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Where does all the fire-derived organic matter go? Do we know what we don't know (yet)?

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Vegetation fires are common in many ecosystems and became more frequent during the past decades. But what happens to all the fire derived organic matter, all the charcoal and soot go? Surprisingly little was known until a decade ago as summarized by Preston, C.M., Schmidt, M.W.I., (2006) (Black (pyrogenic) carbon: a synthesis of current knowledge and uncertainties with special consideration of boreal regions. Biogeosciences, 3(4), 397-420).

Now we know a lot more, mainly from manipulative field studies and lab incubations using 13C and 15N labeling, and from space-for-time approaches covering decades to centuries. Also the advent of novel analytical tools allowed to detect fire-derived organic matter and its degradation products in soil, and in dissolved organic matter from soil, rivers and ocean water (recently summarized in Schmidt, M.W.I., Torn, M.S., Abiven, S., et al. (2011) Persistence of soil organic matter as an ecosystem property. Nature, 477, 49-56). The underlying processes and rates and budgets, however, are still poorly understood. In few ecosystems and climates, these mechanisms have been quantified, including mineralization, particulate transport through the profile, surface erosion. But it still remains a mystery which organisms degrade fire-derived organic matter.

This presentation summarizes some of the insights of the past decade and tries to identify some of the future key research questions.