

# ASSESSMENT OF SUSPENDED SEDIMENT CONCENTRATION AND GRANULOMETRY USING AQUASCAT 1000S ON THE SULINA BRANCH OF THE DANUBE RIVER

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## INTRODUCTION

Suspended particulate matter (SPM) significantly affects water quality, habitat health, and sediment transport. These particles can include pollutants like heavy metals or microplastics, posing risks to aquatic organisms and human consumers. Traditional sampling methods have limitations, especially in stratified or high-energy systems. This study employs the AQUASCAT 1000S, a multi-frequency acoustic profiler, to assess sediment concentration and granulometry along the Sulina branch of the Danube River. The aim is to evaluate the performance of acoustic techniques in detecting suspended sediment dynamics in deltaic riverine systems.

## MATERIALS AND METHODS

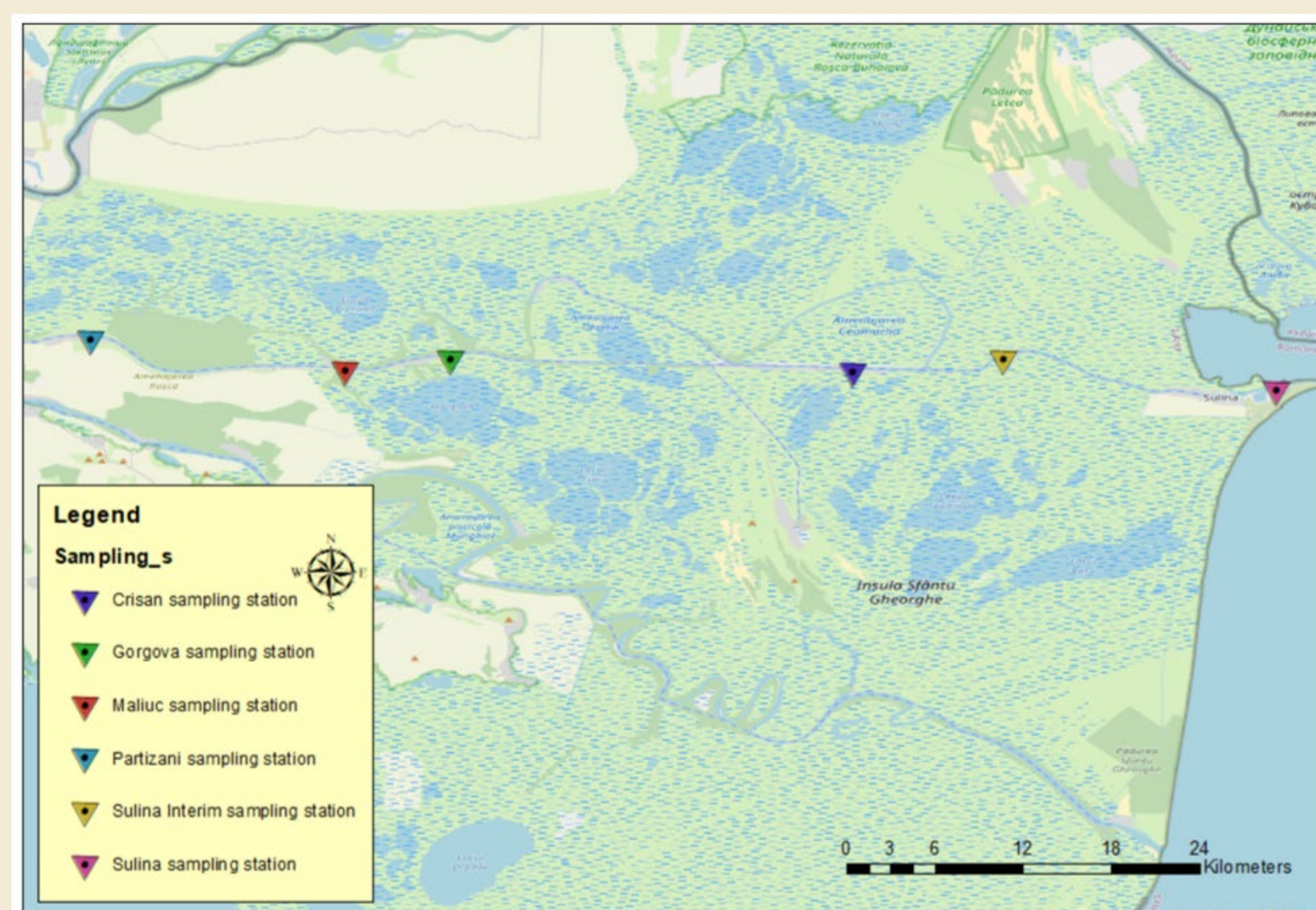


Fig. 1. Location of the six sampling stations on the Sulina branch

Six stations were selected along the Sulina branch and monitored on 23 August 2023 using a vessel-mounted AQUASCAT 1000S. The instrument deployed four acoustic frequencies (500 kHz to 4 MHz) to capture vertical profiles up to 10.24 m, segmented in 40 cm bins. Data acquisition and processing were managed via AQUAtalk and AQUAscatToolkit. Measurements were supported by GIS mapping and statistical analysis to assess sediment stratification, concentration, and granulometric classification. Grain size and concentration data were classified into clay, silt, and sand categories to assess flow energy and sediment regimes.

