



PFAS leaching from AFFF-impacted sandy soil

Why infiltration intensity matters

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AFFF became standard in aviation firefighting



Research question

How does infiltration intensity control PFAS leaching?

❖ RETENTION

❖ Which PFAS remain in the soil?

❖ TRANSPORT

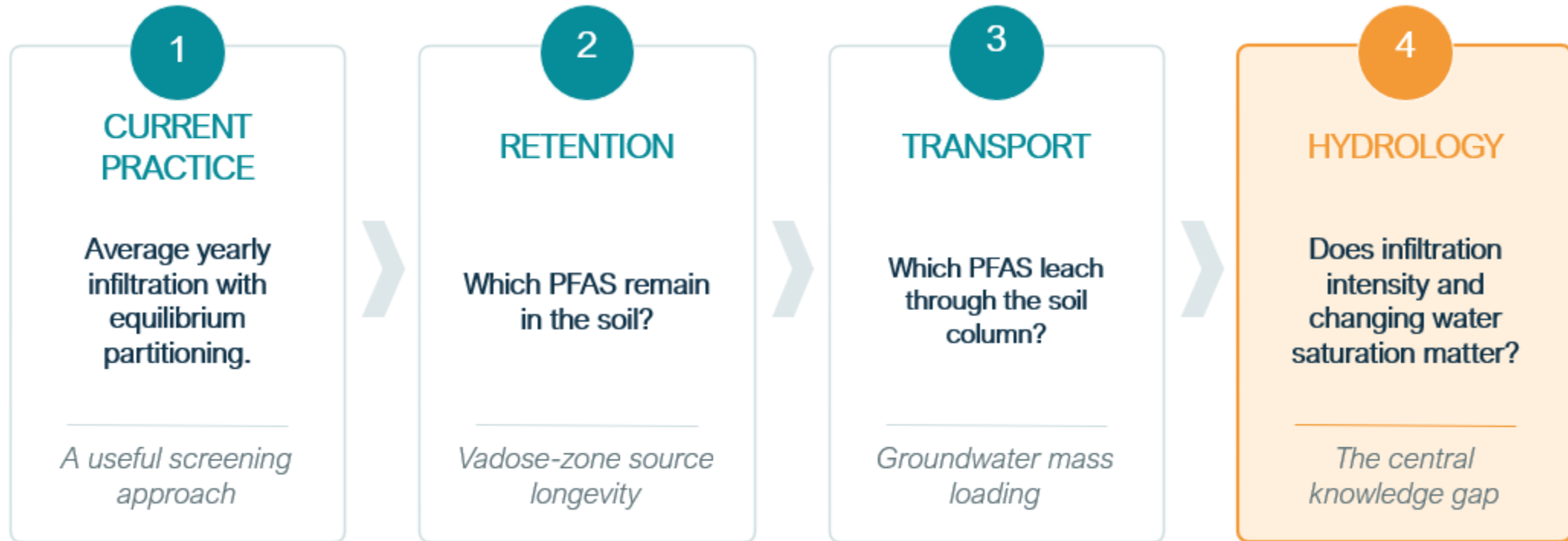
❖ Which PFAS move through the soil?

❖ HYDROLOGY

❖ Does pulse size change leaching?

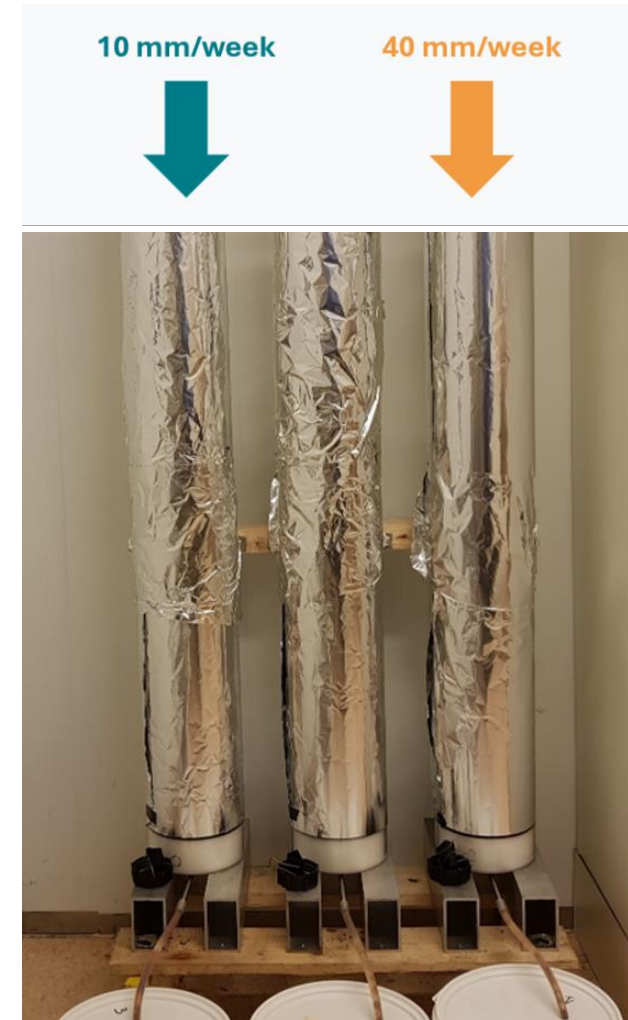
Work conducted with Mona C. Hansen, Hans Peter Arp and Gijs Breedveld.

