# Priming of terrestrially-derived dissolved organic carbon: A laboratory and field-based "proof of concept"

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**Priming of DOC in Aquatic Waters**

Although inland waters comprise a small fraction of Earth's surface, they play a critical role in the global C cycle. Global estimates of riverine flux of dissolved organic carbon (DOC) to the oceans range from about 250 to 360 Tg $y^{-1}$. Recent observations of immense $CO_2$ evasion from streams and rivers thus suggest that terrestrially-derived DOC (TDOC) is not as recalcitrant as previously thought. While the importance of photodegradation and bacterial consumption of TDOC in freshwaters has been widely investigated, the role of priming processes has been essentially ignored.

**Results and Discussion**

In a lab-based experiment pine-litter leachate, from the free-air $CO_2$ enrichment experiment (FACE) was converted to $CO_2$ at roughly the same rate in the trehalose and diatom leachate treatments, less than 1% of the diatom leachate was converted to $CO_2$, as opposed to ~50% of the trehalose over a few days. Pilot field experiments in the Amazon River, with the incubation system performed during two cruises show that $\delta^{13}CO_2$ rapidly increased after adding labeled lignin; roughly 50% of the added lignin was converted to $CO_2$ in 10 hours. Based on an *in situ* experiment, roughly 75 Tg C $yr^{-1}$ of lignin was remineralized in the Amazon River continuum and "priming" accounted for roughly 40% of the remineralization in the river.