

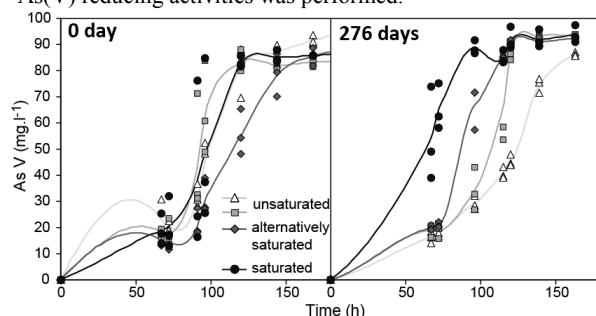
## Biogeochemical behavior of As in a soil contaminated by the destruction of arsenical shells from the Great War: A mesocosm study

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At the end of the Great War, a large amount of unfired chemical ammunitions were burned near the former westernfrontline. This destruction resulted in locally intense soil contamination by arsenic and heavy metals.

This soil was affected for 80 years by water saturation episodes and input of forest litter. To study the As behavior in this specific polluted material submitted to environmental changes, an 8-months experiment was conducted with an 1 m<sup>3</sup> instrumented mesocosm including unsaturated, alternatively saturated and saturated levels. Arsenic speciation in water and solid compartment was analyzed all along the experiment. Microbial characterization including bacterial identification and the determination of As(III)-oxidizing and As(V) reducing activities was performed.



**Figure 1:** Microbial As(III)-oxidizing activity for four sample levels at the beginning and the end of the experiment.

Arsenic concentration reached  $132.44 \pm 3.66 \text{ g.kg}^{-1}$  in soil and 20-110  $\mu\text{M}$  in soil solution. As(V) was the major species of soluble arsenic. Immobilization of As was observed in the saturated soil caused by As(V) adsorption onto iron oxide-hydroxides and by the precipitation of secondary arsenates. As(III)-oxidizing activity (Fig.1) and bacterial community structure were strongly impacted by soil saturation and the addition of organic litter. Results showed a decrease of the As III-oxidizing activity of bacteria together with a stimulation of the As V-reducing activity inducing an increase of As(III) mobility in saturated soil.