

## **Supplemental Material**

### **Temperature and Substrate Controls Woodchip Bioreactor Performance in Reducing Tile Nitrate Loads in East-central Illinois**

Mark B. David<sup>1</sup>, Lowell E. Gentry<sup>1</sup>, Richard A. Cooke<sup>2</sup>, and Stephanie M. Herbstritt<sup>2</sup>

<sup>1</sup>University of Illinois, Dep. of Natural Resources and Environmental Sciences, W503 Turner Hall, 1102 S. Goodwin Ave., Urbana, IL 61801

<sup>2</sup>University of Illinois, Dep. of Agricultural and Biological Engineering, 338 Agricultural Engineering Building, 1304 W. Pennsylvania Ave., Urbana, IL 61801

#### **Nitrous Oxides fluxes**

Three PVC rings (20 cm diameter, 10 cm height inserted ~ 5 cm into the wood chips) were installed along the flow path of bioreactors 1 and 2. End caps of PVC with weather stripping, septa, and ventilation tubes were made to fit tightly on the PVC rings to complete the enclosed chamber, which had overall had space volumes of 5 to 6 L (actual headspace was determined for each measurement on each ring). Fifteen mL samples were collected at 0, 10, 20, and 30 min with a syringe. The samples were placed into evacuated 10 mL glass vials with gray butyl septa. Gas samples were analyzed using a Shimadzu GC-2014 gas chromatograph with autosampler to determine N<sub>2</sub>O concentrations. Linear regression was used to determine the rate of N<sub>2</sub>O emissions during the 30-min incubation period. Linear interpolation was used to determine daily flux values between field measurements.

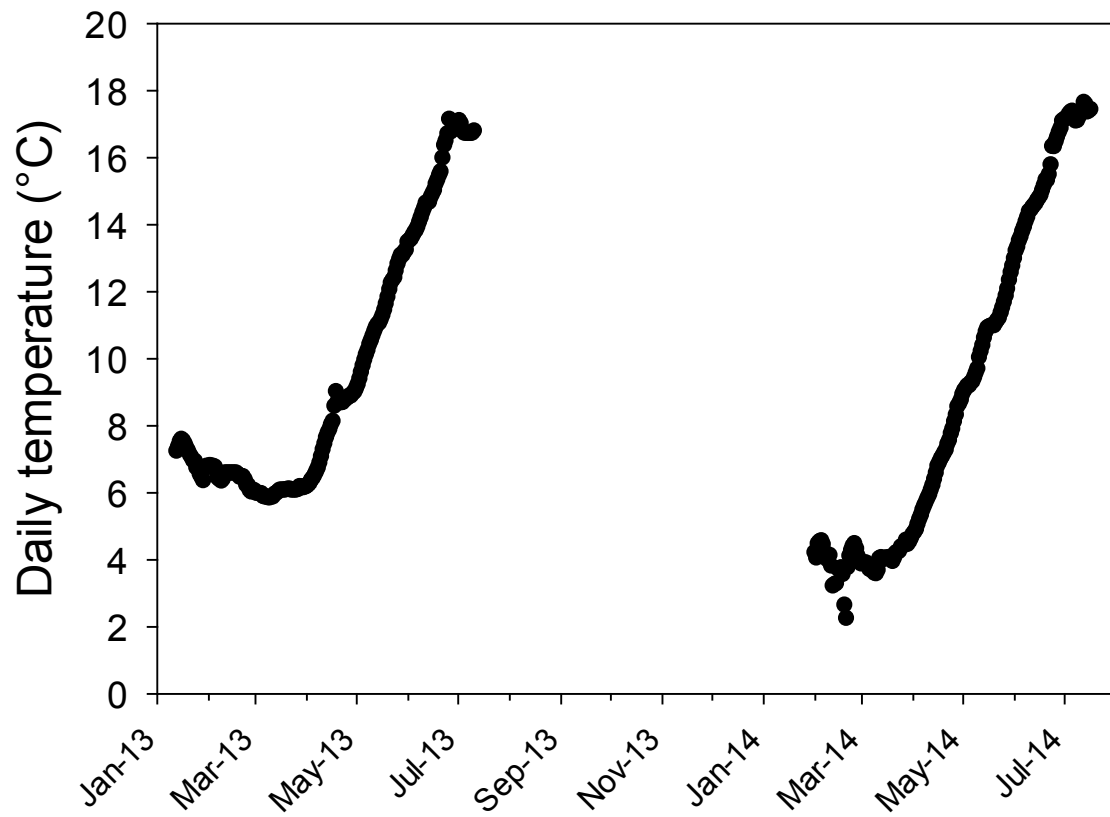


Figure S1. Daily temperature of tile water entering bioreactor 1 in 2013 and 2014.

