10 grams of sediment or soil were added to 50 mL proteomic friendly tubes and left in a temperature controlled chamber with a breath easy membrane overnight. The next morning, samples were inundated water collected from groundwater wells (soil) or river water (sediment). and capped with a modified tube cap and optode disks that are coated with an oxygen sensitive dye. Samples were placed on roller system for two hours, where every two minutes, the rollers stopped, blue LED lights turned on and an image was captured before the light turned off and rolling started again. Raw dissolved oxygen measurements were determined from the ratio of red and green pixels in photos taken every two minutes. Photos were processed using ImageJ. The ratio of (red - green)/green pixels was then converted to dissolved oxygen for each time point using a calibration curve fitted to each optode disk using Spyder. Respiration rates were calculated as the slope of the linear regression between dissolved oxygen measurements and incubation time. The theoretical dissolved oxygen at time zero was removed if the time two minute was greater than the 5.5 mg/L threshold. The two minute time point was removed if the first picture was taken at the same time the sample was put on the multireactor rolling system.