

Vliv požáru na zásoby rtuti (Hg) v lesní půdě, oblast střední Evropy

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Metody

Rtut' – v lesních půdách

☞ článek se zabývá jedním ze základních procesů, které ovlivňují biogeochemický cyklus Hg v lesním ekosystému

☞ odebrány vzorky půd

☞ zjištěny základní charakteristiky

☞ koncentrace Hg měřeny metodou CV-AAS

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Effect of Fire on Pools of Mercury in Forest Soil, Central Europe

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Abstract In year 2006, 179 ha of forest was burned during a forest fire at the Bohemian Switzerland National Park found in northern part of Czech Republic (CR), central Europe. Complete combustion of organic soil (4,039 t) on the burned area caused volatilization of 1.34 ± 0.07 kg of Hg. Thus Hg emissions due to fire amounted to 75.1 g ha^{-1} . The average burned forested areas in CR for the period 2000–2006 were reported at 356 ha with estimated Hg emissions at $26.7 \text{ kg year}^{-1}$, while the average anthropogenic emissions in the same period amounted to 3 t year^{-1} . This estimated mean emissions of Hg from burned forest soil in the period 2000–2006 reached 1% of the annual anthropogenic Hg emissions.

Keywords Hg distribution in soil ·
Natural Hg emissions · Hg soil pools · Czech Republic

Mercury is today considered as a global pollutant that has been released into the atmosphere by both natural and anthropogenic sources. Anthropogenic Hg emissions have been fully well quantified (e.g. Pacyna and Pacyna 2002,

Pacyna et al. 2001, 2003). On the contrary, natural emissions have not been as well characterized. Natural Hg emissions originating from forest fires have been accounted as one of the important Hg non-point sources (Wiedinmayr and Friedli 2007).

Mercury enters terrestrial ecosystems via litterfall, throughfall and dry deposition. In several studies litterfall was shown to be the most important flux of Hg in forest ecosystems (Munthe et al. 1999; Rea et al. 1996; Sheehan et al. 2008). Terrestrial soils retain more than 90% of Hg currently deposited on terrestrial landscapes (Fitzgerald 1995) and represent a very large pool of Hg. In organic horizons Hg is strongly sorbed to organic matter (Yin et al. 1996; Mielke and Ingam 1991) and Hg concentrations are usually higher than in mineral soil horizons (Schwesig and Matzner 2000; Fritler et al. 2007). Nevertheless the mineral soil Hg pool is generally larger than that in the organic one (Krabbenhoft et al. 2005). Sorption, mobilization and transport mechanisms in these two pools is very different, leading to different participation in the Hg biogeochemical cycle that likely places much higher degree of importance on Hg in organic horizons (Krabbenhoft et al. 2005).

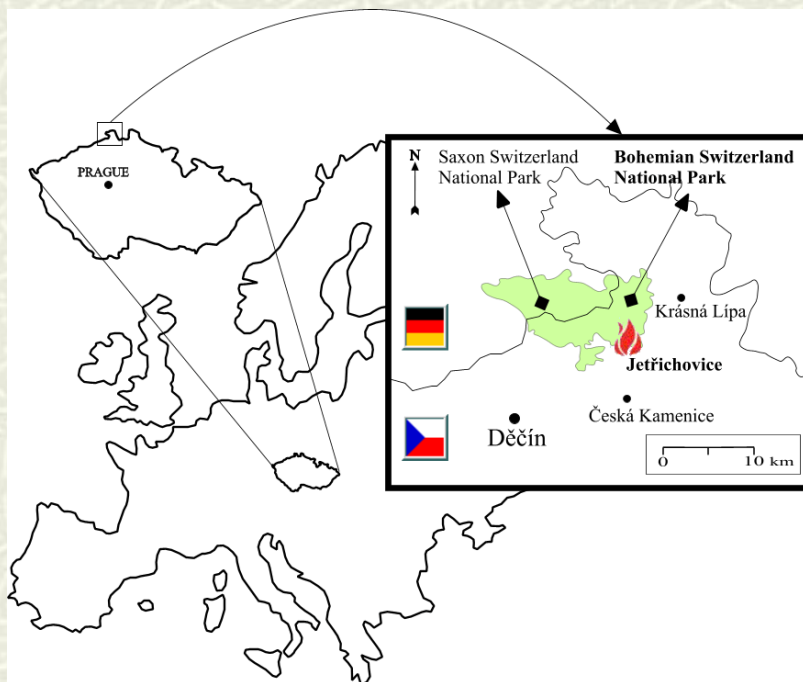
Natural mechanism redistributing Hg and affecting Hg cycling in forest ecosystems are the forest fires. During fires Hg^0 is released to the atmosphere from soils as well as from living and dead vegetation (Arzoo et al. 2000; Friedli et al. 2003). Relatively large Hg losses during forest fires result from the low volatilization temperatures (100–300°C) of Hg species (Biswas et al. 2007). The amount of Hg released during wildfire is limited by Hg accumulation prior to burning. Recent studies documented importance of forest fires in the United States (Sigler et al. 2003; Friedli et al. 2003; Hagle et al. 2006; Biswas et al. 2007, 2008), contributing ~30% to the US EPA National Emission Inventory (Wiedinmayr and Friedli 2007).

