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SEDIMENTARY CYCLICITY IN THE ROCKS FROM ISKAR CARBONATE GROUP FROM THE WESTERN STARA PLANINA AREA – ONE EXAMPLE FROM THE SECTION NEAR RAVNA VILLAGE, MONTANA DISTRICT, BULGARIA

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ABSTRACT. Despite that among the characteristic features of the part of the carbonate rocks from the lowermost part of the Iskar Carbonate Group in the area of Western Stara Planina Mountain, is the displaying of sedimentary cyclicity from different orders, till now specialized characteristic of this cyclicity have been made just in the area of Iskar Gorge. The wide distribution of these rocks in this area, from one hand, and the possibility the study of this aspect to be applied towards the development of detailer and reliable cyclostratigraphical subdivision and the application of this subdivision in the development of the high-resolution correlation scheme, from the other hand, make the study of the sedimentary cyclicity in the rocks from the lower part of the Group especially actual.
The established sedimentary cycles are with thickness from 1.5 to over 10 m, with clear peak in the interval from 4 to 6 m. Despite of some variations in their structure, the bottom of the cycles is dominated by mainly allochemic (clastic, oolitic) limestones, in some places with cross-bedded structure, while mainly in their upper part are established the development of dolomitic limestones and pore dolomites, not infrequently with spotty and flame structure. The analysis of the obtained data permit the interpretation of these cyclicity as Milankovich-type one.

СЕДИМЕНТНА ЦИКЛИЧНОСТ В СКАЛИ ОТ ИСКЪРСКАТА КАРБОНАТНА ГРУПА ОТ РАЙОНА НА ЗАПАДНА СТАРА ПЛАНИНА – НА ПРИМЕРА НА РАЗРЕЗА ПРИ С. РАВНА, МОНТАНСКО

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РЕЗЮМЕ. Въпреки, че сред характерните особености на част от карбонатите скали от най-долната част на Искърска карбонатна група в района на Западна Стара планина е проявата на седиментационна цикличност от различен ранг, специализирана характеристика на тази цикличност досега е правена само в района на Искърския пролом. Широкото разпространение на тези скали в този район, от една страна, и възможността изучаването на този аспект да послужи за разработване на по-детайлна и надеждна циклостратиграфска подялба и прилагането на тази подялба при разработване на високоразрешителна корелационна схема, от друга, правят изучаването на седиментната цикличност в скалите от долната част на групата особено актуална.
Установените седиментни цикли са с дебелина от 1.5 до над 10 m, с един ясен пик в интервала от 4 до 6 m. Въпреки извести вариации в състава им, долната част на циклите се доминира от предимно алохемни (кластични, оолитни) варовици, на места с косослоеста текстура, докато предимно в горната им част се установява присъствието на доломитни варовици до чисти доломити, нерядко с петниста и пламъчна текстура. Анализът на получените данни позволява интерпретирането на тази цикличност като такава от Миланкович-тип.

Introduction

Generally the lowermost part of the section of the Iskar Carbonate Group (ICG) in Western Stara Planina Mountain starts with terrigenous-carbonate rocks (that represent the transition from continental to marine depositional environment) that are covered by shallow marine carbonates. In the studied area the terrigenous-carbonate rocks are presented by the Svidol Formation. These rocks are overlaid by thick alternation of micrite and allochemic limestones and dolomites with Anisian age (Тронков, in: Хайдутов и др., 1995), that are covered by massive dolomites with Ladinian age.

According to Тронков (in Хайдутов и др., 1995) the Anisian in age limestone-dolomite alternation belongs to Mogila Formation (the lower part of this succession) and Babino Formation - respectively its upper part. On the base of geological mapping in scale 1:50 000 Ангелов и др. (1989) propose that these carbonate sequence form another, different from Mogila and Babino Formations unit, that they propose to be named Elovitza Formation. The last one has not the statute of formal lithostratigraphical unit still. The thickness of this unit varies from 300 to 350 m (Ангелов и др., 1989).