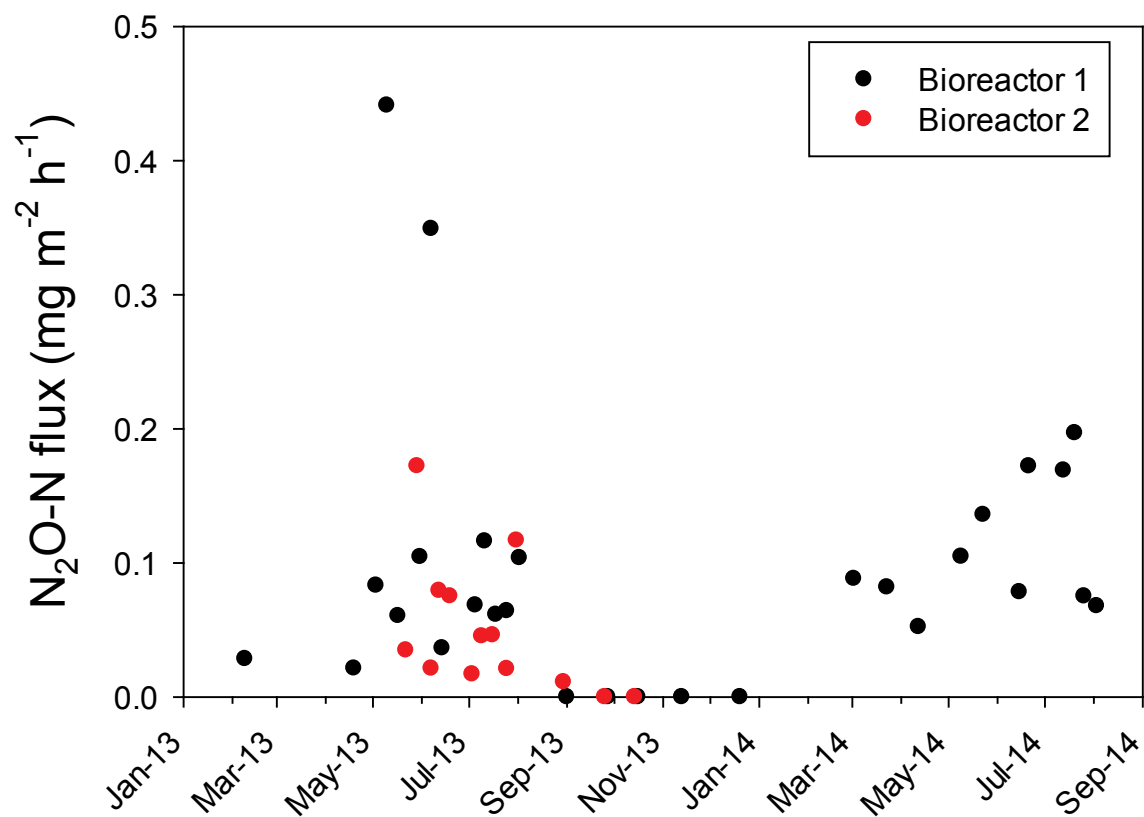


Figure S2. Nitrous oxide fluxes of bioreactors 1 and 2 during 2013 and 2014.

