The Lithological Composition of the Bed Sediments Collected Along the Sf. Gheorghe Branch (km 85 - km 15) (Streams, Artificial Canals, Rectified Meanders, Including Lateral Channels and Lakes), Danube Delta, Romania

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Abstract

The Sf. Gheorghe distributary (the oldest branch of the Danube River) is subject to different hydro-sedimentary impacts due to the anthropogenic meander cut-off plans undertaken in the last decades for navigational purposes. This study aimed to determine the contents of the main lithological levels (i.e., organic matter – TOM%, carbonates – CAR% and siliciclastics – SIL%) in the bed sediments, using the LOI (Loss in Ignition) method. In this sense, a field sediment investigation has been conducted in 58 sampling sites located on the Sf. Gheorghe Arm (km 85 – km 15) (rivers, artificial channels, rectified meanders, including side channels and lakes), during May 2024. The distribution of the organic matter, carbonates and siliciclastics showed a significant spatial variability. The implemented analyses made it possible to distinguish mineral-rich sediments (>15-30%SIL) found especially in river sections, while organic-rich sediments (>15-30%TOM) were mainly identified in lakes. From these outcomes, it seems reasonable to conclude that the sediment deposition and accumulation are strongly influenced by the local hydrodynamic conditions (fluvial and lacustrine environments) which allow the accumulation of a mixture of different sediments. This study enables quantitative evidence related to the main lithological components of the bed sediments within the Sf. Gheorghe Arm (km 85 – km 15), and present a database for future sustainable ecosystem restoration and management measures, to protect and maintain wildlife habitat and biodiversity on the Danube Delta edifice.

Keywords: *bed sediment, Danube River distributary, lithology, meander, organic matter*

1. Introduction

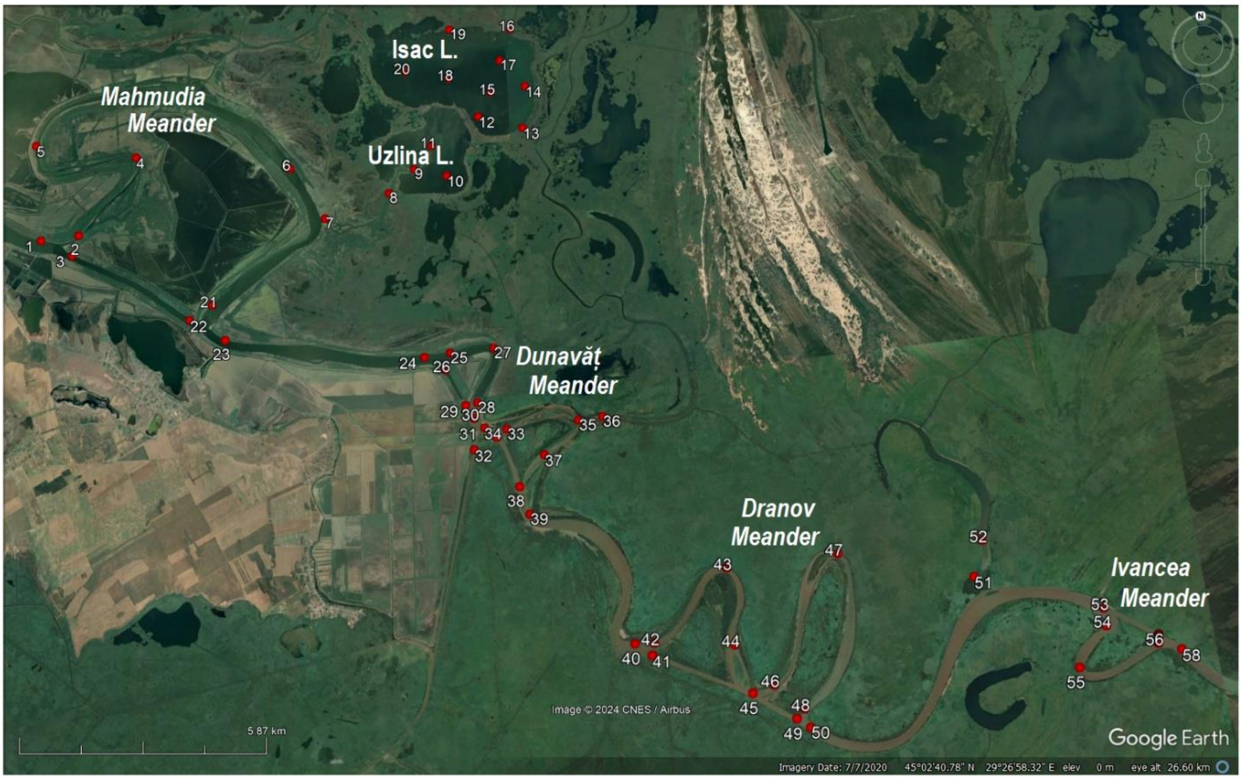
The Danube Delta belongs to a vast European geo-system comprising the Danube River – Danube Delta – Black Sea. Situated in the south-eastern part of Romania, the Danube Delta is the second-largest and the most well-preserved river delta in Europe, with a very complex hydrographic network consisting of the three main distributaries (*i.e.,* Chilia, Sulina, and Sf. Gheorghe), as well as a series of lakes, and natural/artificial waterways used for navigation, drainage or feeding the lakes with water [1]. The Danube Delta is a wide-ranging sedimentary system, so its sedimentation, suspension, and variation of sediments are largely influenced by the Danube River system (freshwater and terrigenous sediment) and the Black Sea environs [2]. Like many other fluvial deltas around the world, shaped and developed in the coastal areas, within a transition zone between marine and terrestrial/aquatic systems [3], the Danube Delta is vulnerable to global environmental change. Past ecological changes issued from human-related activities (*i.e.,* barriers, dams, jetties, meander cut-offs) in addition to climate change issues have had a significant impact on the sedimentary processes within the Danube Delta by disjunction or even interruption of the sedimentary flow [4]. In particular, the Sf. Gheorghe distributary (112 km in length; carrying 22% of the upstream Danube's flow), the oldest arm of the Danube River, has undergone some changes related to its size, lessening to 70 km of navigable water. In the past years, the artificial cut-off plans of the Sf. Gheorghe distributary triggered the process of water discharge and sediment influx among the delta distributaries [2, 5], resulting in a complex interaction between erosion and sedimentation processes. The river's artificial cut-offs play an important role in the long-term-eco-morpho-dynamic and sedimentary evolution of the deltaic landforms, decreasing the downstream supply of sediment load and impacting the sediment interconnectivity between the Danube Delta edifice's main arms and interdistributary depressions. The artificial canals have been eroded severely by bank and bed erosion, while the former meanders will become incrementally sedimented due to the deposition of sediment [6, 7]. Therefore, studies related to the distribution of the water discharge and sediment influx between the former meanders and the artificial man-made canals along the Sf. Gheorghe distributary may express relevant data about the hydrological connectivity and deltaic sedimentary and geomorphological processes [6, 7, 8]. Further, these complementary data and other investigations can be extrapolated to prognoses of the sedimentary evolution and geomorphology, specifically the sediment dynamics of the deltaic landforms of the Danube Delta. This study involved an environmental proxy indicator to identify the lithological characteristics of the investigated surface sediments owing to sedimentary allochthonous and/or autochthonous input sources, along with sediment hydrodynamic conditions.

