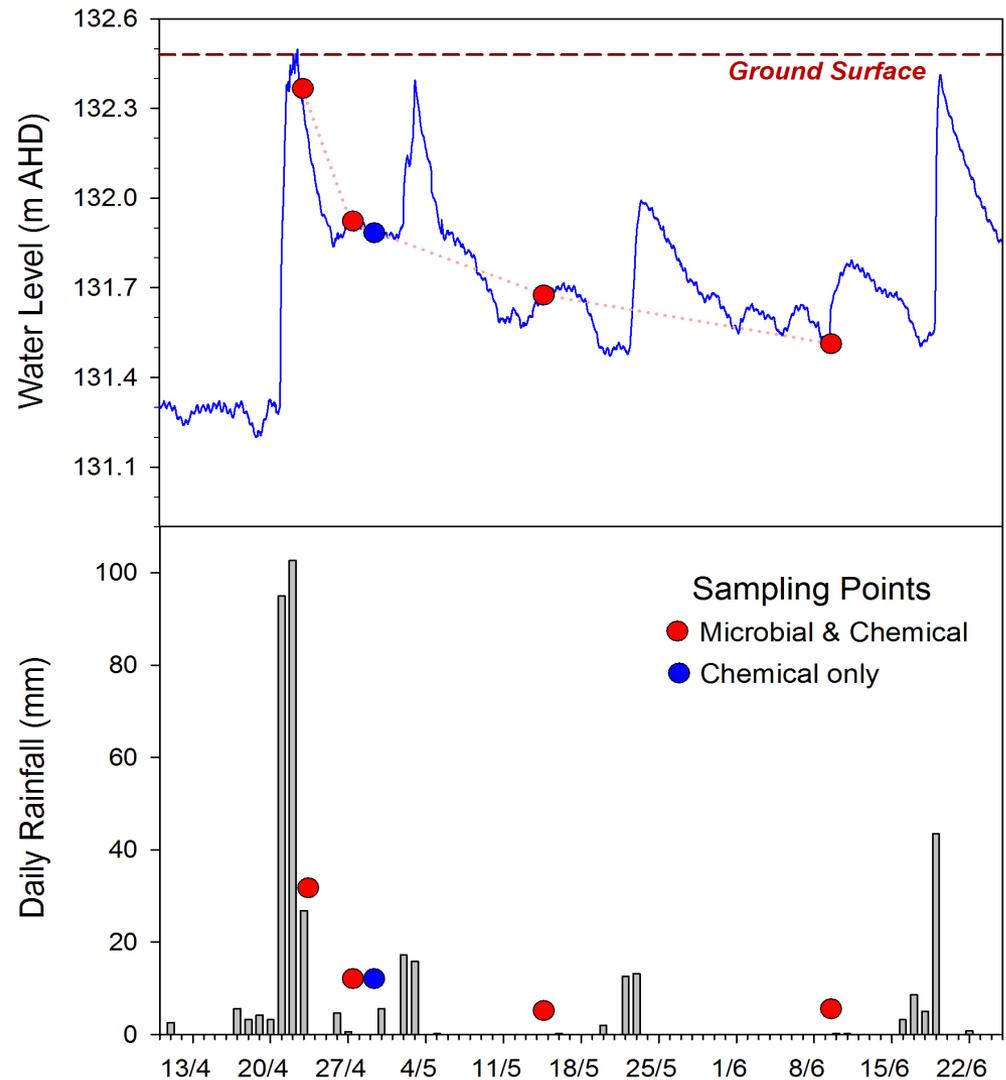
*slope exaggerated

Source: Payne *et al.* (2013)

