Applying environmental geochemical monitoring of fluvial sediments using unique automated and passive sampling in the Danube Basin

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Conference theme number(s): 9 (7, 1)

Introduction: This study reports on the unique results of the recently concluded Sediment-quality Information, Monitoring and Assessment System to Support Transnational Cooperation for Joint Danube Basin Water Management (SIMONA) project the largest of its kind in Europe, which was carried out in 2018-2022 as a project of the EU DTP aiming at delivering a ready-to-deploy sediment-quality monitoring system for the effective and comparable measurements and assessment of sediment quality in surface waters in the Danube River Basin in accordance with the EU Water Framework Directive (WFD).

Methods: The project has developed, tested, demonstrated an innovative environmental geochemical monitoring platform of fluvial (suspended, river bottom and floodplain) sediments using state-of-the-art automated and passive sampling technology (Fig.1) for the contamination risk assessment according to the EU WFD in the Danube Basin. Time series analysis and signal processing of one year multi-variate and multi-matrices monitoring data could be used to identify the geochemical background, temporal trends, periodicities and contamination events in the studied EU-defined Hazardous Substances (HSs). Since the applied technology, methods and data interpretation is fully consistent with EU legislation risk assessment, results may provide a 'best solution' for the spatial and temporal discrimination of contamination.

Results: The results demonstrate the efficacy of these techniques in identifying potential sources of pollution and assessing their impact on the environment.

Fig. 1: *Automated and passive sampling monitoring stations (photo by Zsófia Kovács)*

Discussion: The use of unique automated sampling techniques allows for accurate and reliable data collection, which can inform future management and protection strategies for the Danube Basin.

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