2. Study area

The anthropogenic meander cut-offs along the Sf. Gheorghe Branch (1984-1988) undertaken for navigational purposes generated incidental consequences related to the distribution of velocities, discharge, and sediment fluxes [1, 6, 7, 8]. Over time, the interventions operated on the meanders to straighten the Sf. Gheorghe Branch for navigational purposes triggered hydro-morphological processes (erosion and deposition) identified in different areas of the meanders. Several sediment samples were collected from the Sf. Gheorghe Branch (km 85 – km 15): *Mahmudia Meander, Uzlina Lake, Isacova Lake, Dunavăț Meander, Dranov Meander, Ivancea Meander etc.*, to identify the longitudinal distribution (along the upstream-downstream gradient) of some specific lithological indicators (Figure 1).

2.1 Sampling and Bed Sediment Analyses

To characterize the bed sediment material, a field sediment survey has been carried out in 58 sampling sites (Figure 1), during a wet season (May 2024), a period characterized by the high-water levels of the Danube River. The field activities occurred at the R/V "Istros" of the National Institute for Marine Geology and Geo-ecology - GeoEcoMar, Bucharest, Romania. The unconsolidated sediment material was gathered by using a Van Veen Sampler (Sampled area: 1000cm^2). The sediment macroscopical description (the main physical characteristics) was performed on board (color, structure, texture, particle size, sorting, stratification, and the presence of lithoclast/bioclast elements). Afterward, the sediment material was inserted into plastic containers (100 g) and stored at a constant temperature (4^{o}C) for the pre-analytic phase and further laboratory testing. The lithological analysis is based on standard techniques and procedures used in general, in sedimentology. The pre-analytic phase was related to the Loss on Drying (LOD) Method, involving the percentage moisture content estimation of the sediment samples, that have been dried at 105^{o}C (Memmert Etuve) [9, 10]. Subsequently, the sediment samples were subjected to sequential heating (Snol 8.2/1100 Laboratory Furnace) at different higher temperatures by the Loss On Ignition (LOI) Method [11]. The total organic matter (TOM%), resulted from heating the sediment samples at 550^{o}C [12, 13, 14, 15]. The quantification of the total carbonates (CAR%), derives from the ignition of the sediment samples at 950-1000^{o}C [16, 17]. The leftover material that remained at the end of the calcination process was ascribed to siliciclastic fraction (SIL%) content. The final results were expressed as percentages of the total sediment sample's mass.



