Subsurface Biosphere Initiative
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Developing the Resazurin-Resorufin System as a "Smart" Tracer to Measure Microbial Respiration and Sediment-Water Interactions

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In a short presentation, Marc will present the research findings of his 2008 SBI internship under the mentorship of Roy Haggerty, Geosciences.

ABSTRACT: Water flow and microbiological activity in the hyporheic zone (stream sediment) are important to stream ecosystems. In this thesis I further investigate the resazurin-resorufin system as a "smart" tracer to specifically measure microbiological activity and water flow through the hyporheic zone. Resazurin is a weakly fluorescent dye that undergoes a reduction reaction in the presence of aerobic bacteria to the strongly fluorescent dye, resorufin. Haggerty et al. (2008) measured resazurin reduction rates in sediment from a temperate, forested, heterotrophic stream in Catalonia, Spain, and showed that the resazurin appeared to be a feasible tracer of microbial activity and sediment-water interaction. I expanded this database by measuring resazurin reduction rates in sediment from Drift Creek (Oregon, temperate, forested/agricultural, heterotrophic) and Sycamore Creek (Arizona, desert, autotrophic) using column experiments designed to reproduce hyporheic conditions. Drift Creek had much higher resazurin reduction rates and much higher organic carbon than Sycamore Creek, suggesting that microbial biomass associated with organic content increased the rate of the resazurin-resorufin reaction.

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