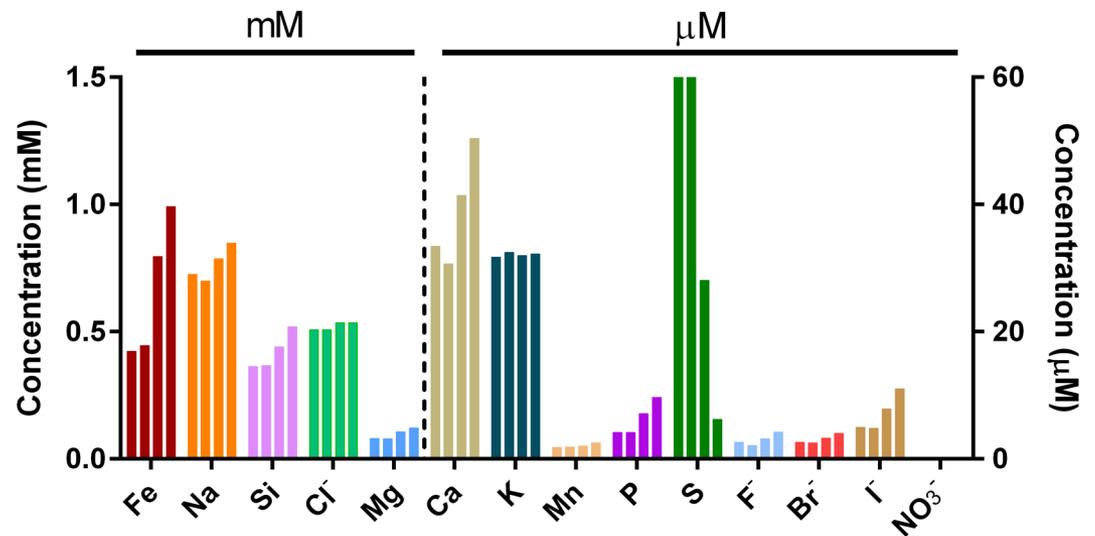
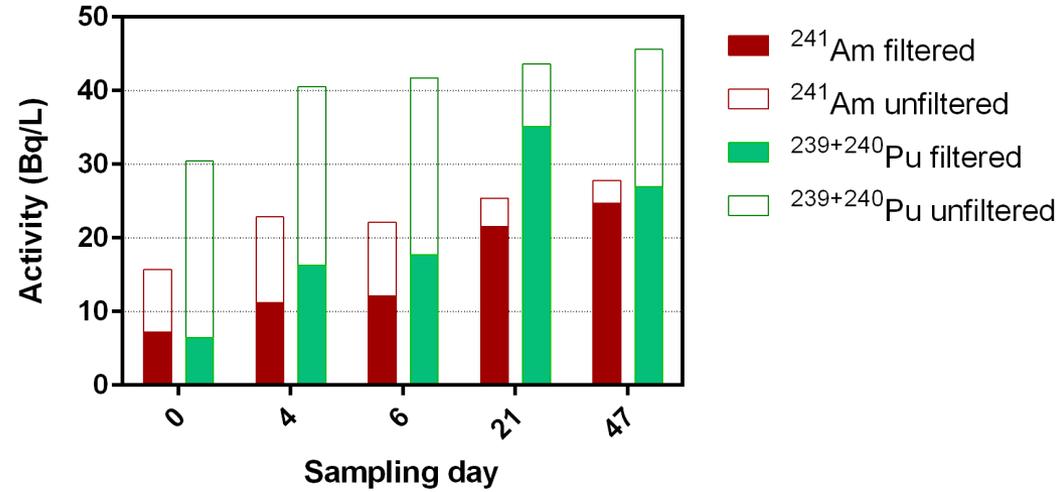
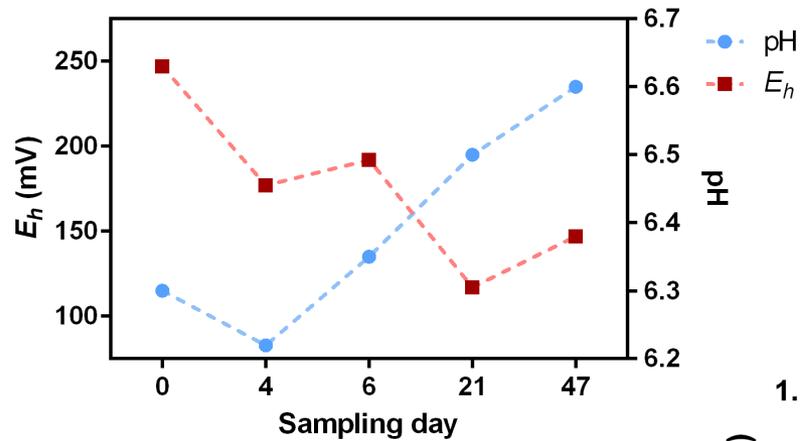