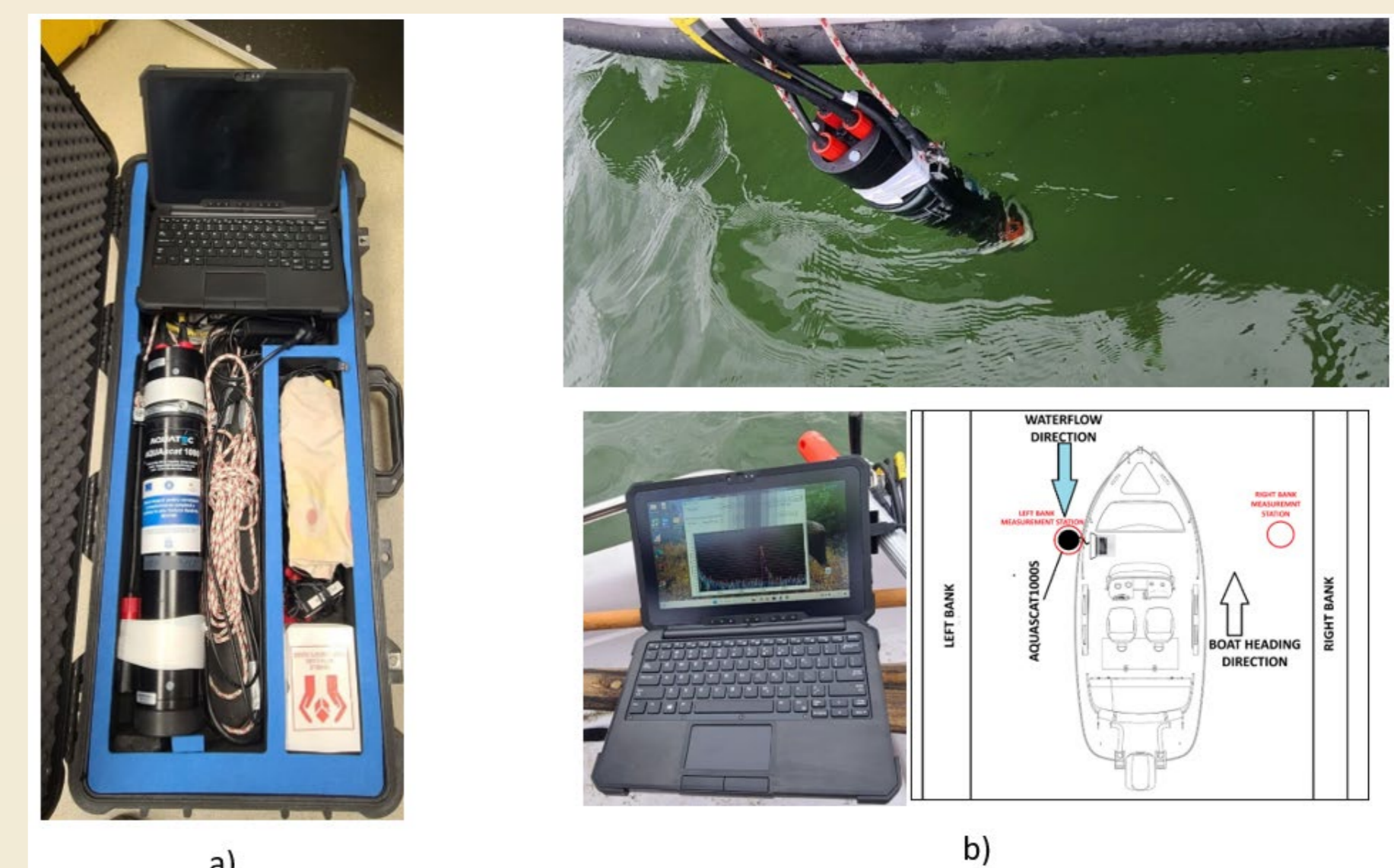


Fig. 2. AQUASCAT 1000S equipment configuration and measurement method

## RESULTS AND DISCUSSIONS

Suspended sediment concentration (SSC) profiles from AQUASCAT 1000S exceeded 200 g/L near the bed, with strong vertical stratification at all sites. Coarse particles (~200 μm) dominated surface and bottom layers, while finer material (50–100 μm) was found mid-column. Upstream sites (Partizani, Maliuc) had higher cumulative loads.

Grain-size classification (Table 1), based on acoustic signal inversion, grouped particles as clay (<2 μm), silt (2–63 μm), and sand (>63 μm). Sand fractions exceeded 89%, confirming high-energy flow and limited fine sediment retention.

Sediment transport indicators seen in Table 2 including mean particle size, depth-integrated SSC, and cumulative mass — suggest active resuspension and bedload transport. Strong SSC–size correlations support dynamic sediment mobility under regulated flow.

