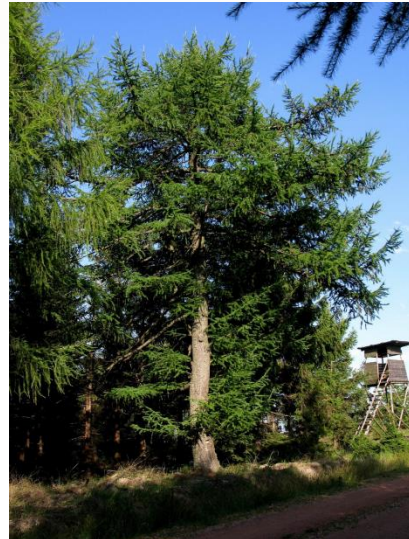




EGU 2018, Vienna

European Larch tree rings as a new archive of Hg pollution



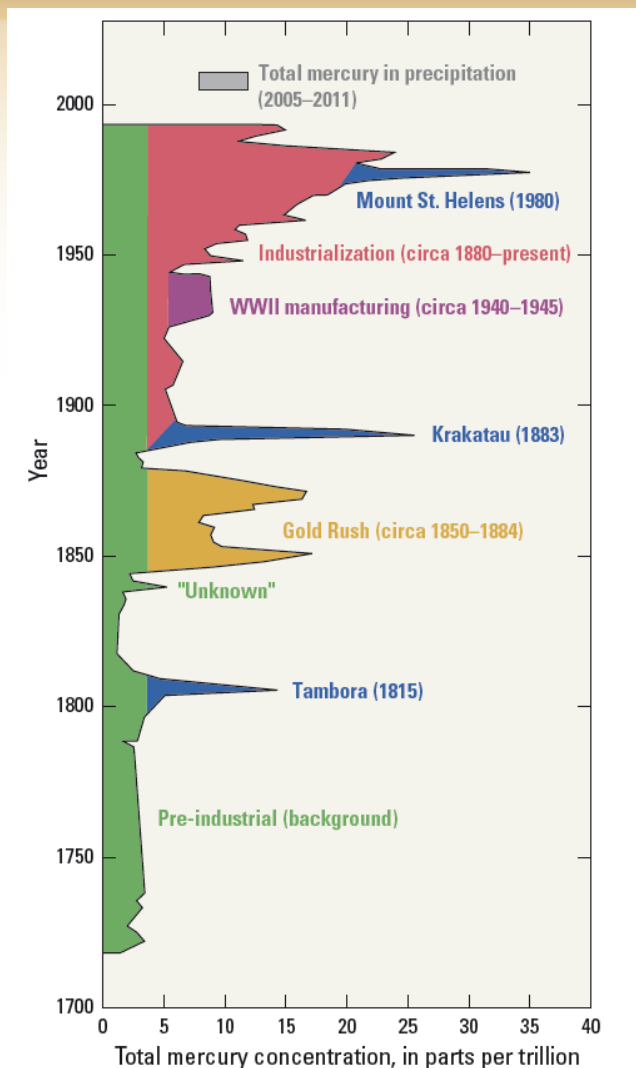
Tomáš Navrátil

with contribution of:

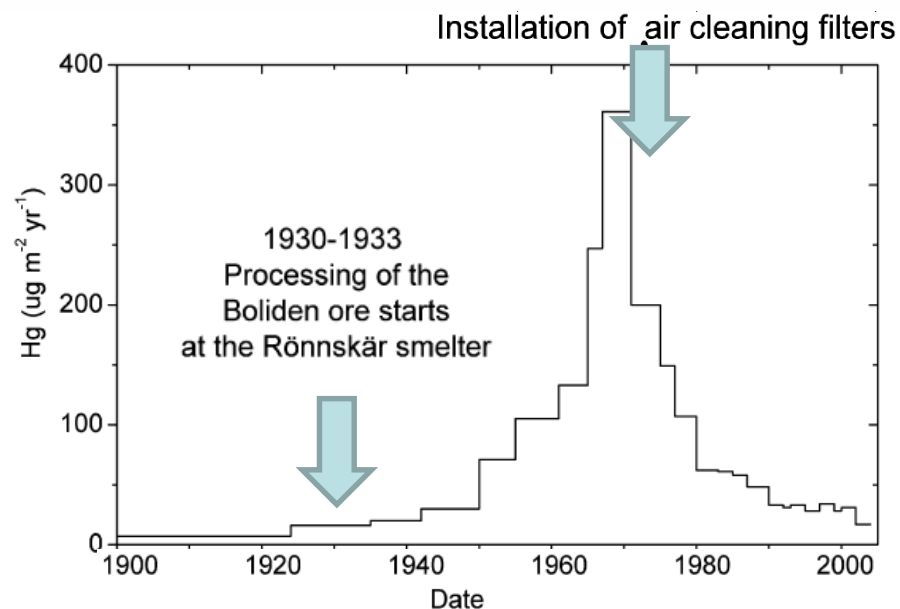
Tereza Nováková, Jan Rohovec, Šárka Matoušková, Marie Hojdová



Geochemical archives



- geochemical archives such as ice cores, lake sediments, peat bogs and forest mor serve as powerful tools for observations of historical anthropogenic Hg pollution

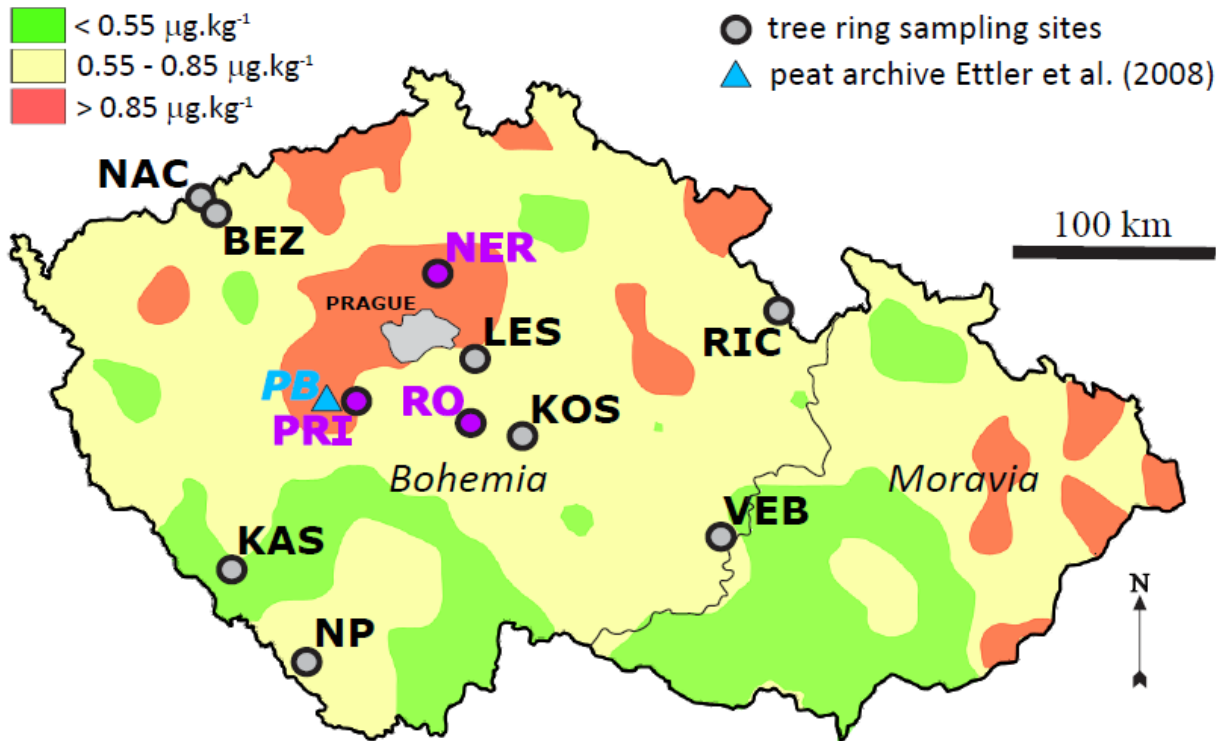


Source: Klaminder et al. (2008) *GEOCHIMICA COSMOCHIMICA ACTA* 72.