Sampling

- Trench waters collected after an intense rainfall event.
- Full chemical analysis, incl. radionuclides
- Metagenomic samples in triplicates

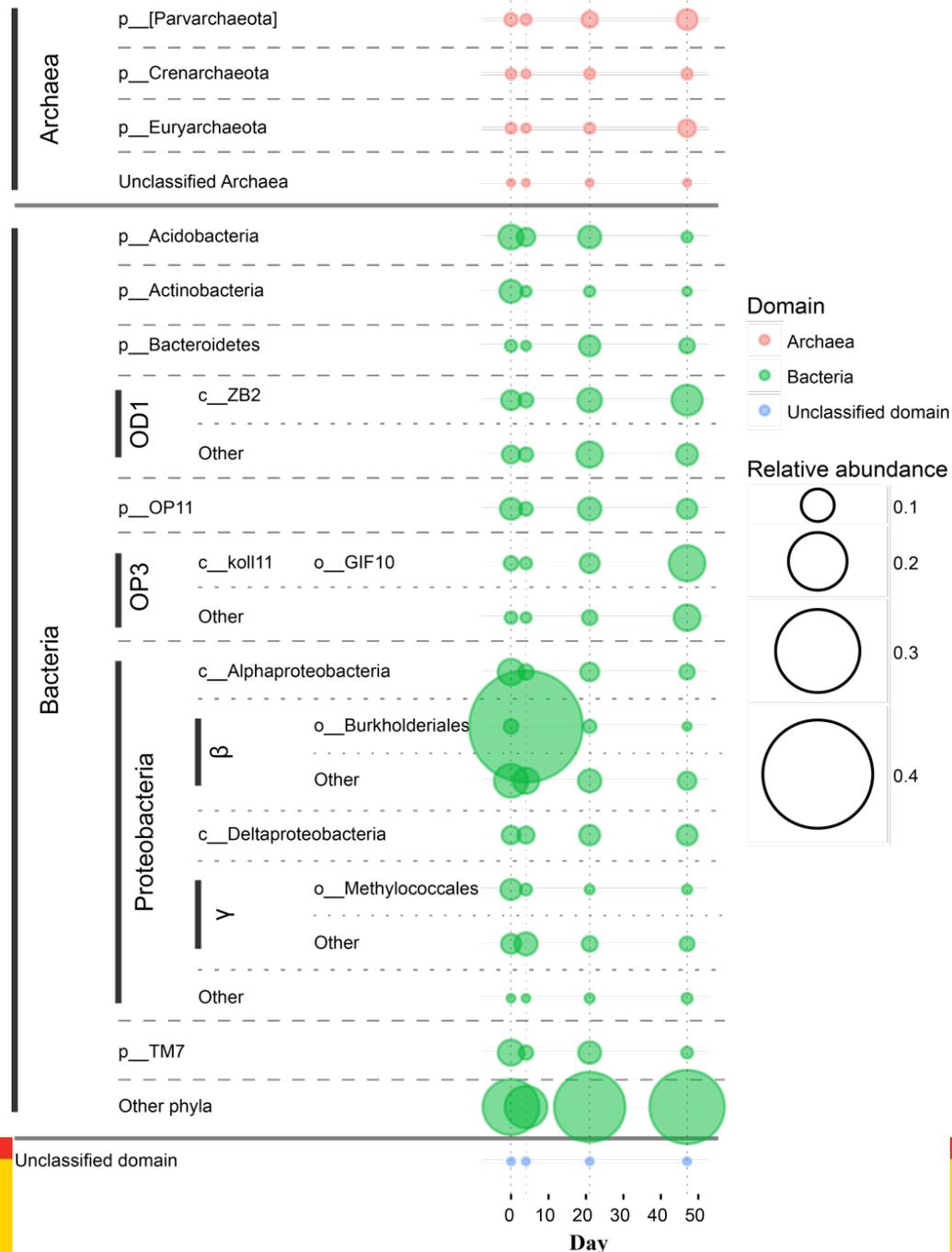


Chemical analyses



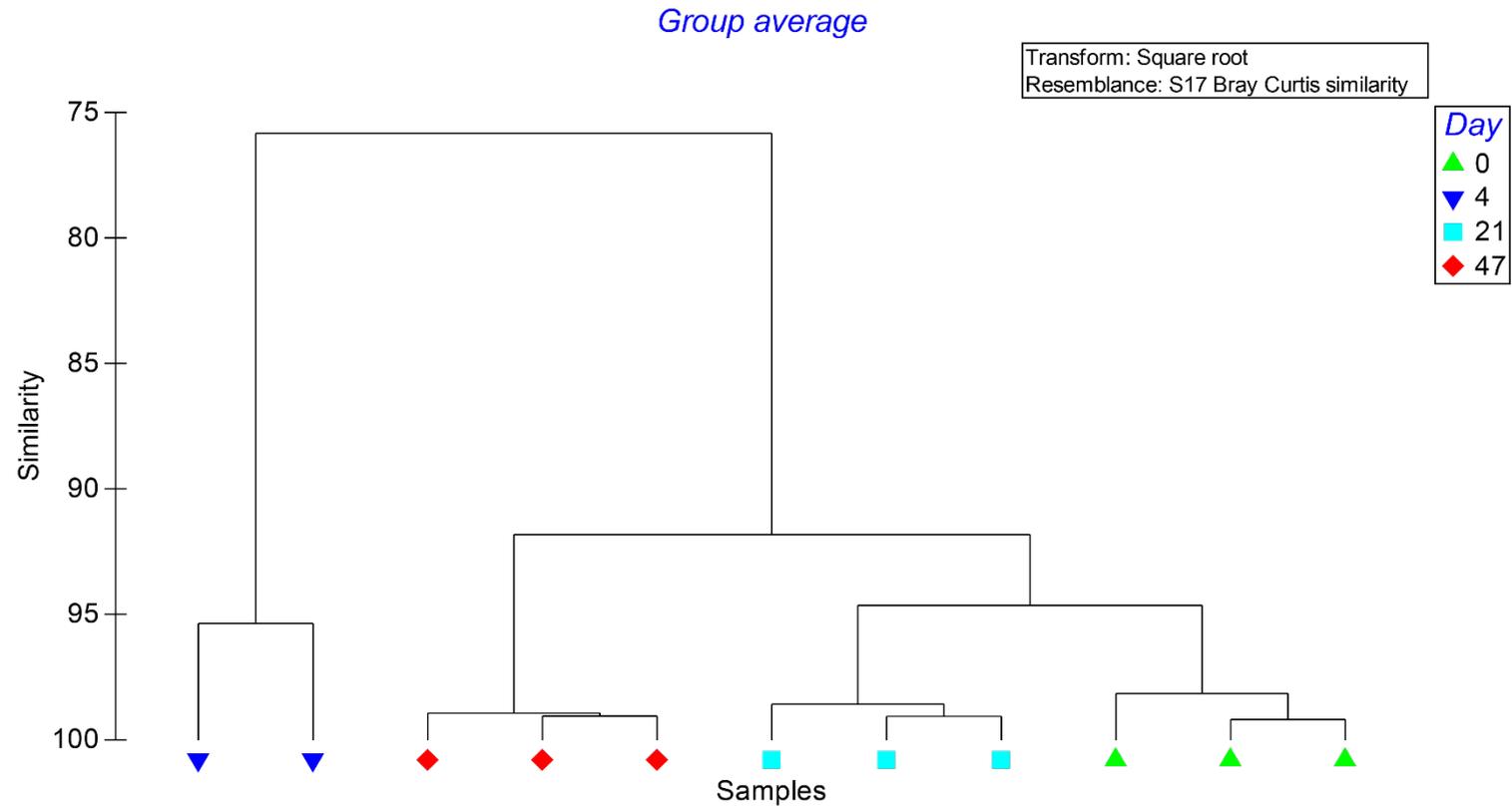
Community profile

- Single read processing with GraftM
- Highly diverse community
- Bacteria dominate in all samples
- Proteobacteria is the main phylum, except at day 47 (OP3)
- Burkholderiales >40% at day 4 due to changes in O₂ and available carbon influxes
- In anoxic periods, Archaea >10%, minimum at Day 4
 - ~50%, “Parvarchaeota”