The lateral distribution of this sequence is in the Elovitza anticline, part of Berkovitza unit (Western Stara Planina zone of the Balkanides) and is outcropped in two areas – south of Prevala village and between Chiprovtzi monastery (to the west) and Pomezdin and Elovitza villages to the east.

Except some short reports (Тронков, 1983; Айданлийски, Страсер и Тронков, В: Синьовски и др., 2004) the cyclicity in the Iskar Carbonate Group is still poorly studied. In this connection any new data, especially those connected with detailed lithofacial and stratigraphic descriptions of concrete section could be very helpful.

This paper presents some results from the realized specialized detail lithofacial and high-resolution stratigraphic description of part of the Upper Spatian and Anisian part of the Iskar Carbonate Group in the area of Elovitza anticline (Berkovitza unit of Western Stara Planina zone). Object of study is one section of the Iskar Carbonate Group that starts with Svidol Formation and cross the Anisian limestone-dolomite sequence situated on the road Ravna village-Gorna Kovachica village, about 0.5 km NE of Ravna village (Fig. 1). On the basis of detailed field and laboratory lithofacial studies meter-scale cyclicity is established.

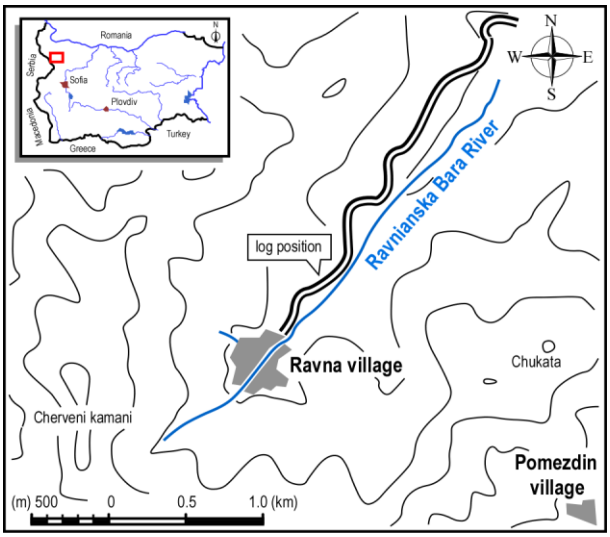


Fig. 1. Schematic map with the position of the studied section

Material and methods

The object of the study is part (about 55 m thick) of the section of the Anisian limestone-dolomite succession that covers the rocks of the Svidol Formation. The lithofacial documentation of the studied succession is based on the Miall (1996) lithofacial approach which was adapted and modified according its specificity of this study. The lithofacieses are documented by abbreviation that contain the rock type (capital letter), followed by the type of the construction components (small letter) and the structure (small letter in brackets). In the cases where there are several types of construction components, they are enumerated according to their quantity.

The lithological determinations of the terrigenous-carbonate rocks are according to the proposed by Султанов (1980) classification. The field color description of the rocks in the section is based on the Rock-Color Chart (1991).

Results

Generally the Anisian limestone-dolomite succession could be subdivided into two parts. In several levels of the lower part it was established limestone-dolomite meter-scale cyclicity that are very similar to those which is typical for the Mogila Formation in the area of Iskar gorge, while for the upper part of the unit is more typical the increasing of the portion of the nodular limestones together with the significant development of dolomites.

Lithofacial characteristic of the cycles

The base of the established cycles represent erosional surface which amplitude is in the range of one to several centimeters (Fig. 2). Macroscopic it was not established gravel-size intraclasts which lithology is similar to the rocks below the erosional surface. As a rule, this surface is covered by allochem and bioclastic limestones (mainly packstones and rare) that in the lower part of the section contain also oolits. The limestones are medium- to coarse-grained, light to medium gray. The structure vary from trough and low-angle cross-bedded (lithofacieses La,b(tr) and La,b(l)), with transition to horizontal lamination (lithofacies La,b(h)) to massive one (lithofacies La,b(m)). Often is observed some increasing of the size of the sets. The nodular and wavy structure (lithofacieses La,b(n-w) and La-m(n)) are also presented but they form thin or uneven beds and lenses. In one of the beds is documented significant amount of well preserved shells (Fig. 2).

