AGE OF RADIOLARIAN CHERTS IN THE PICHAKUN BASIN (SOUTH-EAST ZAGROS RANGE, IRAN)

GORICAN S. 1, ROBIN C. 2, GUILLOCHEAU F. 2, RAZIN P. 3, MOSAFFA H.R. 4

1Ivan Rakovec Institute of Palaeontology ZRC SAZU, Novi trg 2, SI-1000 Ljubljana, Slovenia – Author: spela@zrc-sazu.si 2Geosciences, Université Rennes 1, 35042 Rennes Cedex, France – 3EGID, Université de Bordeaux 3, 33607 Pessac Cedex, France – 4Geological Survey of Iran, P.O.Box 13185-1494, Tehran, Iran

The Pichakun Nappes are an excellently preserved example of a deep-water Mesozoic basin developed on the southern Tethyan margin. Continuous, Jurassic to Cretaceous successions (up to 600 m thick) consisting of radiolarian cherts, shales and carbonate gravity-flow deposits are beautifully exposed. Because carbonate plankton are absent in these successions and scarce benthos occur only in reworked limestones, radiolarians are virtually the only fossils enabling age determination. Five sections were sampled near Lake Tashk in the Neyriz area. Dating is based on the well-established and widely-used low-latitude radiolarian zonations of Baumgartner et al. (1995), Jud (1994) and O'Dogherty (1994). Radiolarian research was carried out as a complement to detailed sedimentological studies (see Robin et al., this volume).

Several intervals dominated by radiolarian cherts were recognized in the Middle Jurassic to Upper Cretaceous successions (Fig. 1). The oldest package of radiolarian chert is early Bajocian (possibly also late Aalenian) to late Bajocian in age. The late Bajocian age (UA Zone 4 of Baumgartner et al. 1995) was determined near the top of this package and is based on the co-occurrence of Williriedellum marcucciae Cortese with Hexasaturnalis suboblongus (Yao). The Bajocian cherty interval is developed only in distal sections. The overlying deposits are calcareous turbidites with rare chert interbeds assignable to UA Zone 5 (latest Bajocian–early Bathonian) on the basis of Williriedellum tetragonum (Matsuoka).

The Callovian to early Oxfordian (UA Zones 7 and 8) radiolarians were obtained from the distal sections only. The most important species is Striatojaponocapsa conexa (Matsuoka), which last occurs in the UA Zone 7 and was found in the lower part of this interval.

Middle-upper Oxfordian to mid Tithonian radiolarians (UA Zones 9 to 12) characterize the proximal successions. Age-diagnostic species are: Emiluvia ordinaria Ozvoldova and Williriedellum crystallinum Dumitrica (present also at the base of this package), Podocapsa amphitreptera Foreman and Pseudoecyrtis reticularis Matsuoka & Yao (first appearing a few meters above), and Eucyrtidiellum pyramis (Aita) (found at the top). Coeval deposits of the distal successions are shales devoid of determinable radiolarians. This time interval records the minimum of platform-carbonate input to the Pichakun Basin. The upper Tithonian to Berriasian deposits are pure radiolarian chert distally and carbonate gravity-flow deposits proximally, whereas the Valanginian to Barremian interval is characterized by calcareous turbidites in both settings. Around the Barremian–Aptian boundary, shale again predominates. Well preserved radiolarians were found in all sections, in the chert succession as well as in pelagic interlayers within the turbidites. Three assemblages were distinguished, which are successively characterized by the following species: Praeparvicingula cosmoconica (Foreman) with Cinguloturris cylindra Kemkin & Rudenko, Cecrops septemporatus (Parona), and Aurisaturnalis carinatus (Foreman).

Late Aptian and early Albian radiolarians were not recovered from the studied sections. Sediments of this age are apparently missing, because the top of the succession is erosional or truncated locally by a fault.

Albian to Turonian (or possibly Coniacian) deposits were studied at one section only. A middle-late Albian radiolarian assemblage containing Mita spoletensis (O'Dogherty) was found below and above a megabreccia, composed of platform-limestone blocks. Upsection, the succession is poorly exposed and could not be dated. The Turonian–Coniacian age, based on Hemicryptocapsa polyhedra Dumitrica and Annikaella sp., was determined above the base of the overlying calcareous turbidites.
Overall, the Middle Jurassic to Lower Cretaceous succession of the Pichakun Basin correlates well with Mesozoic basins of the western Mediterranean, especially those that were located close to a productive carbonate platform. In these basins the areal extent of radiolarian chert and/or shale was determined primarily by the amount of carbonate supply from the adjacent platforms. The Jurassic intervals with prevailing background sedimentation are roughly synchronous in the Southern Alps (Belluno Basin), Dinarides (Slovenian and Budva basins), Hellenides (Findos Basin) and in the Pichakun Basin. Especially outstanding is the upper Oxfordian to lower Tithonian chert/shale maximum. However, a distinct difference is recorded in pelagic-facies changes just below the Jurassic-Cretaceous boundary. In the Pichakun Basin shales are rather abruptly overlain by pure radiolarian chert, whereas in the more western Tethyan basins a transition from chert to pelagic limestone (biancone or maiolica facies) occurs at this level.

Figure 1. Simplified chronostratigraphic view of lithologies in the studied sections.

References:

Baumgartner P. O. et al. 1995: Middle Jurassic to Early Cretaceous radiolarian biochronology of Tethys based on Unitary Associations. In: Baumgartner P. O. et al. (Eds.) Middle Jurassic to Lower Cretaceous Radiolaria of Tethys: Occurrences, Systematics, Biochronology.- Mémoires de Géologie (Lausanne) 23, 1013-1038.


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