Current status of the Central Paratethys Neogene stratigraphy

Mandic, Oleg (Naturhistorisches Museum Wien, Wien, AUT);
Harzhauser, Mathias (Naturhistorisches Museum Wien, Wien, AUT)

The Central Paratethys (CP) was an Oligocene to Middle Miocene European epicontinental sea settled north of the Eastern Alps, Dinarides and Carpathians and south of the European platform. It was a highly dynamic area due to the ongoing Alpine orogeny, resulting in a quickly changing paleogeography. Its westernmost parts between Munich and Linz became terrestrial already during the Early Miocene, its southern domain was not part of it before the Middle Miocene. Major control on the Neogene paleoenvironmental development in the CP were tectonics driving the evolution of the Pannonian Basin System (PBS), including initiation of the pull-apart type Vienna Basin and the sag type Transylvanian Basin. The PBS synrift phase was generally constrained to the Early and Middle Miocene, its postrift phase occurred during the Late Miocene and Pliocene, initiating the disintegration of the CP. Thereby, its western domain (Pannonian Basin System) turned into a fully isolated long-lived lake, whereas its eastern domain (Carpathian Foredeep - Dacian Basin) became integrated into the Eastern Paratethys (EP), extending eastwards via Black Sea to the Central Asia. During open marine phases, the CP was an embayment of the proto-Mediterranean Sea, connected via the Slovenian and Rhône basin gateways. Consequently, its stratigraphy correlates in the first line with the Mediterranean one. During endemic events the stratigraphic correlation with the EP, increases.

A regional chronostratigraphic system was developed gradually since the 1950-ties to fix the correlation of the various Paratethyan basins. The Early to Middle Miocene interval include five CP stages - Egerian, Eggenburgian, Karpatian, Badenian, and Sarmatian. The Late Miocene to Pliocene interval also include several formalized "CP stages". Currently, these are the Pannonian and Cernikian for the PBS lacustrine successions including the Transdanubian as substage of the Pannonian. The Pontian, Dacian and Romanian stages are confined to eastern Paratethyan basins and therefore, its use in the CP is abandoned.

This regional chronostratigraphic system is deeply rooted in the distribution and occurrence of shallow benthic taxa, such as mollusks and benthic foraminifera. These are especially useful during endemic intervals, but do not allow reliable correlations of basinal settings. Therefore, planktic organisms, such as planktic foraminifera and calcareous nannoplankton in marine settings and dinoflagellates in lacustrine deposits, are increasingly used for intra- and interregional correlations. In addition, geochronological methods including Ar/Ar dating of volcanic ash layers, Sr concentration in fully marine shell material, and beryllium-10 cosmogenic dating for Upper Miocene to Quaternary continental deposits, gained increasing interest. Correlation methods depending on calibration by former constrains include magnetostratigraphy and astronomical tuning, yet they both need long continuous successions being very rare. Finally, sequence stratigraphy proved useful for correlation of eustatic sea-level change with the open ocean, but is potentially overprinted by geodynamics.

This is a contribution to the Scientific Project "Stratigraphy, geodynamic development and paleogeography of the Vienna Basin: a cross-border correlation of data between Austria and Slovakia" (Scientific & Technological Cooperation with Slovakia 2018-19, No. SK 09/2018).