the Czech Republic, Central Europe

Isolines in the perimeter of the Czech Republic denote Hg forest humus concentrations in 1995 survey



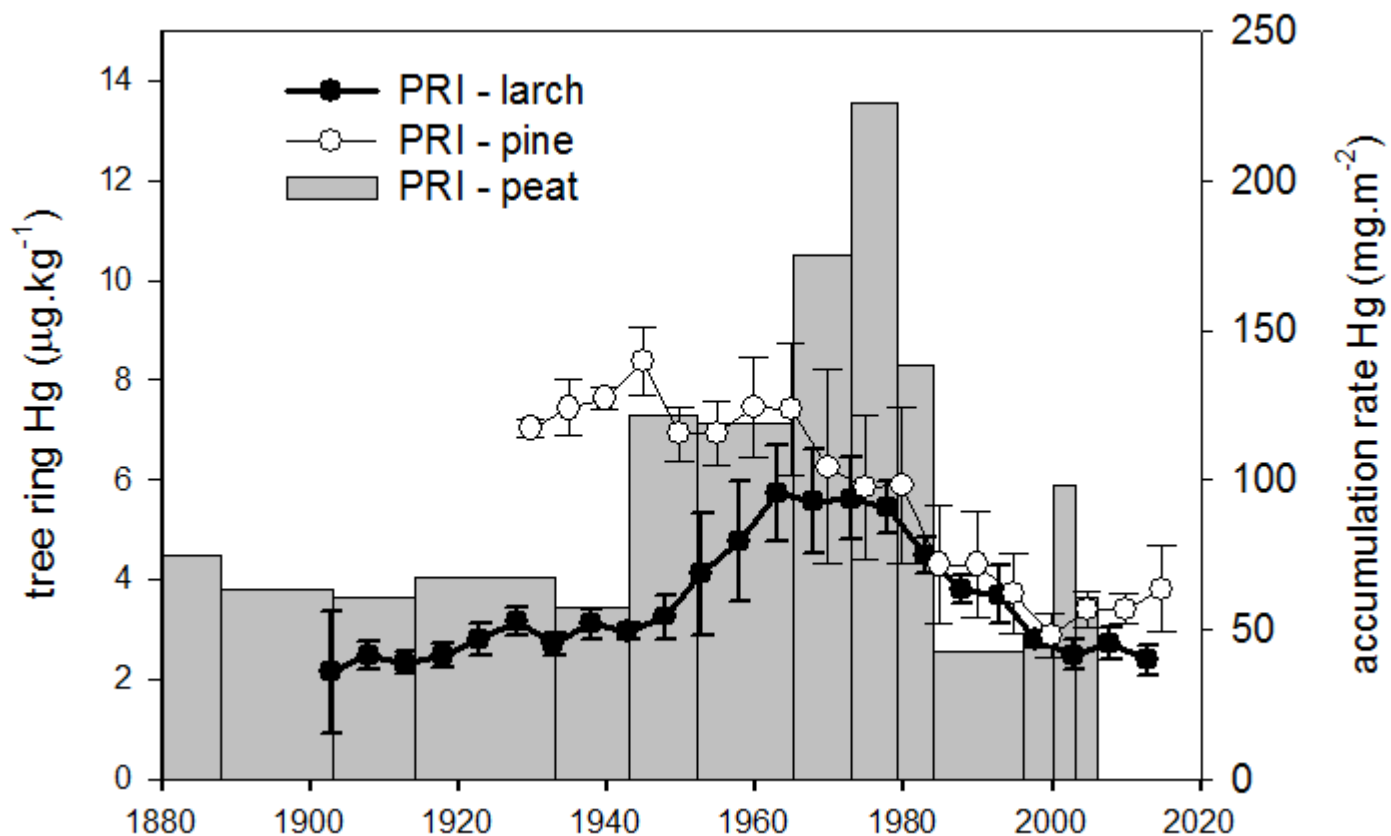
3 tree cores at each site

5 years segment



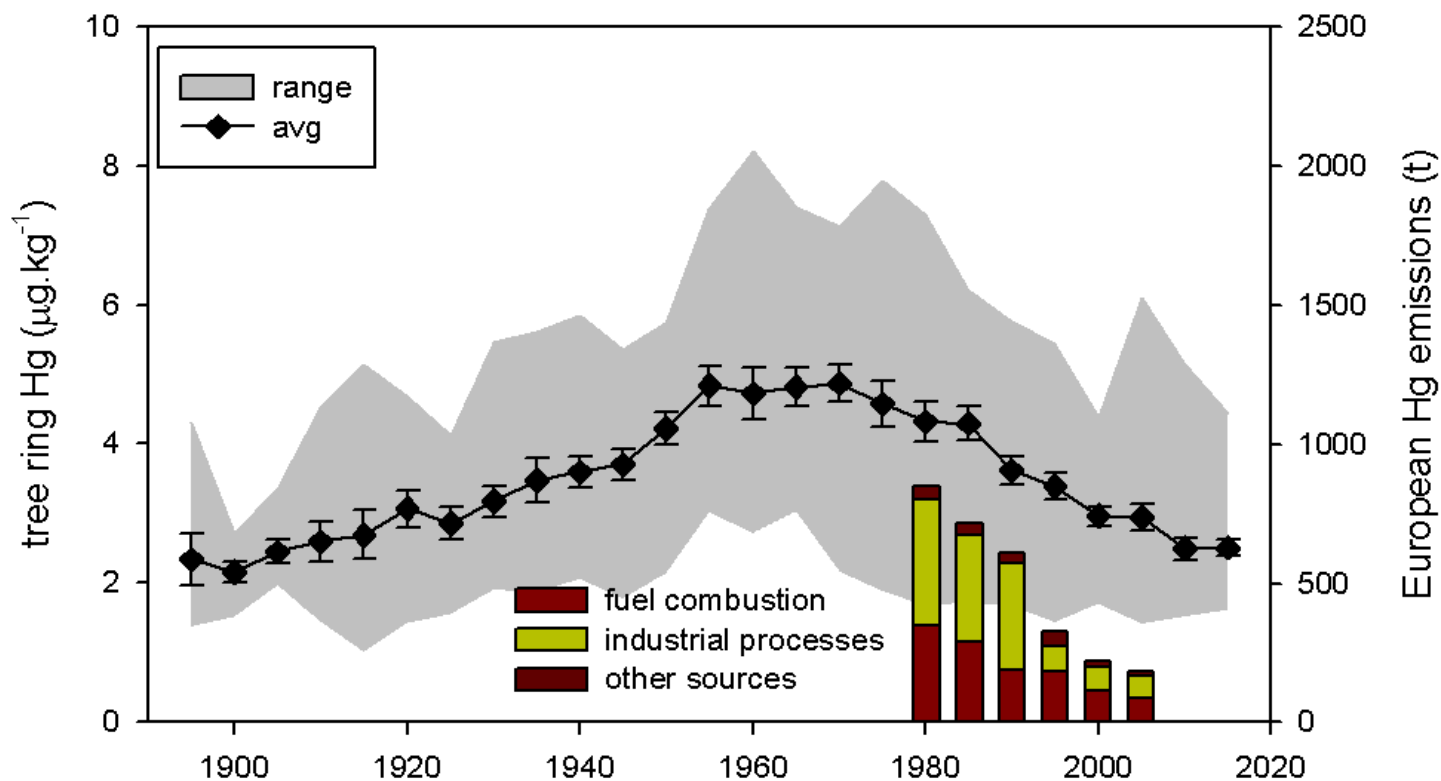
Pine versus Larch...