Fig, 1. Map of the study area, viewing the bed sediment samples location

3. Analysis of data, Results and Discussions

The natural aquatic systems are composed of three main components *i.e.*, water, sediment, and biota. These components are in a permanent interaction both with each other, as well as with the environment, in different hydro-dynamic conditions and different energy gradients, which determines specific physical-chemical characteristics. Anthropogenic pressures (agricultural land use, urbanization, wastewater discharge, water quality impairment, chemical pollution, sedimentation, silting etc.) and climate change triggered imbalances in the aquatic environment functions [18]. Specifically, aquatic sediments can contribute to deciphering aquatic ecosystem changes and potentially negative effects, since they are important archives for physical and biological debris, and sinks for a wide spectrum of chemicals [19]. Generally, organic matter, carbonates and siliciclastics are the main components of the aquatic sediments that state their solid fraction [20]. This study focused on the percentage determination of the main lithological components (*i.e.*, total organic matter - TOM%, total carbonates - CAR%, siliciclastic fraction - SIL%) and their spatial accumulation and longitudinal distribution (along the upstream-downstream gradient) in terms of changing hydrodynamic conditions. The investigated areas within this study are quite influenced by the upstream input (freshwater and sediment) transported by the Danube River. The evaluation and interpretation of the total organic matter content results were related to standard classification [21, 22, 23], which presents two main types of sediments: *mineral sediments* (≤15-30% organic matter), and *organic sediments* (≥15-30% organic matter). Forwards, the carbonates content results were compared to the sedimentological classification scheme [24], displaying three main types of sediments: *non-carbonated sediments* (CaCO3≤10%), *low calcareous sediments* (10%< CaCO3≤30%) and *calcareous sediments* (30%< CaCO3≤50%). The lithological analysis results acquired from the investigated sediments showed significant variations of the main physical-chemical parameters (*i.e.*, total organic matter - TOM%, total carbonates - CAR%, siliciclastic fraction - SIL%). The results are synthetically presented in the following sections (including Table 1).

Tab. 1. The percentage contents (%) of the main physical-chemical parameters (TOM%, CAR%, SIL%)

Location	Lithological components of the bed sediments								
	TOM (%)			CAR (%)			SIL (%)		
	Min	*Max*	*Ave-rage*	*Min*	*Max*	*Average*	*Min*	*Max*	*Ave-rage*
Mahmudia Meander *(Sf. Gheorghe Branch, km 85 – km 60)* (n = 9)	***1.04***	***53.21***	***21.84***	***5.93***	***11.78***	***8.9***	***38.98***	***89.69***	***69.26***
Uzlina L., Isacova L. (including associated canals) (n = 13)	***36.73***	***77.94***	***67.14***	***4.24***	***19.69***	***13.23***	***7.51***	***54.6***	***19.62***
Dunavăț Meander *(Sf. Gheorghe Branch, km 60 – km 48)* (n = 16)	***0.54***	***40.39***	***10.58***	***7.14***	***24.71***	***12.26***	***50.23***	***89.49***	***77.16***
Dranov Meander, Ivancea Meander, Erenciuc C., Erenciuc L. *(Sf. Gheorghe Branch, km 42 – km 15)* (n = 19)	***0.33***	***64.09***	***14.06***	***6.62***	***30.74***	***12.39***	***29.29***	***89.45***	***73.55***

