Ber. Inst. Erdwiss. K.-F.-Univ. Graz	ISSN 1608-8166	Band 9	Graz 2004

CRETACEOUS TURBIDITES FROM TRASCAU MOUNTAINS (SOUTHERN APUSENI): SEDIMENTOLOGICAL AND MICROPALEONTOLOGICAL CHARACTERISTICS

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Geological setting

The Cretaceous deep marine deposits from the northern part of the Trascau Mountains form a long (about 9 Km) and relatively narrow band between the localities Petrestii de Jos and Buru. Their thickness is variable, but range generally around 750 m. Eastward, they are in tectonic contact with the Upper Jurassic-Lower Cretaceous shallow water limestones, and in the western part are covered by Cenozoic deposits.

Quaternary erosion cut throuh fine siliciclastic, pelagic and hemipelagic deposits, and the coarse sediments remain as morphologic prominences (fig.1). These coarse deposits represent in fact submarine fan systems (Figs.2, 3) intercalated with deep marine pelagic-hemipelagic deposits (Stow, 1992, Stow et al., 1996).

The sedimentation starts with fine pelagic deposits (mudstones with radiolaria and calpionelids), some tens of metres in thickness. Their age ranges from Middle Berriasian to Valanginian. They are followed by more siliciclastic deposits represented by shales and marls with radiolaria and sponge spicules (Hauterivian-Barremian), and a sequence of deposits which are related to gravitational processes (Aptian-Albian).

Sedimentological characteristics

The morphologic elements of the submarine fan systems are isolated channels, distributary channels, debris flow masses (Fig.4), tabular non-channelized bodies and sheets systems. Channel fill bodies are lens-shaped. They are filled by the coarsest sediment, which includes basal lag deposits, a mixture of carbonate and siliciclastic fragments, bioclast-bearing pebbly sandstones, chaotic deposits and thin bedded turbidites. The tabular non-channelized bodies are composed of well-graded medium to thick bedded classic turbidites, and sheet systems represent fine grained turbidites and interbeded pelagites-hemipelagites.

The vertical succession of these deposits is evidence for the evolution of the basin margin, which transferred sediments into the basin that were more and more coarse towards the top. In the lower part of the succession the channels have small widths (of meter scale), and large erosional incisions (more than 1 meter). They are frequently associated with debris flows. The channel fill consists of centimeter to decimeter sized shallow water carbonate rocks of late Jurassic-early Cretaceous age. The first fragments of metamorphic rocks appear also here. The matrix of debris flows contains both planktonic and reworked benthic microfossils. The siliciclastic input on the carbonate shelf increases towards the upper part of the succession. The change of the shelf environment from a carbonate to a siliciclastic one can be also followed in the test structure of the foraminifers which aggutinate terrigenous clasts in the upper part of the succession. In the same time, this change is marked by the channel geometry: they become more wide (tens of meters) with a meter scale thickness. Their fill is coarse, and predominantly siliciclastic (conlomerates and pebbly sandstones).

The lateral and vertical arrangement of the submarine fan systems is indicative for the existence in the region of point sources, which became active during the tectonic stress or shortly after that.

Micropaleontological content

The age of the turbidites from the northern part of Trascau Mountains could be established on the basis of the micropaleontological content of the shallow water limestone blocks, and on the calpionellid and nannoplankton assemblages from the pelagic-hemipelagic sediments.