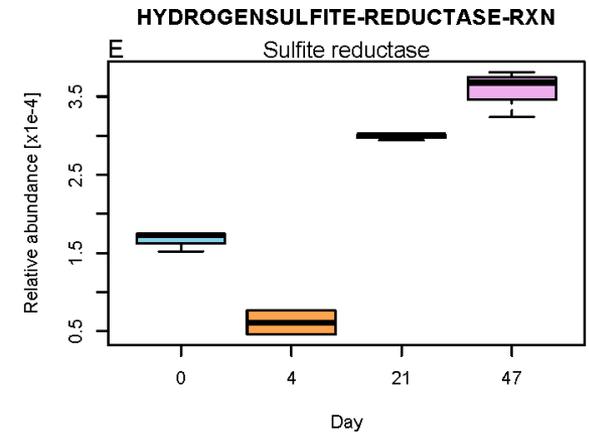
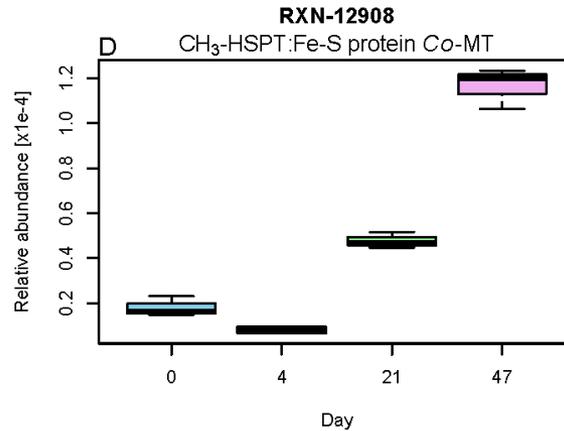
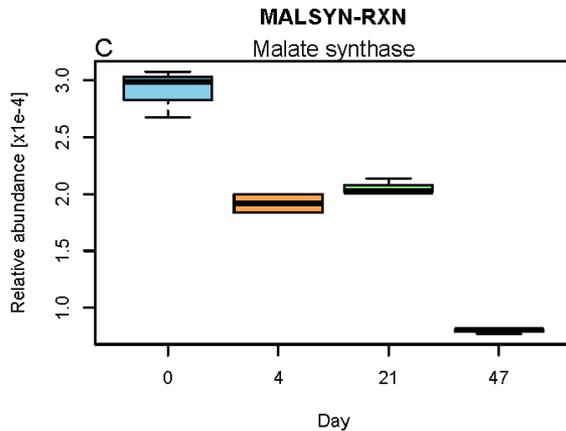
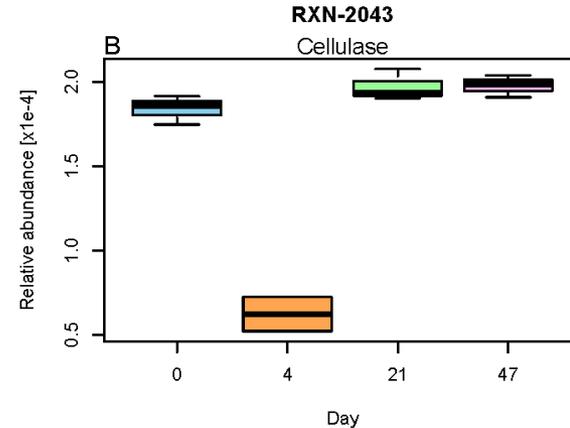
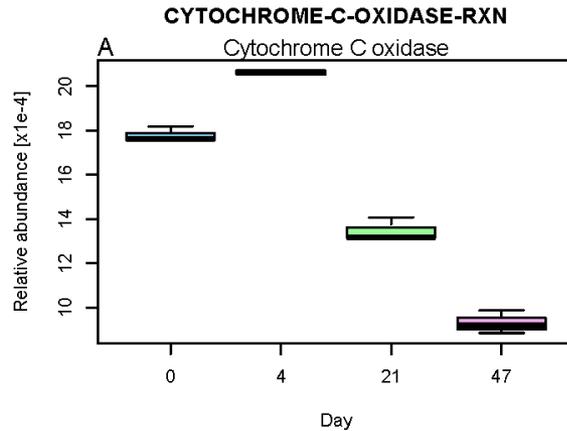


