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AQUATIC PLASTIC

Microplastic monitoring along the Tisza River: environmental take-home messages

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1. Preliminaries, aims

To map the micro- and macroplastic pollution of the Tisza
determine the environmental influencing factors

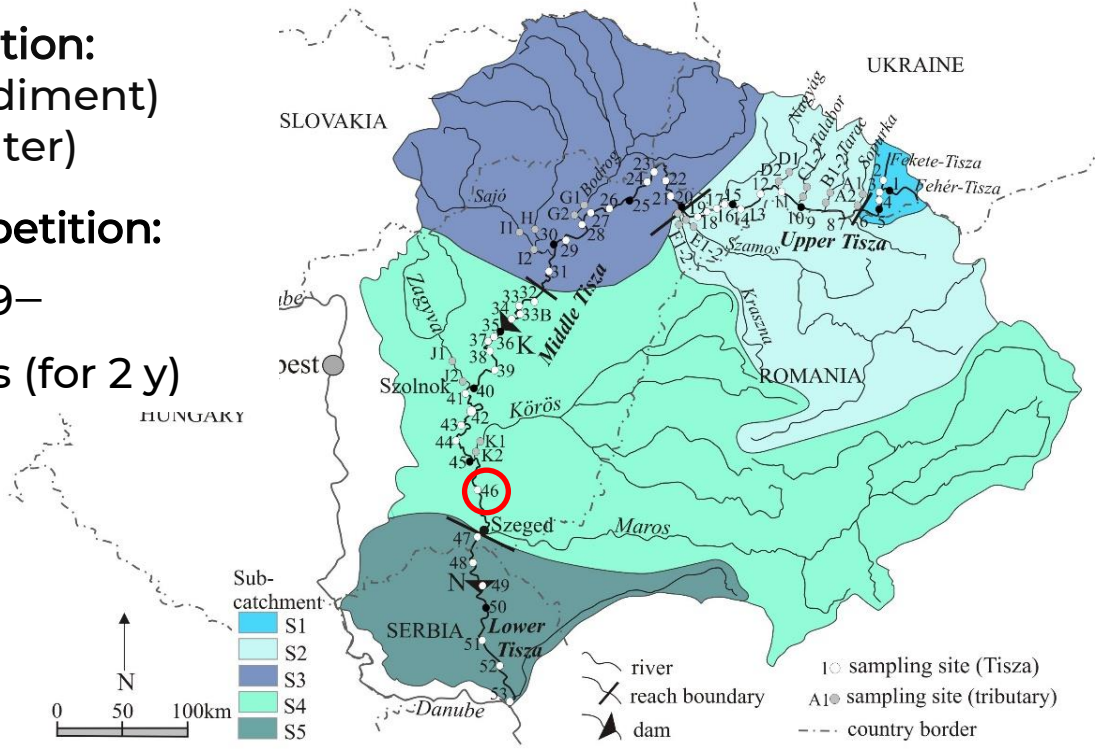
Spatial repetition:

70 sites (sediment)
34 sites (water)

Temporal repetition:

annual: 2019–

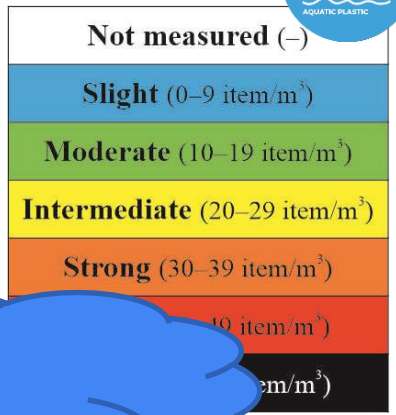
every 5 days (for 2 y)