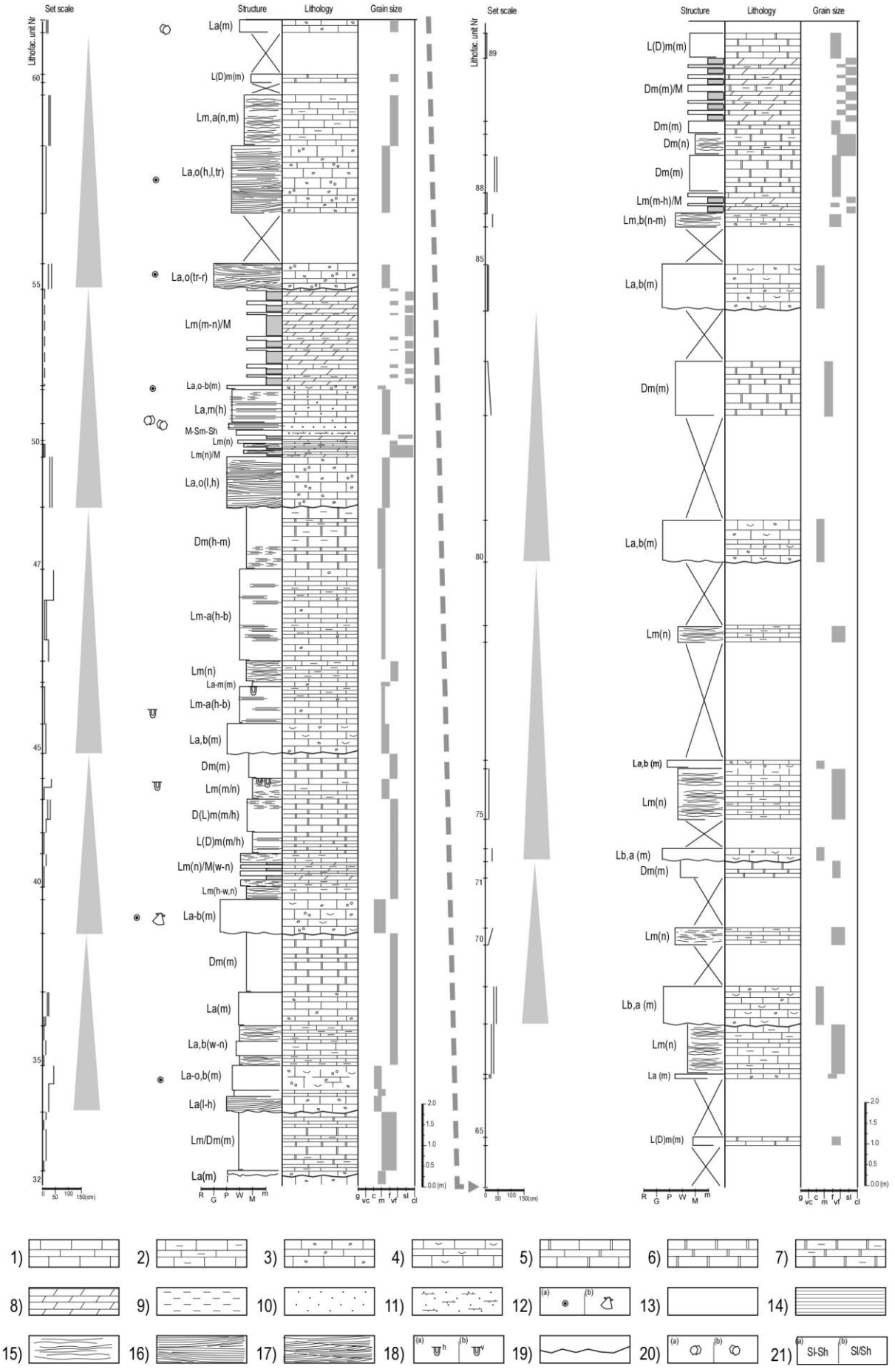
The allochem limestones form as solitary beds as well as packages, which thickness varies from 40-70 cm to over 3 m. This part of the cycles is interpreted as transgressive one.