- site Příbram (PRI) historical ore mining and smelting district
smelting of Pb-Zn-Cd ores with trace amounts of Hg



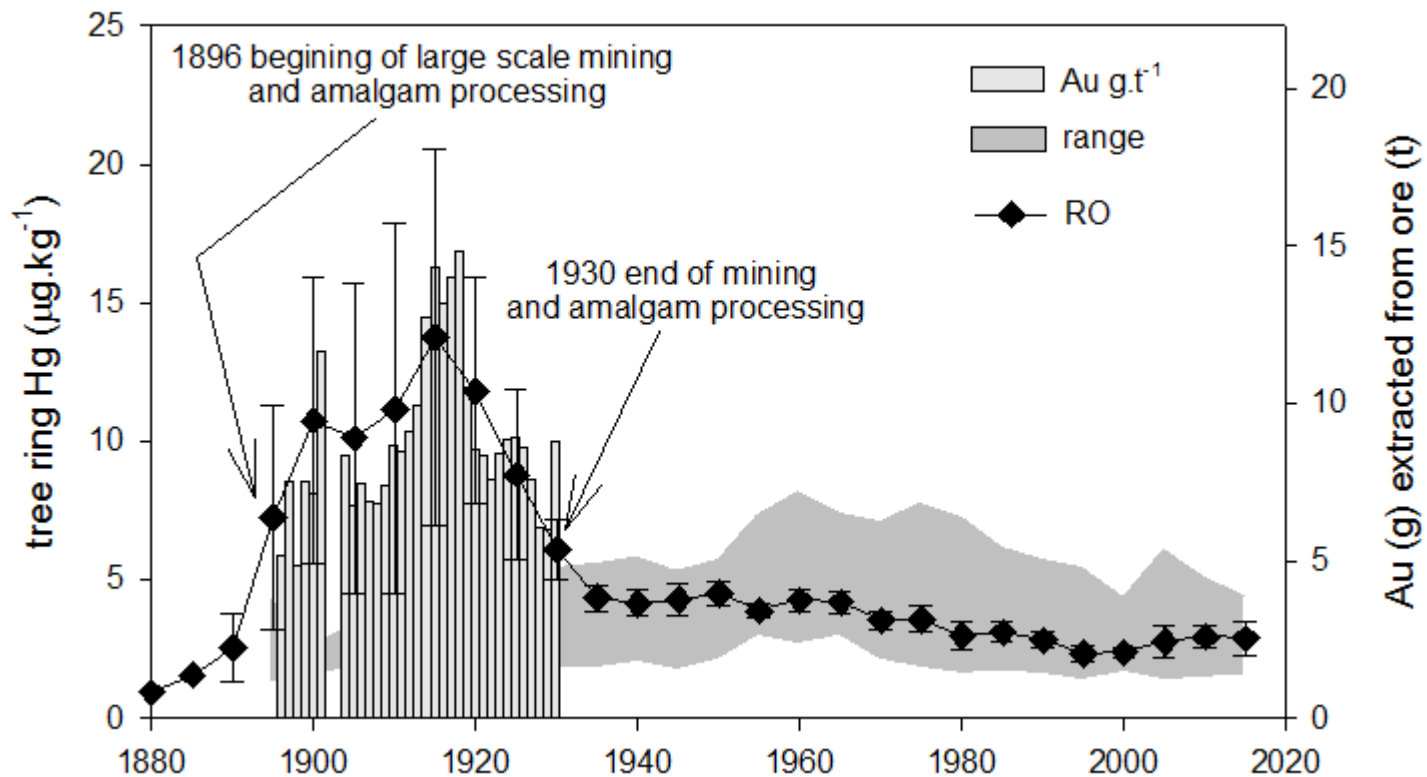
8 Background sites

altitude range 411-880 m a.s.l.; mean tree age 55-123 yrs; mean bole Hg $2.7\text{-}4.1 \mu\text{g}\cdot\text{kg}^{-1}$