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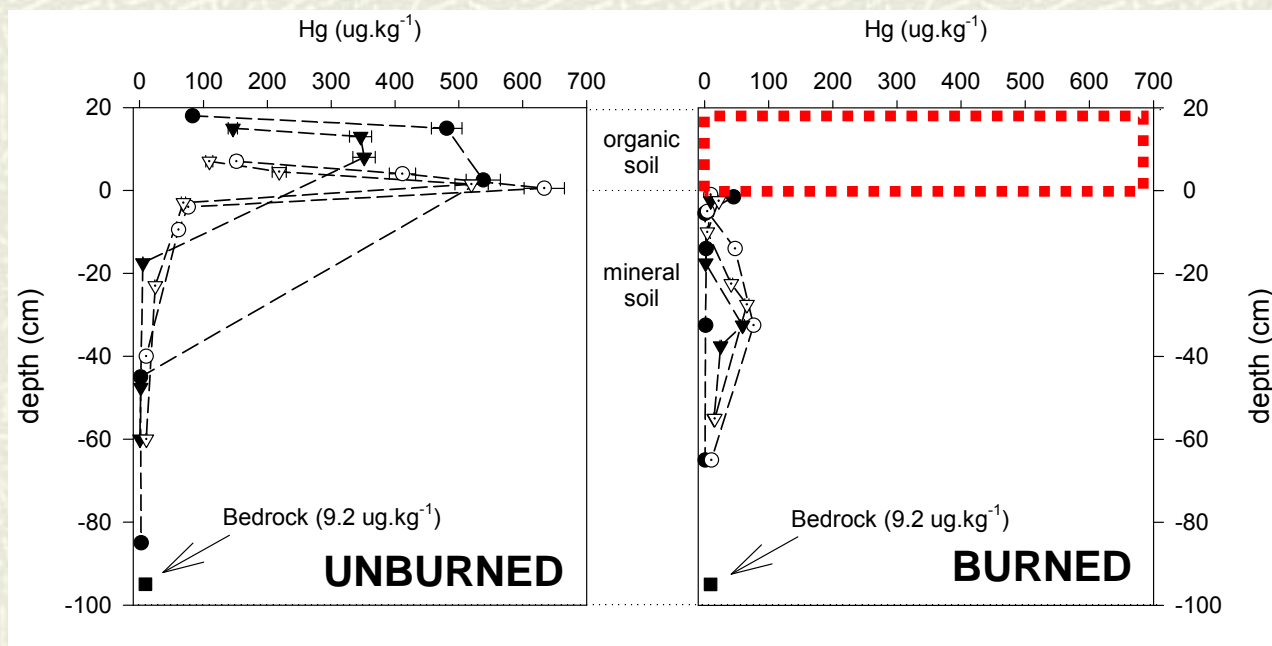


- požár trval od 22 do 28.června 2006
- největší požár za 30.let na Děčínsku
- plocha lesa zasažená požárem 17,92ha



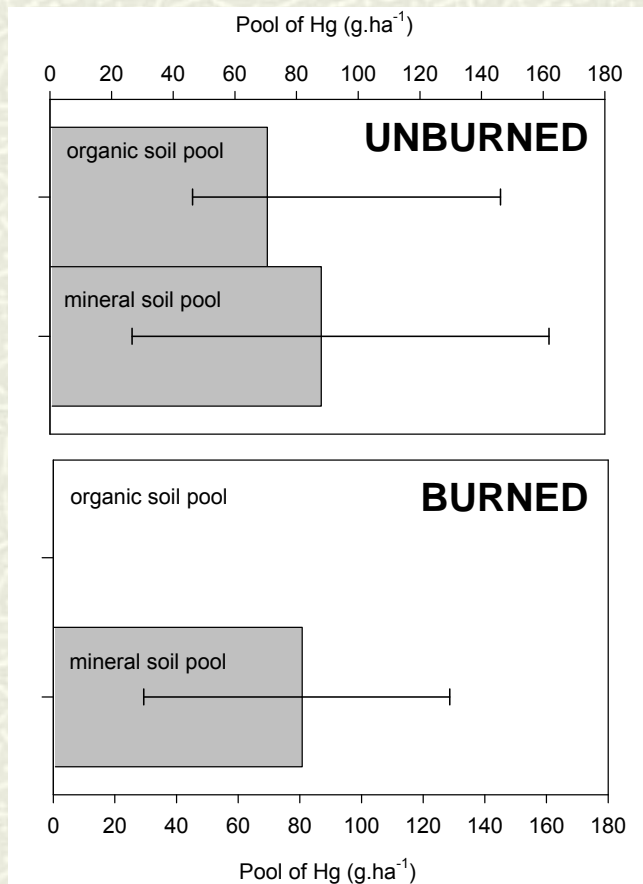
Výsledky

Distribuce Hg v půdních profilech



- volatilizace Hg z lesních půd již mezi 100-300°C

Zásoby Hg v půdě



Požárem **NE**zasážená oblast

- zásoba Hg v organických horizontech 75.1 g.ha⁻¹
- zásoba Hg v organických horizontech 83.3 g.ha⁻¹

Požárem zasážená oblast

- zásoba Hg v organických horizontech 0 g.ha⁻¹
- zásoba Hg v organických horizontech 85.5 g.ha⁻¹

Závěr

- emise z plochy dosáhly $7,5 \text{ ug.m}^{-2}$ nebo 75 g.ha^{-1}
- shořelo 4,039 t organické půdy = celkové emise Hg $1.34 \pm 0.07 \text{ kg}$
- NPČŠ je průměrná lokalita s ohledem na konc. Hg v organických horizontech
- lesní požáry na území ČR mezi 53 až 2043 ha (Ročenka MVČR - 2007), průměrná plocha lesa zasažená požárem za posledních 10let = **356 ha**
- odhad ročních emisí Hg z lesních požárů v ČR = **3,14 kg**
- tj. 0,003 t = **0,1% antropogenních emisí Hg**, které činí 3,1 t za rok