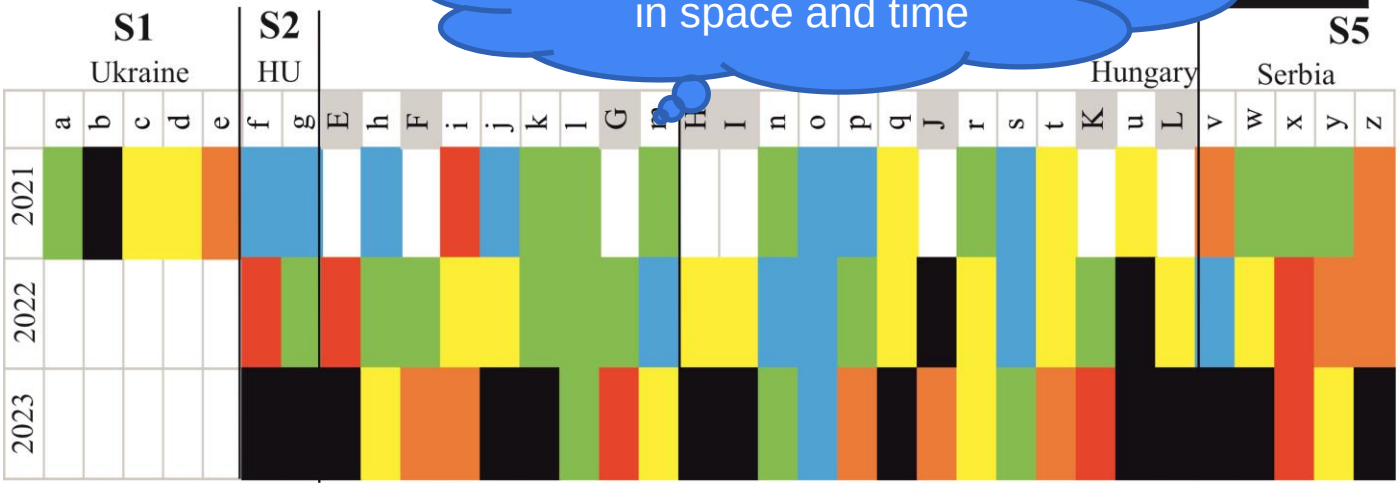
2. Results MiP in WATER

Mean MP concentrations (item/m³)

	Tisza	Tributaries
2021	19±13	n.d.
2022	22±14	27±19
2023	52±41	



Highly varies:
in space and time



Balla A. et al., 2024: Microplastic clouds in rivers: spatiotemporal dynamics of microplastic pollution in a fluvial system. Envi. Sci. Europe, 36:143