3.1 Mahmudia Meander (Sf. Gheorghe Branch, Km 85 – Km 60)

The results of the analyses revealed a spatial distribution of the investigated parameters in the collected sediments, based on the preponderance of the main physical-chemical parameters (TOM%, CAR%, SIL%) (Table 1). In general, the sediment samples gathered from the *Mahmudia Meander*, specifically on the main flow direction of the river (from upstream to downstream) are characterized by a relatively high siliciclastic content (SIL%), with values over 38% of the total dry sediment weight (Table 1) (Figure 2 a). *The siliciclastic content (SIL%)* has values included in a wide range, respectively 38.98 - 89.69 (SIL%), and the average value is 69.26 (SIL%). The highest value, 89.69 (SIL%) was recorded in the station *SG-1-24-P01* (*Mahmudia Meander – Bifurcation – Main Arm*) and the lowest value, 38.98 (SIL%) was observed in the station *SG-1-24-P06* (*Mahmudia Meander – Upstream Uzlina*). *The carbonates content (CAR%)* was variable, being characterized by relatively low values (CaCO3≤10%) estimated from the total dry sediment weight, respectively, values in the range of 5.93 - 11.78 (CAR%), and an average value of 8.90 (CAR%). The highest value, 11.78 (CAR%) was recorded in station *SG-1-24-P04* (*Mahmudia Meander – Bifurcation –Apex 1*) and the lowest value, 5.93 (CAR%) was observed in station *SG-1-24-P03* (*Mahmudia Meander – Bifurcation – Artificial Canal*). *The organic matter content (TOM%)* displayed some higher values (>30% of the total dry sediment weight) in certain investigated samples. Overall, the values belonged to a relatively wide range, namely, 1.04 - 53.21 (TOM%), and an average value of 21.04 (TOM%). The highest value, 53.21 (TOM%) was recorded in station *SG-1-24-P06* (*Mahmudia Meander – upstream Uzlina*), and the lowest value, 1.04 (TOM%) was observed in station *SG-1 -24-P01* (*Mahmudia – Bifurcation – Main Arm*). Based on the results obtained (SIL ≥15-30%; 10%<$CaCO_3$; TOM ≤15-30%, from the total dry sediment weight), the investigated sediments within *Mahmudia Meander (Sf. Gheorghe Branch, km 85 – km 60)* (Figure 3 a), were grouped as mixed sediments, *i.e.*, ***silica-rich sediments***, and subordinately, in *mineral-organic-rich sediments*, without a significant carbonate content (non-carbonate sediments). The relatively higher carbonate content identified in the station *SG-1-24-P04* was attributed to abundant biogenic material (shells, shell fragments and shelly detritus).