Over the allochem limestones, in the middle part of the cycles, is build up mainly by irregular alternation of micritic, cleyey and allochemic medium-light grey limestones with episodic development of terrigenous-carbonate and terrigenous rocks. Generally the rocks are finer-grained. The limestones are wack- to mudstones. The packstones, where they are presented forms very thin beds and lenses. Among the structures dominate the nodular, horizontal laminated and massive (lithofacieses La(m), Lm,a(m,h), Lm(m,h) and Lm,a(n)). In some levels slightly to moderate dolomitic limestones are also documented.

The terrigenous-carbonate rocks are presented mainly by marls (lithofacies M) and medium to fine grained limy sandstones (lithofacies Sm). The marls are grayish yellow green (5GY 5/2) to dusky yellow (5Y 6/4), massive, laminated or slightly nodular, thin to medium bedded. In some samples they are slightly silty. In two levels they form packages where alternate with thin bedded micrite (mudstone) massive to nodular, often clayey limestones (lithofacieses Lm(m) and Lm(n)) or dolomicrites (lithofacies Dm(m)). In these both cases the thickness of the allochem limestones from the lower part of the cycles is relative thin.

Other specific feature of this middle part of some cycles is their enrichment of terrigenous mica (Fig. 2).

The nodular micrite to clayey limestones form also the upper part of some of the cycles. In the other part of them, the upper part is dominated by micrite, some times slightly clayey, massive to slightly horizontal laminated grayish orange to grayish orange pink (5-10YR 7/4) dolomites (lithofacieses Dm(m-h) and Dm(m)). Usually the thickness of these beds is about 1-1.5 m and rare can be seen bodies which thickness is less than 50-60 cm.



1) 2) 3) 4) 5) 6) 7)

8) 9) 10) 11) 12) 13) 14)

15) 16) 17) 18) 19) 20) 21)

Fig. 2. Lithofacial log of the studied section. Lithology: (1-5) limestone: (1) pore; 2) clayey; 3) allochemic; 4) biodetritic; 5) dolomitic; (6-7) dolomite: (6) pore; (7) clayey; (8) marl; (9) argillaceous; (10-11) sandstone: (10) pore; (11) limy; (12) other cpmponents– a) oolites and b) well preserved shells. Structures: 13) massive; 14) horizontal lamination; (15) nodular; (16) low-angle cross-bedding; (17) trough cross-bedding; (18) bioturbation – a) horizontal and b) vertical; (19) erosional surface. Mineralogy: (20) terrigenous mica – a) along the lamination and b) chaotic. Lithofacies: (21) – a) transition and b) alternation.

The scale of the described above cycles vary from 1.5 to over 10 m, with clear peak in the interval from 4 to 6 m.

Discussion and conclussions

The structure, composition and the scale of the described above cycles are very similar to the meter-scale one established in the Mogila Formation in the area of the Iskar gorge (Тронков, 1983; Айданлийски и др., В: Синьовски и др., 2004). The vertical changes in the composition of the cycles as the thickness of their allocehmic lower part, development and thickness of packages in which participate carbonate-terrigenous or terrigenous rocks in the middle part of cycles, as well as the degree and scale of dolomite development in their upper part from the other hand could be interpretated as manifestation of larger scale cyclicity, which is established in the Iskar gorge area as well.

The presented above data is just part of more complex study of the cyclicity in the Lower Triassic Series in Western Stara Planina zone, that include the cyclicity in the continental red beds, the transition from terrestrial to marine and shallow marine part of this Series. The results obtained are very preliminary but they gives important information about the possibility the cyclicity in this rocks to be used for solving as some lithostratigraphical problems as well as to be developed more precise and high-resolutional correlational scheme of the Lower Triassic Series in the area.

Recommended for publication by the Department of
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