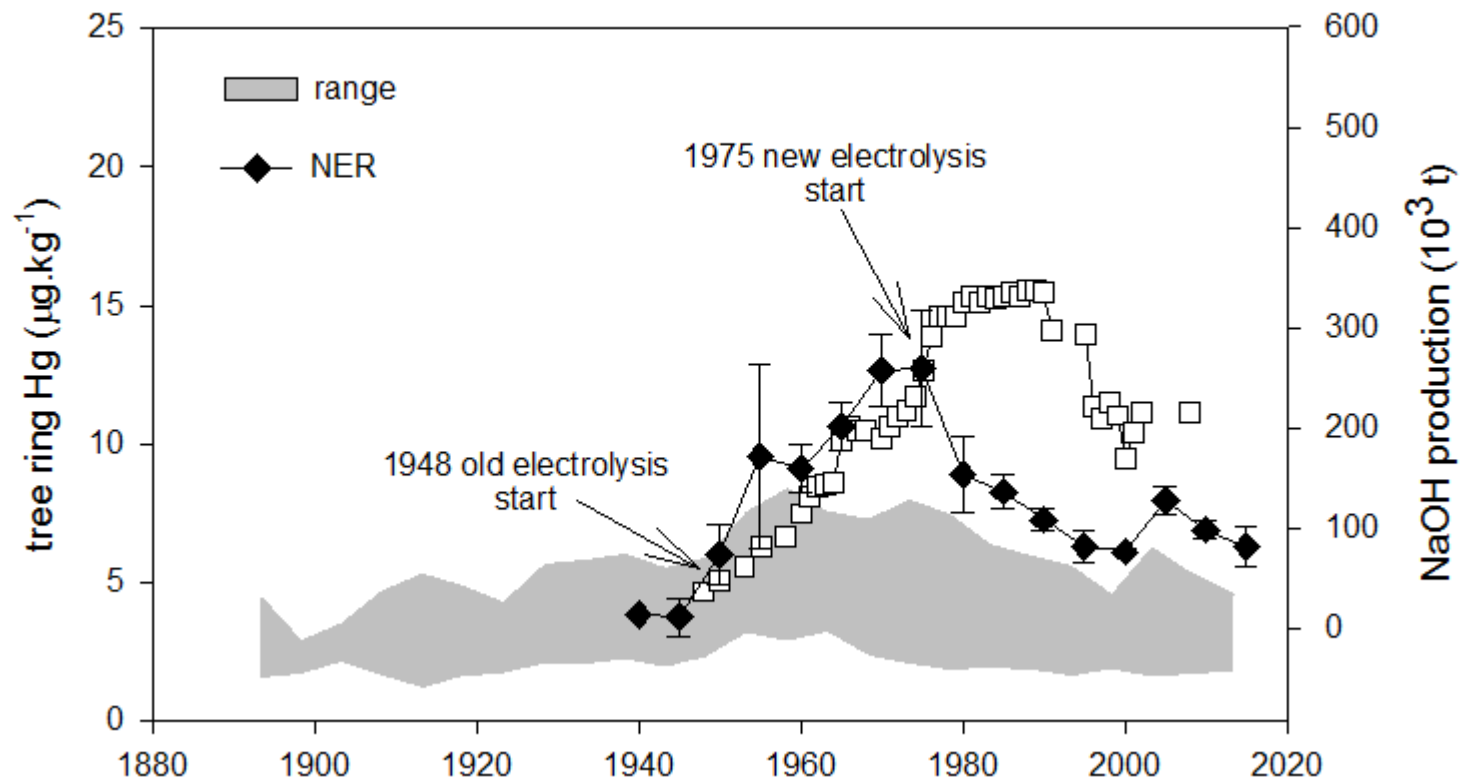
Polluted site Roudný - amalgamation

Roudný (RO) gold mining and processing using amalgamation procedure in period 1896-1930



