Geophysical Research Abstracts
Vol. 12, EGU2010-3552, 2010
EGU General Assembly 2010

Recovery of Soil Microbial Community Structure in a Wildfire Impacted Forest Soil

Robert Tate III and Robyn Mikita
Rutgers University, Environmental Sciences, New Brunswick, United States (tate@envsci.rutgers.edu)

Wildfires are common disturbances that will increase in frequency and intensity as a result of conditions associated with the changing climate. In turn, forest fires exacerbate climate conditions by increasing carbon and atmospheric aerosols, and changing the surface albedo. Fires have significant economic, environmental, and ecological repercussions; however, we have a limited understanding on the effect of severe wildfires on the composition, diversity, and function of belowground microorganisms. The objective of this research was to examine the shift of the forest soil microbial community as a result of a severe wildfire in the New Jersey Pinelands. Over the span of two years following the fire, soil samples from the organic and mineral layers of the severely burned sites were collected six times. Samples were also collected twice from an unburned control site. It was hypothesized that soil microbial communities from severely burned samples collected shortly after the fire would be significantly different from (1) the unburned samples that serve as controls and (2) the severely burned samples collected more than a year after the fire. Microbial community composition was analyzed by principal component analysis and multivariate analysis of variance of molecular fingerprint data from denaturing gradient gel electrophoresis of bacterial and archaeal-specific amplicons. Bacterial community composition was significantly different among all the organic and mineral layer samples collected 2, 5, 13, and 17 months following the fire. This indicated a shift in the bacterial communities with time following the fire. Common phylotypes from the burned organic layer samples collected 2 months after the fire related closely to members of the phyla Cyanobacteria and Acidobacteria, whereas those from later samples (5, 13, and 17 months following the fire) were closely related to members of the genus Mycobacteria. Canonical correlation analysis was used to determine connections between the biological and physical variables. The bacterial community in the mineral layer soil samples from 2 and 5 months after the fire were positively correlated with soil copper and iron concentrations. Molecular analysis of the soil archaeal community revealed that while the unburned and burned samples share common bands, the samples from the unburned site clustered separately from those of the burned site collected 2, 13, and 25 months after the fire. The identities of the dominant phylotypes are being further evaluated. The results will bring insight into how disturbances associated with the changing climate affect belowground microbial ecology.