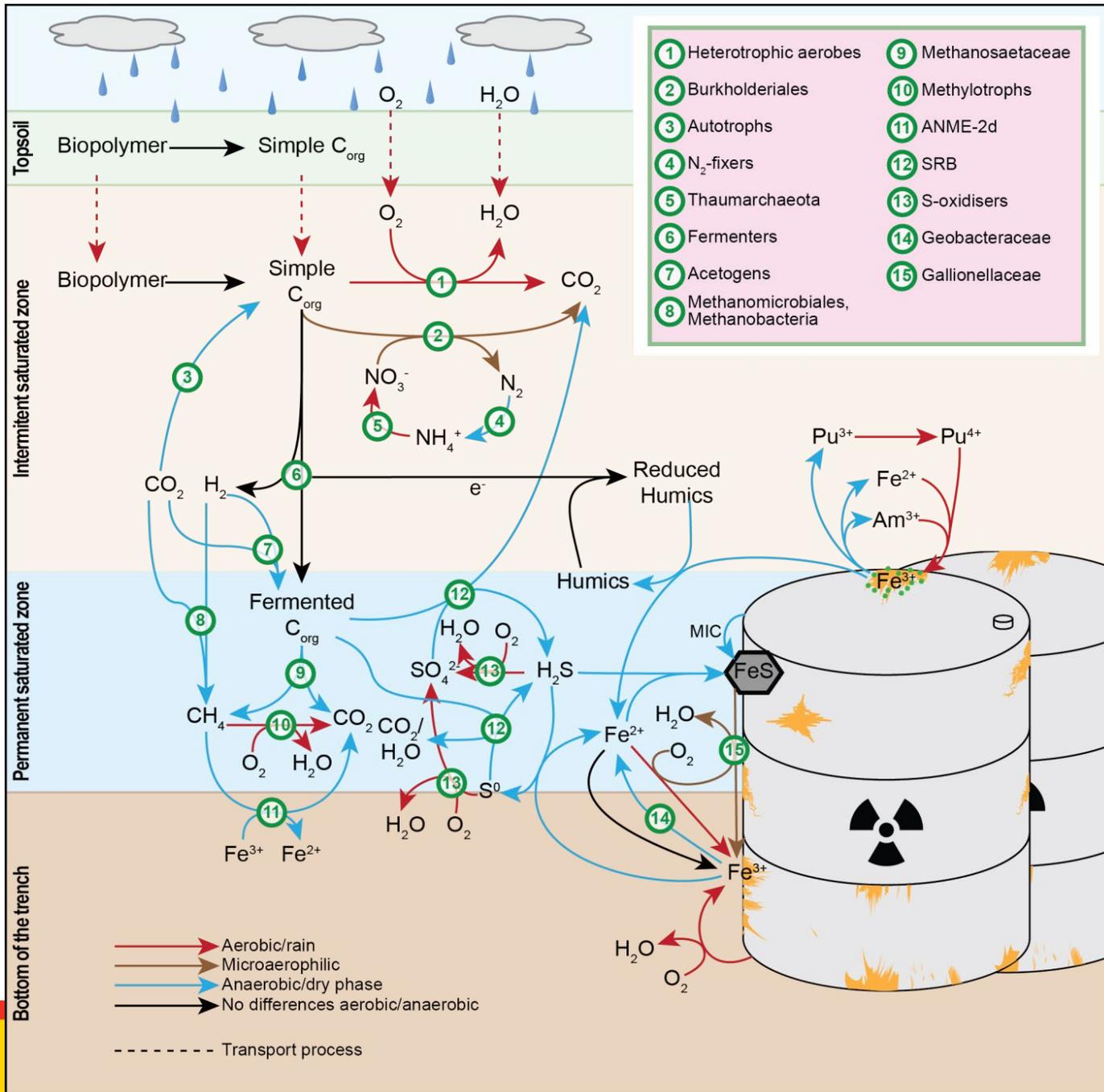
Functional profiling

- Single read analysis with HUMAnN2 --> MetaCyc database



Functional profile





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Collection 'MAGs' for LFLS water

Tree order: Relative abundance (D: Euclidean; L: Ward) | Current view: relative_abundance | Sample order: custom