3. Influencing factors

A) Location of the sampling site

* Downstream of tributaries: mixing of waters

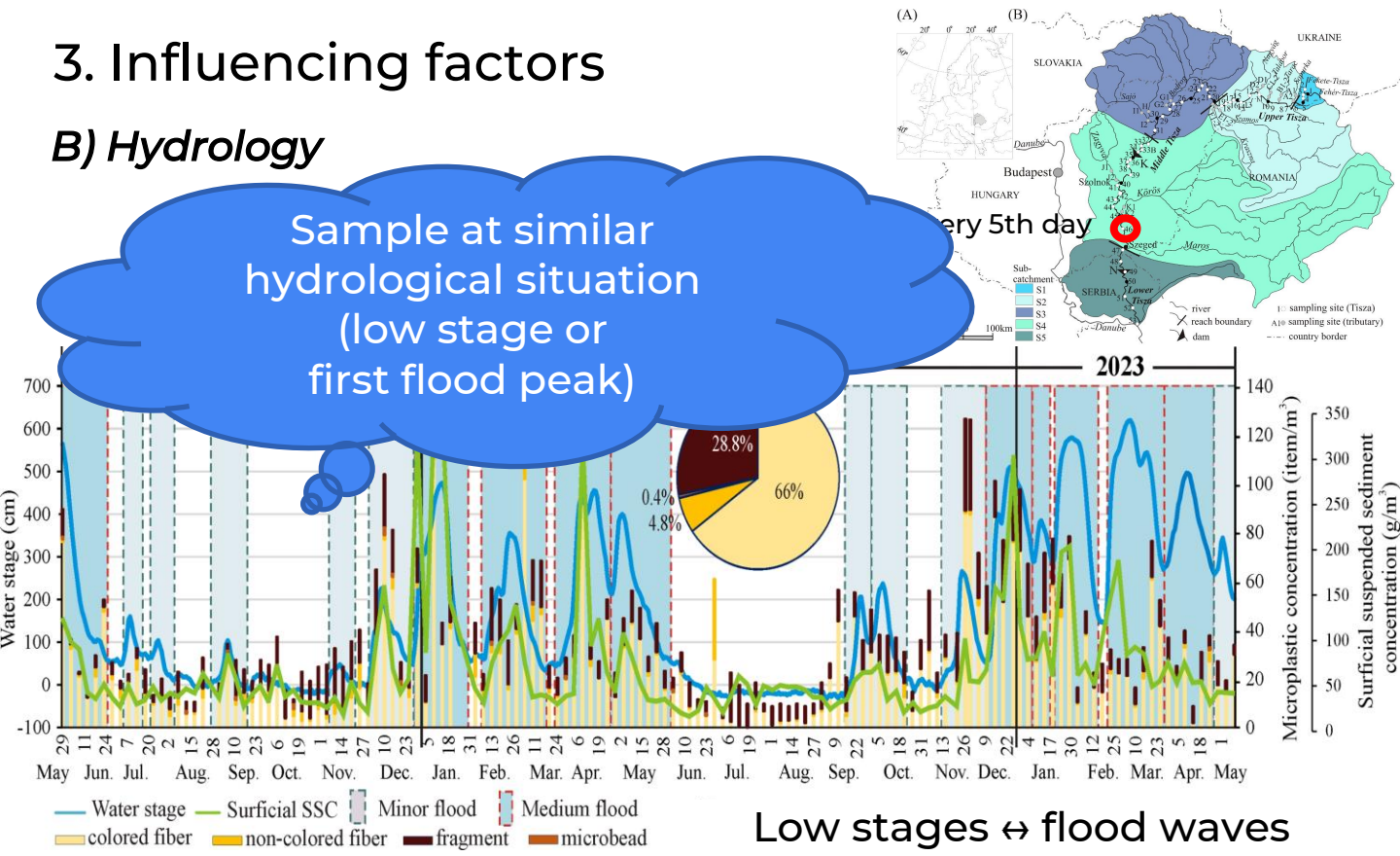
* cross-section vs. point

Mohsen et al. 2021: Sediment transport dynamism in the confluence area of two rivers transporting mainly suspended sediment based on Sentinel-2 satellite Images. WATER 13, No. 3132.

3. Influencing factors

B) Hydrology

Sample at similar hydrological situation (low stage or first flood peak)