Polluted site Neratovice – chlor-alkali plant

Neratovice (NER) production of caustic soda and chlorine since 1948
upgrade of production line in 1975



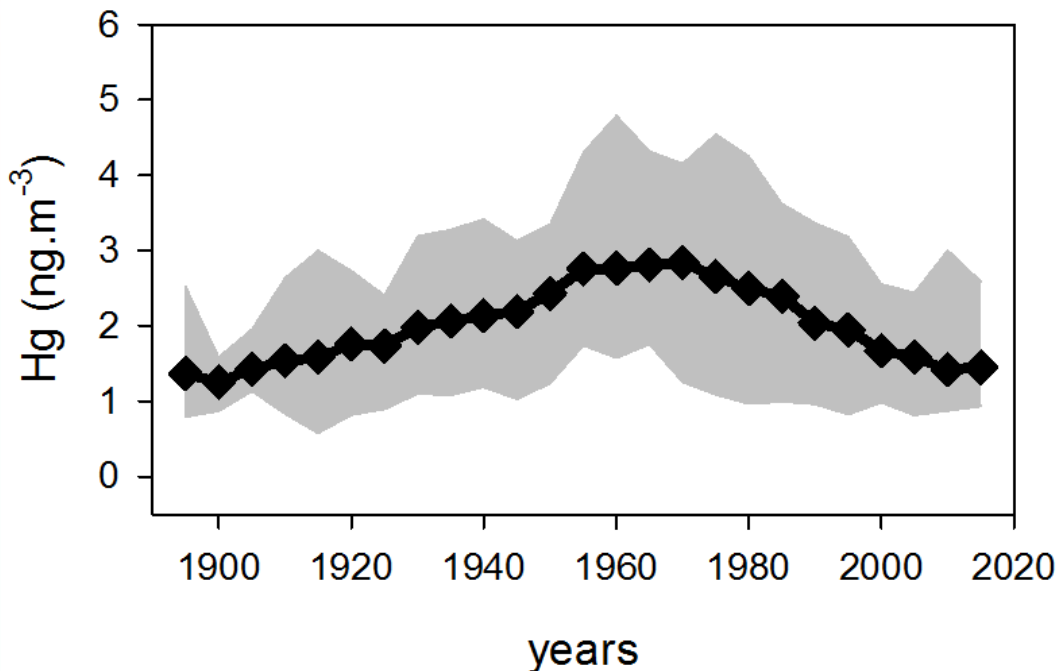


Tree ring model - relation to air Hg

Košetice (KOS) GMOS site with continuous air Hg measurements Czech Hydrometeorological Institute