Motivation: Why hydrology matters for PFAS leaching



Large-Scale Soil-Column Experiment

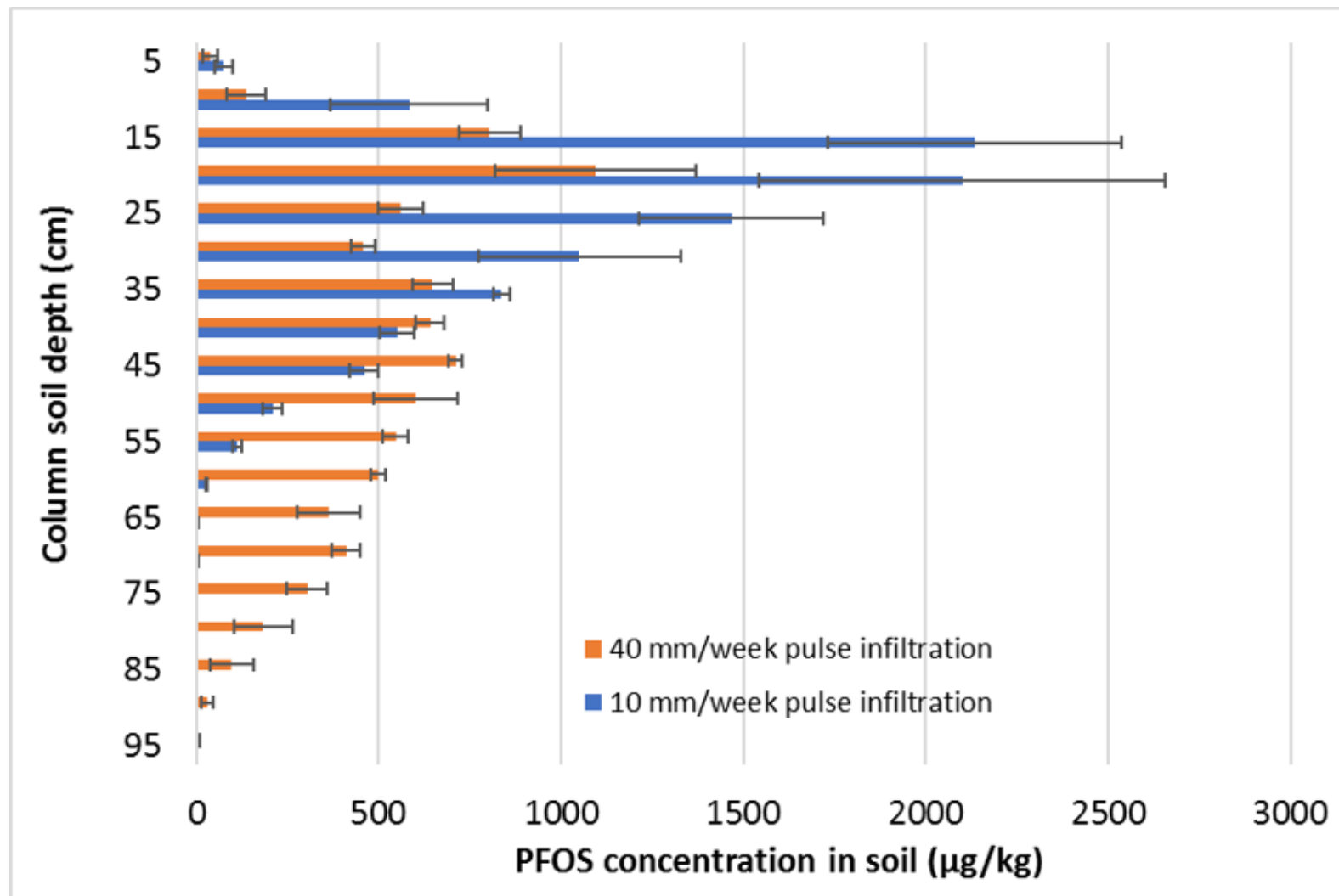
- ▶ Pristine sandy soil: 93% sand, 0.1% TOC
- ▶ Column dimensions: L=100 cm and d=14 cm
- ▶ Legacy PFOS-based AFFF applied to the soil surface
- ▶ Approximately 10 850 µg target PFAS per column
- ▶ Weekly pulse infiltration: 10 and 40 mm
- ▶ Duration: 11 weeks at 10 °C