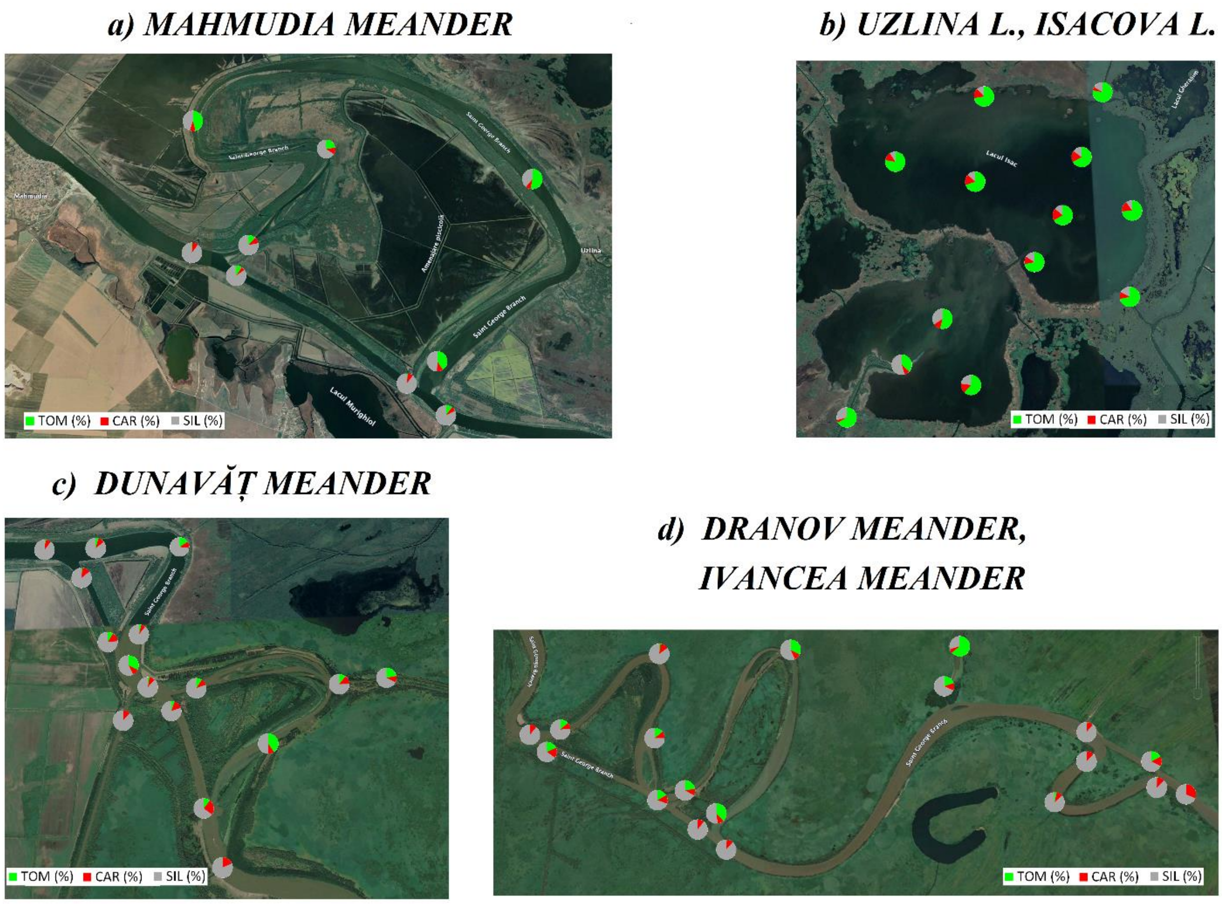


Fig. 2. The spatial distribution of the main lithological components (TOM%, CAR%, SIL%) in bed sediments:

a) *Mahmudia Meander (Sf. Gheorghe Branch, km 85 – km 60)*
b) *Uzlina L., Isacova L. (including associated channels)*
c) *Dunavăț Meander (Sf. Gheorghe Branch, km 60 – km 48)*
d) *Dranov Meander, Ivancea Meander, Erenciuc C., Erenciuc L. (Sf. Gheorghe Branch, km 42 – km 15)*

3.2 Uzlina L., Isacova L. (including associated channels)

The analysis findings revealed a spatial distribution of the investigated parameters in the collected sediments, based on the prevalent percentage of the main physical-chemical parameters (TOM%, CAR%, SIL%) (Table 1). The sediment samples taken from Uzlina L., and Isacova L. (including associated channels) are characterized by a relatively higher organic matter content (TOM%), with values over 36% of the total dry sediment weight (Table 1) (Figure 2 b). *The organic matter content (TOM%)* showed values included in a wide range of variation, respectively 36.73 - 77.94 (TOM%), and an average value of 67.14 (TOM%). The highest value, 77.94 (TOM%) was noticed in station *SG-1-24-P16* (*Isacova L.*), and the lowest value, 36.73 (TOM%) was noted in station *SG-1-24-P09* (*Uzlina L.*). *The carbonates content (CAR%)* fluctuated, being characterized by different values ($CaCO3 \leq 10\%$; $10\% < CaCO3 \leq 30\%$) estimated from the total dry sediment weight, respectively, values in the range of 4.24 - 19.69 (CAR%), and an average value of 13.23 (CAR%). The highest value, 19.69 (CAR%) was recorded in station *SG-1-24-P17* (*Isacova L.*), and the lowest value, 4.24 (CAR%) was observed in station *SG-1-24-P08* (*Downstream Uzlina Canal*). *The siliciclastic content (SIL%)* revealed a relatively wide range of variation, with values of 7.51 - 54.60 (SIL%), and an average value of 19.62 (SIL%). The highest value, 54.60 (SIL%) was recorded in station *SG-1-24-P09* (*Uzlina L.*), and the lowest value, 7.51 (SIL%) was observed in station *SG-1-24- P17* (*Isacova L.*). According to the results obtained (TOM $\geq$15-30%; $10\% < CaCO_3$ and $10\% < CaCO3 \leq 30\%$; SIL $\leq$15-30%), from the total dry sediment weight), the investigated sediments within *Uzlina L.*, *Isacova L. (including associated channels)* (Figure 3 b), were categorized as mixed sediments, *i.e.*, ***organic-rich sediments***, and subordinately, in *organo-mineral-rich sediments*, with a slightly carbonated trace identified in some samples (low carbonated sediments). The relatively higher carbonate content, found in several samples from both lakes (Uzlina and Isacova), was bound to the accumulation of carbonated biogenic material (shells, shell fragments and shelly detritus), as well as fine bioclastic debris which is attached to the sediment mass.

