



Building a black soil

C.I. Czimczik (1) and C.A. Masiello (2)

(1)Department of Earth System Science, 2103 Croul Hall, University of California, Irvine, CA 92697-3100, USA (czimczik@uci.edu)

(2) Department of Earth Science, Rice University, Houston, TX 77005, USA (masiello@rice.edu)

Black carbon (BC) is a major fraction (up to 35%, depending on methods used) of soil organic carbon (SOC) in some of the most fertile and extensively cropped soils of the world (Mollisols, Andisols, Terra Preta de Indio). Although BC is produced via biomass burning in many ecosystems, it accumulates as a component of SOC in only a few. Soils enriched in BC are not necessarily found in areas with the highest fire frequencies (savannah) or with the largest black carbon production (woody vegetation). Rather than high BC production, the accumulation of BC in soils requires that both input and protection of BC be maximized. We examine a few systems where BC soil concentrations are high and attempt to generalize on the physical and biological conditions of soils promoting this. We consider two scenarios where black carbon storage is high: due to (1) natural processes (unmanaged Mollisols under prairie/steppe vegetation) or (2) anthropogenic activities (farmed Mollisols of the North American prairies, central European Mollisols, Japanese Andisols under grassland, and Amazonian Terra Preta).