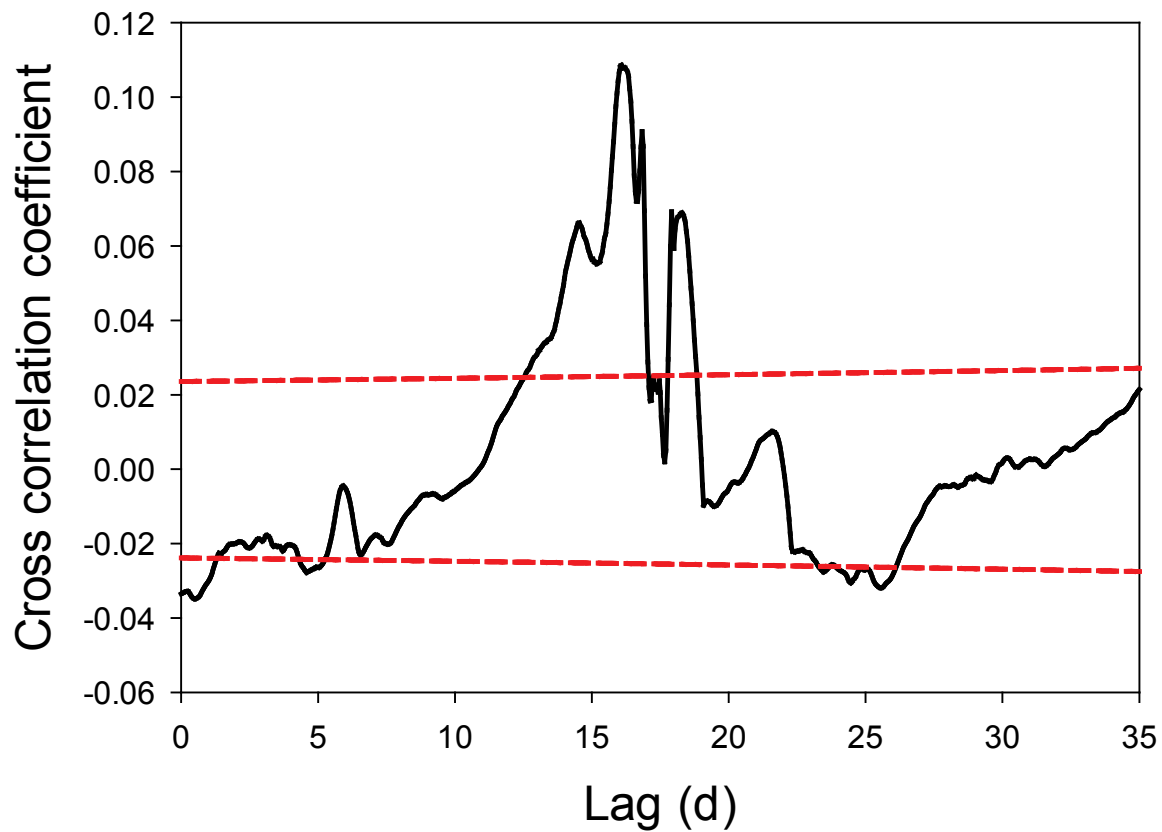


Figure S3. Serial cross correlogram for flowrate versus the product of flow cross sectional area and hydraulic gradient for bioreactor 1 during 2013. The dashed lines are the upper and lower 95% confidence limits.

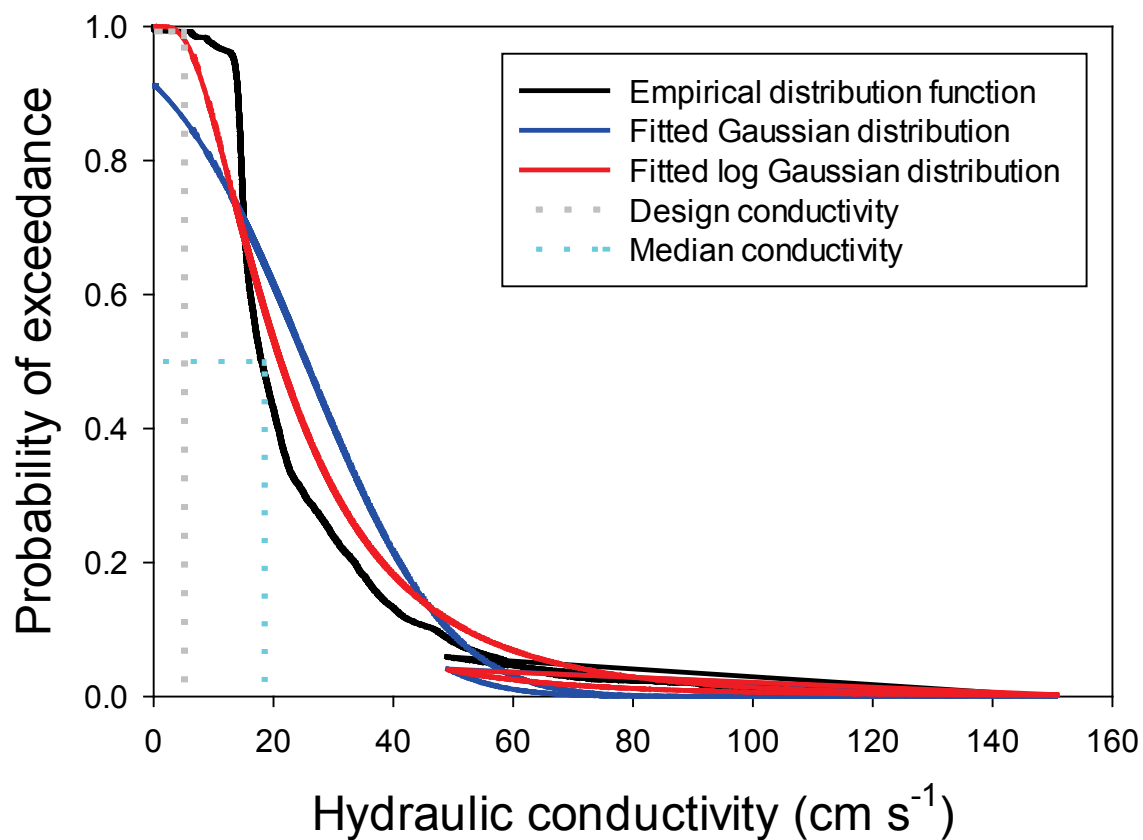


Figure S4. Cumulative distribution functions for in-situ hydraulic conductivity, based on the assumption of Darcian flow, in bioreactor 1 during 2013.