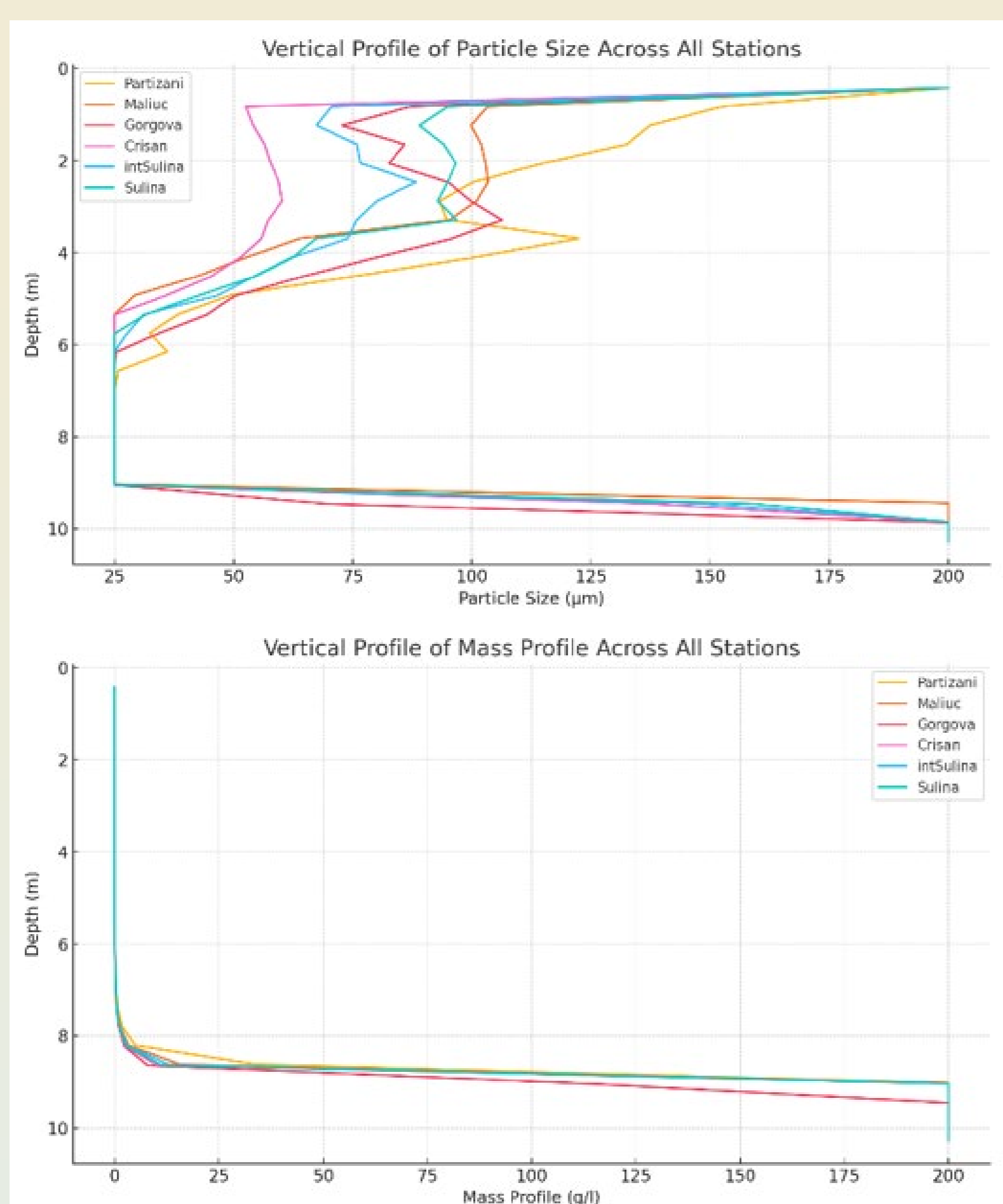


Fig. 1. Location of the six sampling stations on the Sulina branch

The Sulina branch is a high-capacity sediment transport channel, characterized by vertical stratification of suspended sediments and dominant sand-sized fractions (>89%). Peak SSC values near the channel bed and coarse material in surface layers indicate strong resuspension and active bedload transport. Grain size and SSC variability highlight localized hydrodynamic conditions, shaped by flow intensity and channel structure. The use of AQUASCAT 1000S acoustic profiling enabled accurate, high-resolution monitoring of sediment behavior. These results support the integration of acoustic tools into deltaic management practices, improving decisions on dredging, navigation safety, and ecosystem protection in sediment-rich environments

## ACKNOWLEDGEMENTS

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## CONCLUSIONS

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Table 1. Sediment classification by grain size

Station	Clay (%)	Silt (%)	Sand (%)
Partizani	1.52	4.55	93.94
Maliuc	1.52	4.55	93.94
Gorgova	1.52	7.58	90.91
Crisan	1.52	9.09	89.39
Int. Sulina	1.52	7.58	90.91

Table 2. Sediment transport indicators

Station	Cumulative Mass (g/l)	Near-Bed Avg MP (g/l)	Size-MP Correlation
Partizani	841.86	166.74	0.438
Maliuc	821.48	163.14	0.545
Gorgova	727.59	144.64	0.473
Crisan	814.66	161.98	0.604
Int. Sulina	818.41	162.61	0.558