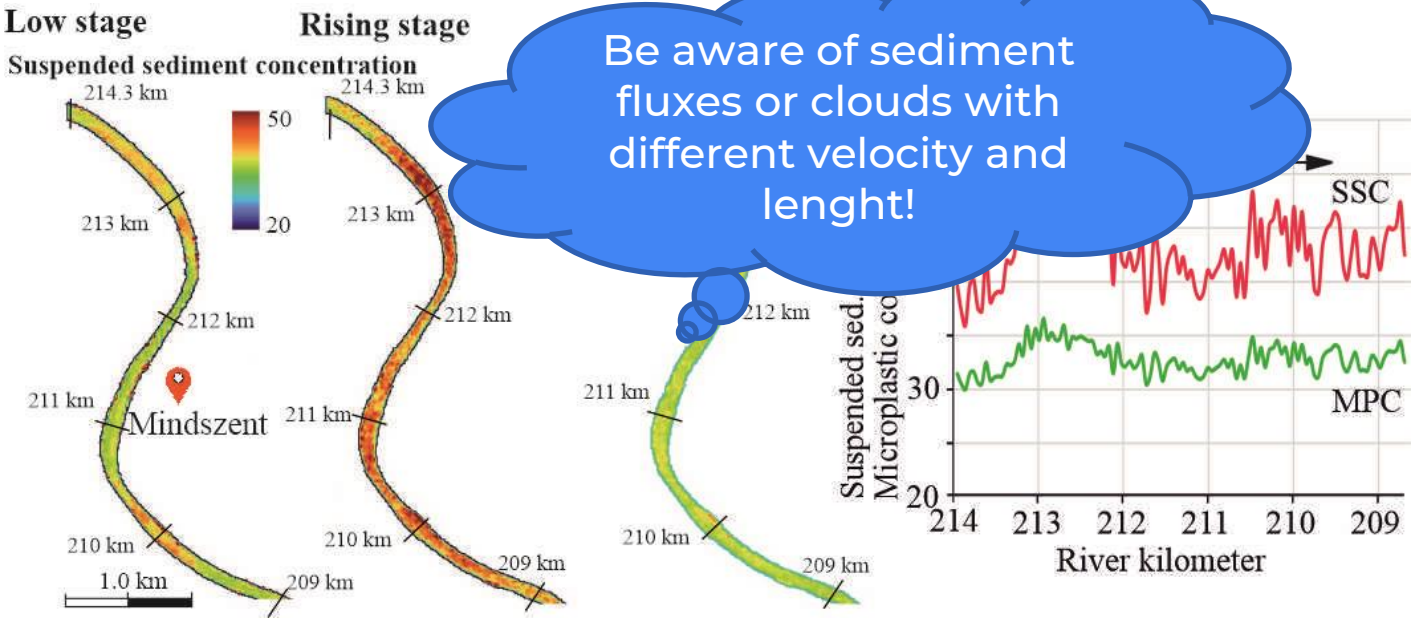
Low stages ↔ flood waves

Event sequence

Mohsen A. et al., 2023: High spatiotemporal resolution analysis on suspended sediment and microplastic transport of a lowland river. Sci. Total Envi. 902, No. 166188

3. Influencing factors

C) Sediment and microplastic fluxes

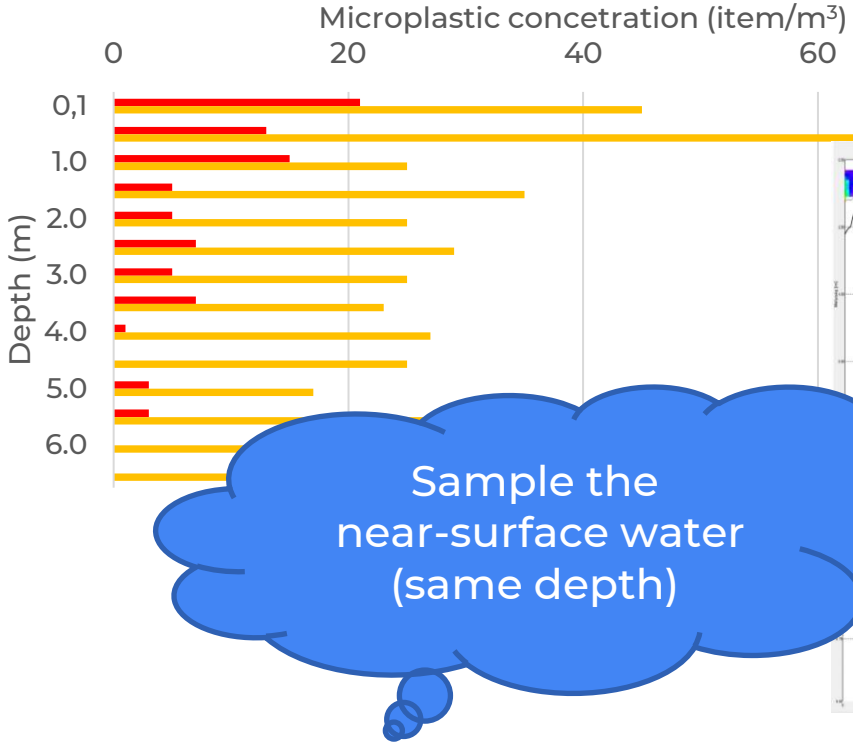


Estimation accuracy	R^2	RMSE	MAE
Low stages	0.17	12.9 item/m³	9.4 item/m³
Flood waves	0.88	7.8 item/m³	10.8 item/m³

