

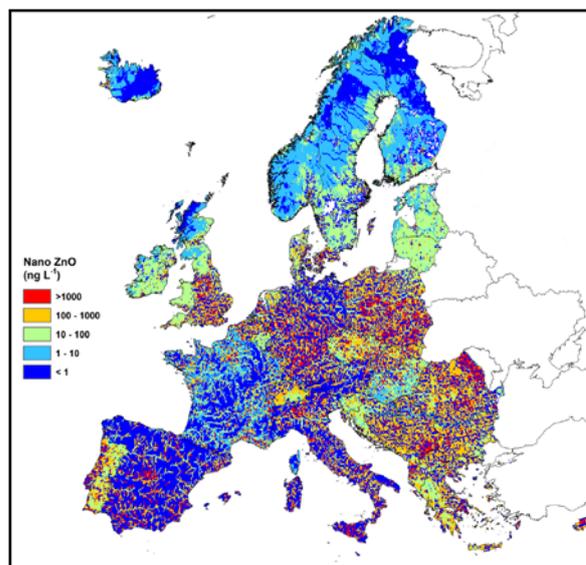
Nano silver and nano zinc-oxide in surface waters - Exposure estimation for Europe at high spatial and temporal resolution

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Abstract

Nano silver and nano zinc-oxide monthly concentrations in surface waters across Europe were modeled at $\sim 6 \times 9$ km spatial resolution. Nano-particle loadings from households to rivers was simulated considering household connectivity to sewerage, sewage treatment efficiency, the spatial distribution of sewage treatment plants, and their associated populations. These loadings were used to model temporally varying nano-particle concentrations in rivers, lakes and wetlands by considering dilution, downstream transport, water evaporation, water abstraction, and nano-particle sedimentation.



Map of 90th percentile expected nano ZnO concentrations IN European freshwaters

Temporal variability in concentrations caused by weather variation was simulated using monthly weather data for a representative 31-year period. Modeled concentrations represent current levels of nano-particle production. Two scenarios were modeled. In the most likely scenario, half the river stretches had long-term average concentrations exceeding 0.002 ng L^{-1} nano silver and 1.5 ng L^{-1} nano zinc oxide. In 10% of the river stretches, these concentrations exceeded 0.18 ng L^{-1} and 150 ng L^{-1} , respectively. Predicted concentrations were usually highest in July.

Impact

Ten percent of European river stretches have expected concentrations exceeding 0.18 ng L^{-1} nano silver and 150 ng L^{-1} nano zinc-oxide.

Reference

Dumont *et al.* (accepted). Nano silver and nano zinc-oxide in surface waters - Exposure estimation for Europe at high spatial and temporal resolution. Environmental Pollution.

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