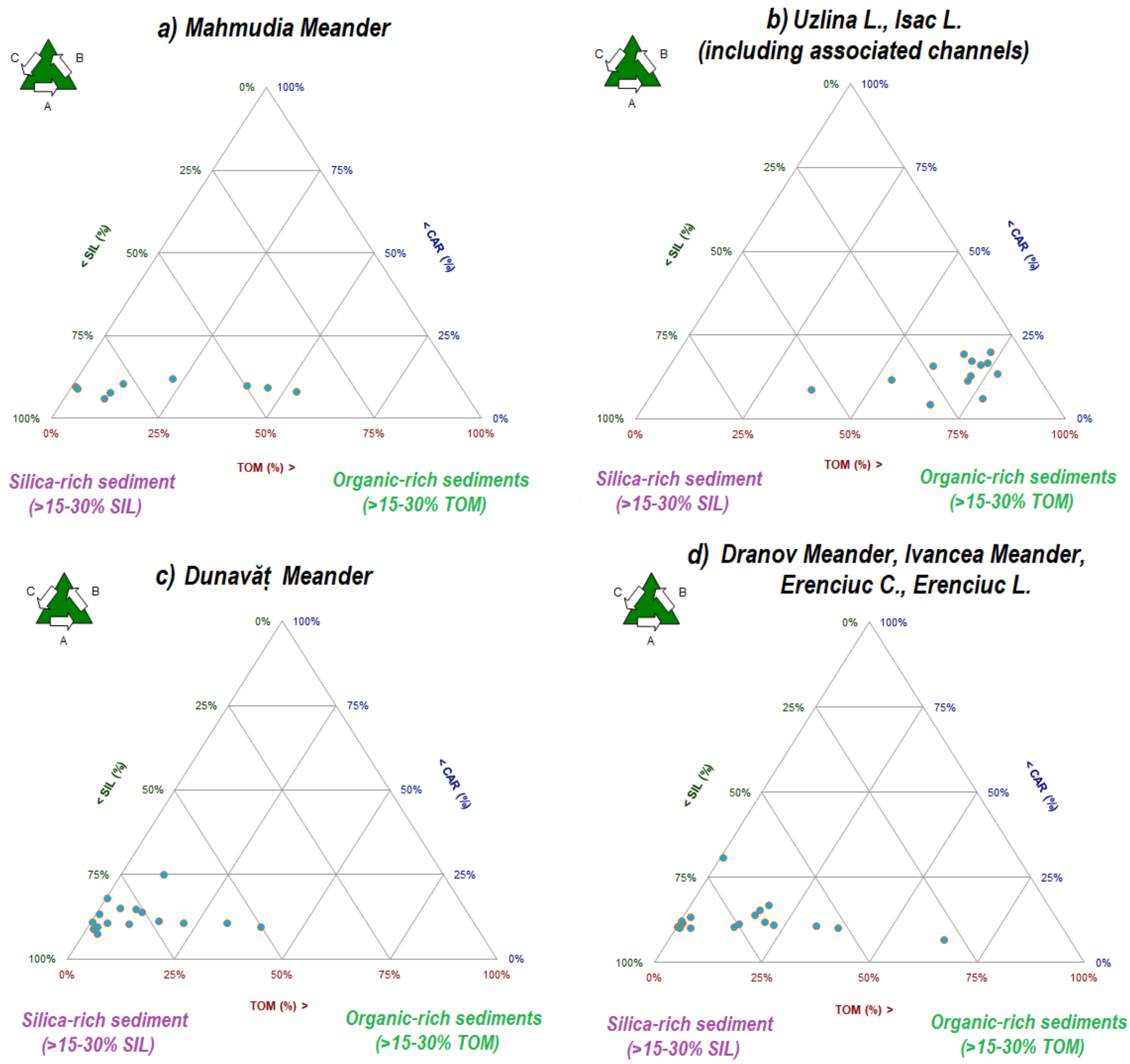


Fig. 3. Ternary diagrams showing the percentage distribution (%) of the lithological parameters:

a) *Mahmudia Meander (Sf. Gheorghe Branch, km 85 – km 60)*
b) *Uzlina L., Isacova L. (including associated channels)*
c) *Dunavăț Meander (Sf. Gheorghe Branch, km 60 – km 48)*
d) *Dranov Meander, Ivancea Meander, Erenciuc C., Erenciuc L. (Sf. Gheorghe Branch, km 42 – km 15)*

