

Channel deposits of submarine fan in abandoned quarry in Wielka Puszca, Beskid Mały Mts. (Outer Carpathians)

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The Beskid Mały Mts. is a part of the Outer Western Carpathians, situated within the Silesian Nappe. This nappe is tectonically partitioned and consists of Upper Jurassic–Neocomian series with a large proportion of shales and Upper Cretaceous–Paleogene series, in which sandstones dominate (Paul et al., 1996; Golonka, 2007). In the study area, the Silesian Nappe is divided into tectonic sub-units. The lower, Cieszyn sub-unit is folded and reveal in a small area. The upper, Godula sub-unit is characterized by predominance a part of sandstones (Konior, 1938; Książkiewicz; 1951, Nowak; 1957).

During Uppermost Turonian–Early Senonian sedimentation in the Silesian Basin was dominated by very thick-bedded, sandy flysch series of the Godula Beds (Godula Formation after Golonka et al. 2008). Within the Western Carpathians the Godula Formation is subdivided into three, lithologically different parts. The lower part is represented by coarse-grained conglomerates and thin-bedded sandstones intercalated by green and black shales. The middle part is developed as thick-bedded sandstones with green and black shales. The upper part is composed of thick-bedded, coarse-grained sandstones with locally developed horizons of conglomerates (Malinowska skała conglomerate). Complete thickness of the Godula Formation in the western sector of the Polish Carpathians is about 3000 m.

Analyzed outcrop is built of thick and medium bedded sandstones (S), muddy sandstones (SM) and conglomerate sandstones (SC) lithofacies (see Ghibaudo, 1992; Słomka, 1995). These lithofacies correspond to the Lower Godula Formation. The sandstones are gray or gray-green, silica–clay. Shales are steel gray, intercalated by cross-bedded, fine-grained sandstones.

Thick - bedded sandstones are usually massive, occasionally parallel laminated and cross bedded. Amalgamated surfaces and normal grading are common. The lower surfaces are sharp, usually uneven, with small load casts. Beds are laterally continuous. There are also a tendency to decrease in beds thickness (positive cycles) and the grain size toward the upper part of the outcrop (Bębenek 2011).

According to the classical theory (Lowe, 1982) these deposits were formed from high/low density turbidity currents. However, the grain size is too large to transport in the suspension, which is the main mechanism of turbidity current (Lowe, 1982). It may suggest that deposits from Wielka Puszca are the result of sandy debris flow sensu Shanmugam (2006).

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