Two types of calcareous blocks have been recorded: 1) Tithonian-Berriasian limestones, with *Clypeina* sp., *Thaumatoporella parvovesiculifera* (Raineri), *Bacinella irregularis* Radoicic., *Lithocodium aggregatum* Elliott, „*Tubiphytes*“ *morronensis* Crescenti, *Andersenolina alpina* (Leupold), *Troglotella incrustans* Wernli & Fookes, ?*Everticyclammina* sp. 2). Aptian-Albian limestones and sandy limestones with *Anisoporella*(?) *cretacea* (Dragastan), *Neomeris* sp., *Terquemella* sp., *Lithocodium aggregatum* Elliott, *Bacinella irregularis* Radoicic, *Polystrata alba* (Pfender), *Marinella lugeoni* (Pfender), *Coptocampylodon fontis* Patrulius, *Sporolithon rude* (Lemoine) (Fig.8), *Agardhiellopsis cretacea* Lemoine (Fig.8), *Sabaudia minuta* (Hofker) (Fig.7), *Charentia cuvillieri* Neumann (Fig.6), *Vercorsella hensoni* (Dalbiez), *Vercorsella* sp., *Mesorbitolina texana* (Roemer) (Fig.5), ?*Orbitolinopsis* sp., *Everticyclammina* sp., *Mayncina* sp., *Nezazzatinella* sp., *Novalesia* sp., *Gaudryina* sp., *Glomospira* sp., *Lenticulina* sp. Many of the blocks have a brecciated strucure. In the matrix of the breccia *Hedbergella* sp. and rare ?*Rotalipora* sp. were recorded. We have to stress the abudance of orbitolinids (*M. texana*, an index orbitolinid for the Upper Aptian-Albian) in many of the blocks in the upper part of the succession. This orbitolinid foram also occurs in some coarse sandstones and conglomerates where it agglutinates mostly quartz grains.

The carbonate pelagites-hemipelagites in the lower part of the succession (the so-called „Aptychus beds“) contain an assembage of calpionellids with: *Calpionella alpina* Lorenz, *Calpionella elliptica* Cadisch and *Remaniella* sp.(Figs.9-12) (Middle-Upper Berriasian). On the other hand, the siliciclastic pelagics in the middle-upper part of the succession contain a nannoplankton assamblage (Figs.13-16) with *Assipetra terebrodentarius* (Applegate et al.) , *Eprolithus cf. antiquus* Perch-Nielsen, *Micrantolithus obtusus* Stradner, *Zeugrhabdotus embergeri* (Noel), *Lithraphidites moray-firthensis* Jakubovski, which indicate mostly an Hauterivian-Aptian age.

Taking into account all the micropaleontological data, we can assign the whole succession to the Berriasian-Albian time interval.

Significance

The turbiditic sequence is comprised within the nappe which ovethrust towards east on top of the Oxfordian-Valanginian shallow water carbonate deposits. This nappe is in turn overthrusted from the west by Upper Jurassic-Lower Cretaceous carbonate rocks, or by metamorphic rocks (Baia de Aries nappe). It is difficult to correlate this nappe with the tectonic units separated by Bleahu et al. (1981), Lupu (1983) or Balintoni & Iancu (1986) because of the non-concordant definition of some characteristics of these tectonic units.

The Lower Cretaceous (Aptian-Albian) turbidites from Trascau Mountains mark the start of the meso-Cretaceous tectonogenesis in the Southern Apuseni Mountains, and the end of the carbonate platforms development. During the Late Jurassic-Early Cretaceous, a series of isolated carbonate platforms developed on the volcanic island arc and the shallow water areas adjacent to the continent (Sasaran, unpublished data), These isolated platforms passed laterally to deep intra-arc or back-arc basins. During the meso-Cretaceous tectonogenesis, all these deposits were involved in overthrusting nappes generating a complex structure. The sequence presented in this paper tries to reconstruct the evolution of a back-arc basin which developed during Early Cretaceous (Berriassian-Albian).

References

BALINTONI, I. & Viorica IANCU, 1986 - Lithostratigraphic and Tectonic Units in the Trascău Mountains North of Mânăstirea Valley. D. S. Inst. Geol. Geofiz., vol. 70-71/5 (1983-1984), p. 45-56.

BLEAHU, M., LUPU, M., PATRULIUS, D., BORDEA, S., ŞTEFAN, A. & PANIN, S., 1981 - The Structure oh the Apuseni Mountains. Carp. Balk. Geol. Ass., XII Congr. Guide to Exc. B3, 107p.

LUPU, M., 1983 - The Mesozoic History of the South Apuseni Mountains. An. Inst. Geol., Geofiz., LX, p. 115-124.

STOW, D. A. V., 1992 – Deep – water environments: overview and commentary. In: Stow, D. A. V. (ed.) Deep – water turbidite systems. Reprint series Vol. 3 of the IAS, Blackwell Scientific, p. 279-282.

STOW, D.A.V. READING H.G. & COLLINSON J.D., 1996 – Deep seas. In: Reading H. G. (ed), Sedimentary environments: Processes, Facies and Stratigraphy, 3rd ed. Blackwell