PFOS remained predominantly in the soil column

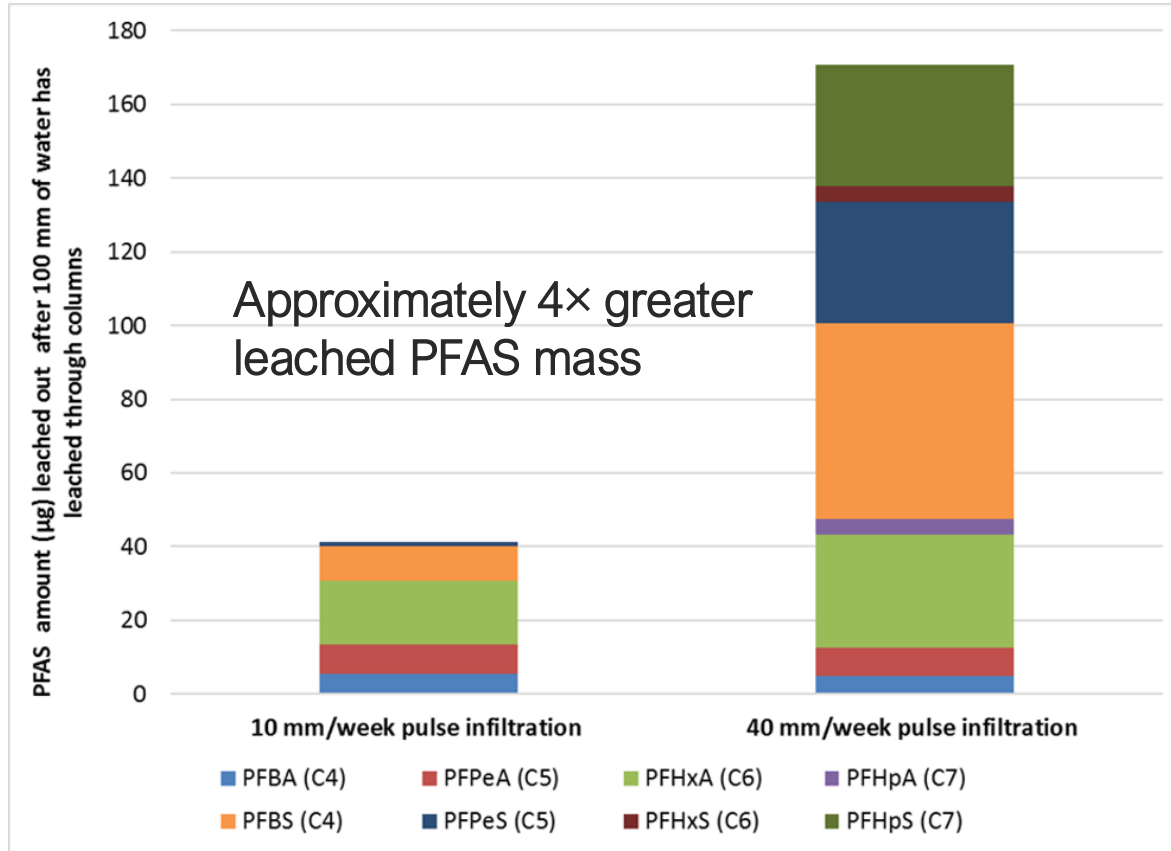


Infiltration intensity altered the PFOS depth profile



Larger infiltration pulses increased PFAS leaching

Cumulative target PFAS mass in leachate after 100 mm



≈40 µg

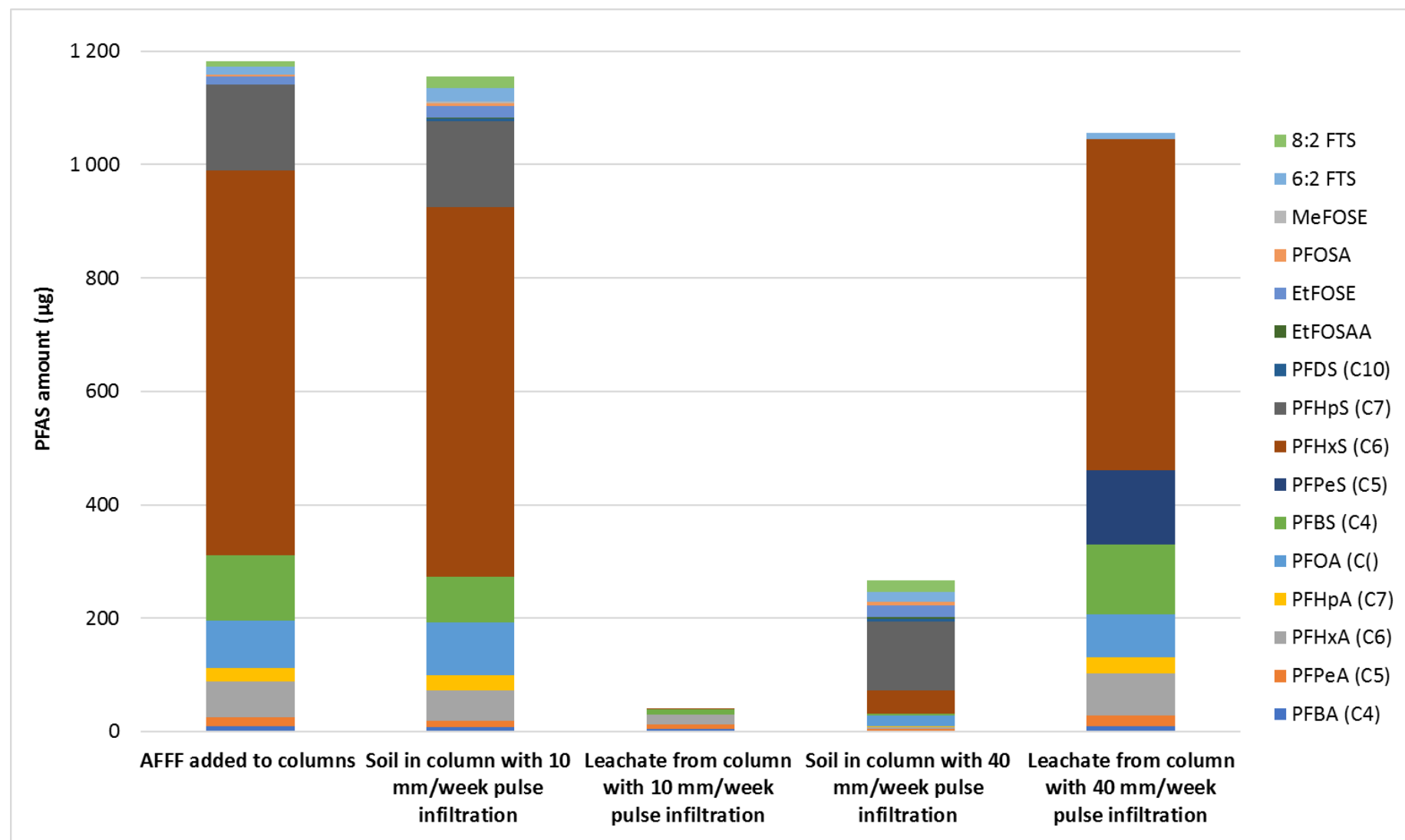
10 mm/week



≈170 µg

40 mm/week

PFAS mass balance, excluding PFOS



Conclusions and implications for PFAS site management

1

RETENTION

Soil partitioning and air-water interfacial adsorption, varies with water saturation.

2

TRANSPORT

Higher infiltration can increase breakthrough and depth of migration; compound-specific.

3

RISK ASSESSMENT

Annual-average infiltration may miss episodic fluxes.

4

SITE MANAGEMENT

Characterize vadose-zone mass and recharge dynamics; infiltration control and mass-flux monitoring.



The amount of water matters, but
so does the way it arrives.