3.3 Dunavăț Meander (Sf. Gheorghe Branch, Km 60 – Km 48)

The acquired results showed a spatial distribution of the investigated parameters in the collected sediments, based on the prevalent percentage of the main physical-chemical parameters (TOM%, CAR%, SIL%) (Table 1). Predominantly, the sediment samples collected from the *Dunavăț Meander (Sf. Gheorghe Branch, km 60 – km 48)*, specifically on the main flow direction of the river (from upstream to downstream) are characterized by a relatively high siliciclastic content (SIL%), with values over 50% of the total dry sediment weight (Table 1) (Figure 2 c). *The siliciclastic content (SIL%)* has values included in a wide range, respectively 50.23 - 89.49 (SIL%), and an average value of 77.16 (SIL%). The highest value, 89.49 (SIL%) was recorded in station *SG-1-24-P24* (*Upper Dunavăț M.– bifurcation – Main Arm*), and the lowest value, 50.23 (SIL%) was observed in station *SG-1-24-P37* (*Lower Dunavăț M.– confluence – rectified meander*). *The carbonates content (CAR%)* was changing, being characterized by different values ($CaCO3 \leq 10\%$; $10\% < CaCO3 \leq 30\%$) considered from the total dry sediment weight, respectively, values in the range of 7.14 - 24.71 (CAR%), and an average value of 12.26 (CAR%). The highest value, 24.71 (CAR%) was noticed in station *SG-1-24-P38* (*Lower Dunavăț M.– confluence – artificial canal*), and the lowest value, 7.14 (CAR%) was found in station *SG-1-24-P28* (*Upper Dunavăț M.– confluence – rectified meander*). *The organic matter content (TOM%)* fluctuated between the investigated samples and displayed some higher values (>30% of the total dry sediment weight). Overall, the values were a relatively wide range, specifically, 0.54 - 40.39 (TOM%), and an average value of 10.58 (TOM%). The highest value, 40.39 (TOM%) was recorded in station *SG-1-24-P37* (*Lower Dunavăț M.– confluence – rectified meander*), and the lowest value, 0.54 (TOM%) was observed in station *SG-1-24-P39* (*Lower Dunavăț M.– confluence – Main Arm*). Corresponding to the results obtained ($SIL \geq 15\text{-}30\%$; $10\% < CaCO_3$ and $10\% < CaCO3 \leq 30\%$; $TOM \leq 15\text{-}30\%$, from the total dry sediment weight), the investigated sediments within *Dunavăț Meander (Sf. Gheorghe Branch, km 60 – km 48)* (Figure 3 c), were systematized as mixed sediments, *i.e., **silica-rich sediments***, and subordinately, in *mineral-organic-rich sediments*, with a slightly carbonated trace identified in some samples (low carbonated sediments). The relatively higher carbonate content identified in several samples was linked to carbonate bioclastic debris.

3.4 Dranov Meander, Ivancea Meander, Erenciuc C., Erenciuc L. (Sf. Gheorghe Branch, Km 42 – Km 15)

The lithological results obtained from this perimeter indicated a spatial distribution of the investigated parameters in the collected sediments, based on the prevalent percentage of the main physical-chemical parameters (TOM%, CAR%, SIL%) (Table 1). Broadly, the sediment samples collected from the Dranov Meander, Ivancea Meander, Erenciuc C., Erenciuc L. (Sf. Gheorghe Branch, km 42 – km 15), specifically on the main flow direction of the river (from upstream to downstream) are characterized by a relatively high siliciclastic content (SIL%), with values over 29% of the total dry sediment weight (Table 1) (Figure 2 d). The siliciclastic content (SIL%) has values included in a wide range, respectively 29.29 - 89.45 (SIL%), and an average value of 73.55 (SIL%). The highest value, 89.45 (SIL%) was measured in station SG-1-24-P49 (Lower Dranov M.– confluence– artificial canal), and the lowest value, 29.29 (SIL%) was observed in station SG-1-24-P52 (Erenciuc L.). The carbonates content (CAR%) oscillated, being characterized by different values ($CaCO3 \leq 10\%$; $10\% < CaCO3 \leq 30\%$) calculated from the total dry sediment weight, respectively, values in the range of 6.62 - 30.74 (CAR%), and an average value of 12.39 (CAR%). The highest value, 30.74 (CAR%) was noticed in station SG-1-24-P58 (Ivancea M. – confluence– Main Arm), and the lowest value, 6.62 (CAR%) was found in station SG-1-24-P52 (Erenciuc L.). The organic matter content (TOM%) was included in a wide range of values (>30% of the total dry sediment weight). Largely, the registered values were comprised from 0.33 - 64.09 (TOM%), and an average value of 14.06 (TOM%). The highest value, 64.09 (TOM%) was recorded in station SG-1-24-P52 (Erenciuc L.), and the lowest value, 0.33 (TOM%) was observed in station SG-1-24-P56 (Ivancea M. – confluence – rectified meander). Based on the results obtained (SIL ≥15-30%; $10\% < CaCO3$ and $10\% < CaCO3 \leq 30\%$; TOM ≤15-30%, from the total dry sediment weight), the investigated sediments within Dranov Meander, Ivancea Meander, Erenciuc C., Erenciuc L. (Sf. Gheorghe Branch, km 42 – km 15) (Figure 3 d), were structured as mixed sediments, i.e., silica-rich sediments, and subordinately, in mineral-organic-rich sediments, with a slightly carbonated trace identified in some samples (low carbonated sediments). The relatively higher carbonate content identified in several samples was linked to carbonate bioclastic debris.