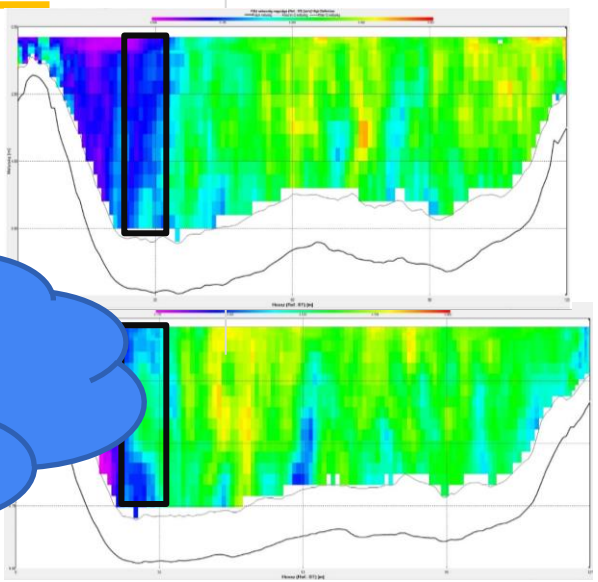
Balla A. et al., 2024
pollution in a flu
Mohsen A. et al. 20
satellite images, neural network, and suspended sediment data as a proxy. Sensors 23, 9505.

3. Influencing factors

D) Depth of sampling



Velocity profiles



Károlyi Cs. 2023: Vertical distribution of microplastics in the water column of the Tisza River, Hungary. MSc Diploma work, University of Szeged

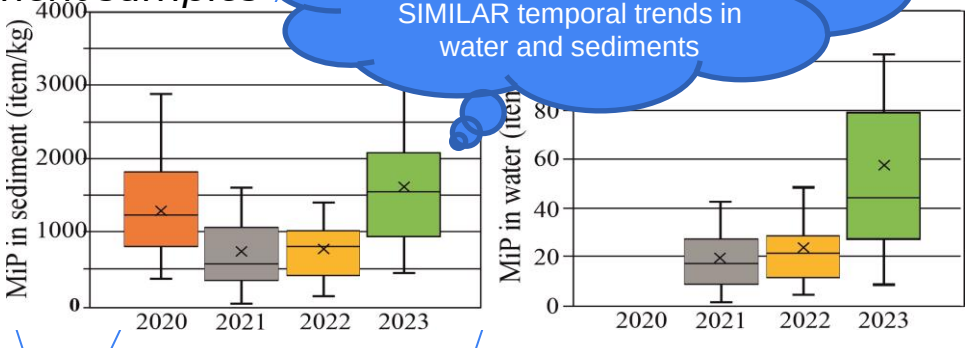
4. Connection between MiP in water and in sediments

not measured
0-999
1000-1999
2000-2999
3000-3999
4000-4999
5000-

Sediment samples

Sediment samples

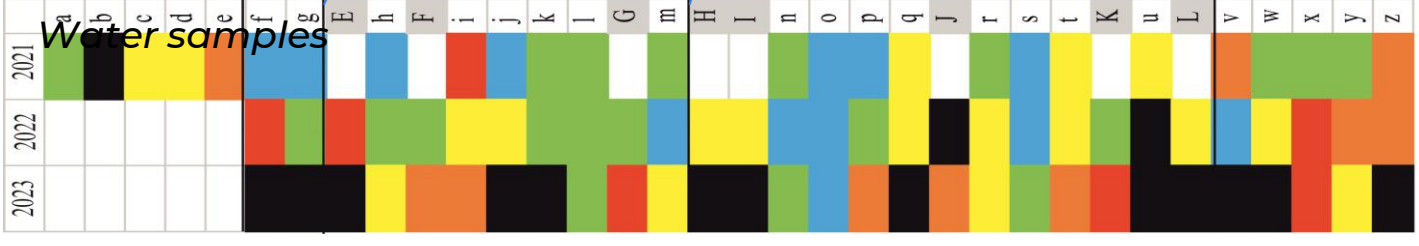
Repeated measurements are necessary: redistribution by flood waves
SIMILAR temporal trends in water and sediments



Serbia

not measured
0-9
10-19
20-29
30-39
40-49
50-

Water samples



5. Conclusions, take-home messages

- ✓ Not only the analytical procedure should be standardised.
- ✓ The environmetal conditions of the sampling should be carefully considered, recorded and published.
- ✓ The MiP content of the freshly deposited, fine-grained sediments show similar spatio-temporal trends as the water (cummulative archive but more diffulcult to analyse).

Further research aims:
Spatially and temporally more detailed sampling:
fluxes and clouds
verical profiles
reservoirs
confluences

Thank you for your attention!

The team:

Alexia, BALLA
sampling, laboratory work,

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modelling

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