



Nitric acid as an oxidant for determining black carbon in soil

R. J. DiCosty and J.A. Stanturf

US Department of Agriculture – Forest Service, Georgia, USA (rdicosty@fs.fed.us / Fax: 001-706-559-4317 / Phone: 001-706-559-4318)

Nitric acid oxidation has been widely used as a simple, low-cost method to determine black carbon (BC) in environmental samples. However, little information is available regarding the oxidation conditions that maximally destroy non-BC while minimally degrading BC. We are presently optimizing this method using (1) soils of known fire history, (2) natural chars formed during forest fires, and (3) soils from the ongoing International Black Carbon Ring Trial. Kinetic curve fits from oxidations in our laboratory indicate that there are fast- and slow-oxidizing pools of carbon, which we assume to represent non-BC and BC, respectively. Five minutes in boiling nitric acid appears to be optimal for destroying non-BC while preserving BC. Using this method, BC as a percentage of total carbon was 50% for natural pine char, 25% for a forest soil burned every two years since 1988, and 10% for a comparable forest soil unburned since 1988. We will present data for additional samples, important details of the method, and spectroscopic data that reveal the chemical nature of the carbon isolated by this procedure.