The lithological analyses of the bed sediments investigated along the Sf. Gheorghe Arm (km 85 – km 15) (rivers, artificial channels, rectified meanders, including side channels and lakes) has allowed the identification of mixed sediment types. Generally, these types of mixed sediments are the result of the local sedimentation conditions, specific to the transitional fluvial and lacustrine environment, i.e., sediments with a higher content of lithoclastic material – sand, silt, silt, clay, and a subordinate content of organic material. Along with organic and inorganic content, there is an abundant carbonated biogenic material (shells, shell fragments and shelly detritus) The most commonly *found sediment* faunal species were identified as: Anodonta cygnea, Camelea gallina, Cardiidae sp., Corbicula fluminea, Cyclopidae sp., Dreissena polymorpha, Limnaea stagnalis, Limnocardiidae sp., Litoglyphus naticoides, Mytilus galloprovincialis, Ostreidae sp., Planorbarius sp., Polititapes aureus, Tritia neritea, Unio pictorum, Valvata piscinalis, Viviparus viviparus.

Specifically, based on the organic matter (TOM%) and the siliciclastic (SIL%) content (calculated from the total dry sediment weight) the following types of mixed sediments were differentiated:

- ***silica-rich sediments*** (>15-30%SIL). Therefore, 45 samples had higher values (30-100%SIL), and the rest of the 12 samples had lower values (0-30%SIL), by the total number of 57 analyzed samples.
- ***organic-rich sediments*** (>15-30% TOM). Accordingly, 21 samples had higher values (30-100%TOM), and the rest of the 36 samples had lower values (0-30%TOM), by the total number of 57 analyzed samples.

Subsequently, based on the total carbonate content (CAR%) the following types were spotted:

- *non-carbonated sediment* ($CaCO3 \leq 10\%$). In this way, 15 samples had quite very low values (0-10% $CaCO_3$), by the total number of 57 analyzed samples.
- ***slightly carbonated sediments*** ($10\% < CaCO_3 \leq 30\%$). From this perspective, 41 samples had lower values ($10\% < CaCO_3 \leq 30\%$), by the total number of 57 analyzed samples.
- *carbonated sediments* ($30\% < CaCO_3 \leq 50\%$). In this regard, 1 sample had a relatively higher value ($10\% < CaCO_3 \leq 30\%$), by the total number of 57 analyzed samples.

The relatively higher proportion of siliciclastic content (30-100%SIL) can be attributed to the allochthonous source (higher input of alluvial sedimentary material carried by the Danube River), as well as to the high-energy hydrodynamic conditions. The sectors where high concentrations of siliciclastic content were found are linked to natural fluvial, dynamic, active, energetic, dominant conditions of the Danube water, which characterize these areas: Mahmudia Meander, Dunavăț Meander, Perivolovca Stream, Dunavăț C., Dranov Meander, Erenciuc C., Ivancea Meander, etc., and which do not facilitate a significant accumulation of organic material. More than that, the well-aerated/oxygenated waters (high levels of dissolved oxygen content) influence the rate of decomposition of the organic matter (e.g., temperature, moisture, pH etc.). Organic matter decomposes much faster when the waters are well aerated, and much more slowly in "stagnant" waters (less hydrodynamically active conditions).

Otherwise, the investigated sediments that presented a higher content of organic matter (30-100%TOM) were found especially in Uzlina, Isacova and Erenciuc lakes, as well as in other sampling sites. The organic material of autochthonous origin is subject to low-energy hydrodynamic conditions due to the local hydrodynamic patterns of such areas (closed water basins, with small extensions of water, relatively sheltered, with reduced water exchanges, protected from the action of winds and slightly disturbed by the bottom water currents, which are sometimes negligible).

In general, within a deltaic depositional environment, it is possible to encounter a wide and specific spectrum of sediment variants, namely a mixture of different types of sediments (gradual transitions between sediment categories) if they have been accumulated under different hydrodynamic conditions. The sediment deposition and accumulation rate availability are strongly influenced by the local hydrodynamic conditions (fluvial and lacustrine environments) which allow the accumulation of a mixture of different sediments.

4. Conclusion

A field sediment investigation was conducted in 58 sampling sites along the Sf. Gheorghe Arm (between km 85 – km 15) (on the main channel, artificial channels, rectified meanders, including side channels and lakes), to characterize and identify the bed sediment material from a lithological point of view.

The cutoff meander rectifications (natural and artificial) attributed to Sf. Gheorghe Arm (the southern Danube River distributary), left their marks on the general lithology, composition and quality of the bed sediments.

The research allowed the determination of the main lithological content levels (organic matter, carbonates and siliciclastics) in the surface sediments, and implicitly a generic classification of the identified sediment types. Consequently, mineral-rich sediments have been found especially in the river sections, while organic-rich sediments have been mainly identified in the lakes.

From these outcomes, it seems reasonable to conclude that the sediment deposition and accumulation are strongly influenced by the local hydrodynamic conditions (fluvial and lacustrine environments) which allow the accumulation of a mixture of different sediments.

Further analyses are required to gain insights into the interpretation and quantification of sedimentary processes in high-energy fluvial environments, as well as low-energy lacustrine environments.

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