Ratio

$$\text{Hg}_{\text{treering}} / \text{Hg}_{\text{air}} = 1.71$$



Hg_{air} - mean air Hg concentration
2011-2015

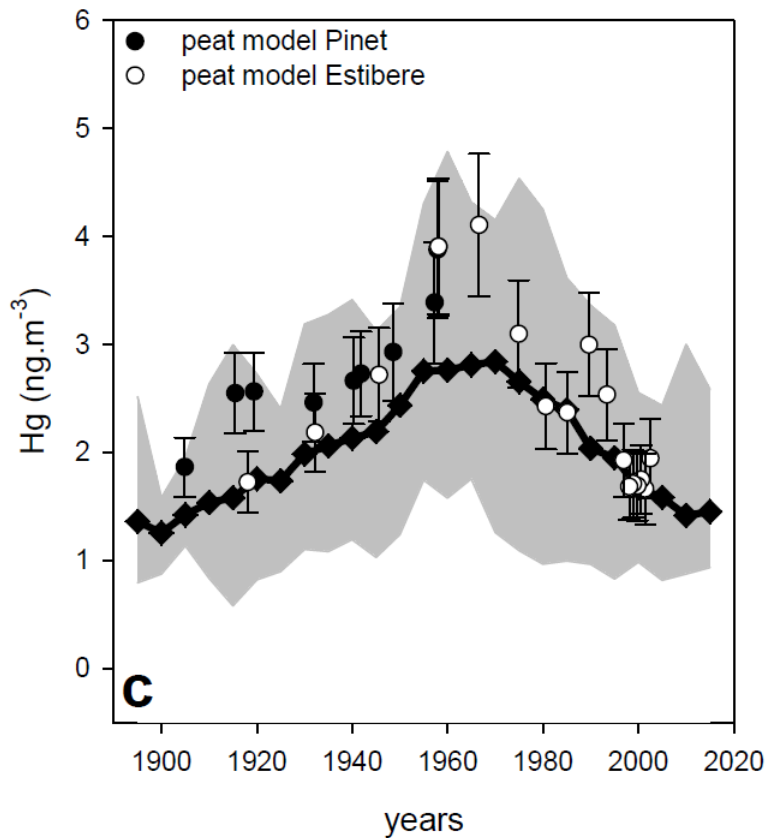
1.63 ng m⁻³

Hg_{treering} - local mean tree ring Hg conc.
2011-2015

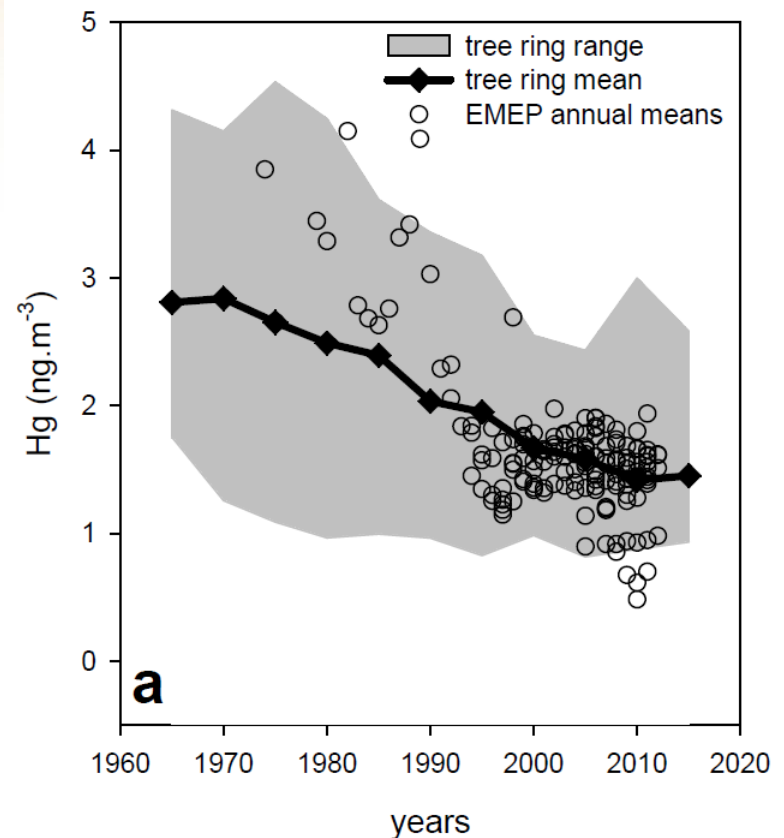
2.8 μg kg⁻¹

Results other...

- modeling using peat Hg isotopes



- air Hg measurements





Conclusions



- temporal fidelity of **larch tree ring Hg records** to Hg emissions at industrial sites suggests that larch is a robust Hg archive with minimal translocation
- **larch tree ring segments** at background and emission impacted sites reliably recorded the start and end of anthropogenic Hg emitting activities
- agreement of tree ring model air Hg with Europe-wide measurements and other models suggest that larch tree rings represent a promising tool to estimate trends in past air Hg levels

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