



Aerosols to groundwater: DEET (*N,N*-diethyl-*m*-toluamide) and 7-ODAA (7-oxodehydroabiatic acid) as markers for anthropogenic emissions in the Hanich CZO

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Understanding biogeochemical processes in groundwater is paramount for safety management of our water supplies. The AquaDiva project has been investigating a groundwater probing site in central Germany to monitor hydrology, biology and dissolved organic matter (DOM) chemistry in a multiannual project (Küsel et al., 2016). As part of this, we are addressing how deep surface-derived signals can be traced on their passage through the critical zone and into the groundwater.

We acquired a multiannual DOM data set from an untargeted liquid chromatography coupled to mass spectrometry (LC-MS) monitoring and have previously shown that fingerprints from mass-signals associate with water flows (Zerfaß et al., 2022). Using tandem mass spectrometry, we have now identified DEET (*N,N*-diethyl-*m*-toluamide) and 7-ODAA (7-oxodehydroabiatic acid, putative) in groundwater samples, compounds that are released to aerosols as insect repellent sprays and through conifer wood burning for heating, respectively. We show that these signals are found in groundwater throughout the year, but with elevated intensities in summer (DEET) and winter (7-ODAA), respectively, corresponding to their primary seasons of release.

This demonstrates by the counter-periodic DEET and 7-ODAA patterns how surface-derived (aerosol) organic matter signals arrive in groundwater down to 88 m of sampling depths with intra-annual dynamics.

References

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