SALTECTA – solni dijapiri i aktivna tektonika srednjeg Jadrana

Korbar, Tvrtko; Kamenski, Ana; Palenik, Damir; Markušić, Snježana; Brunović, Dea; Budić, Marko; Frangen, Tihomir; Navratil, Dražen; Petrinjak, Krešimir; Šumanovac, Franjo; ...

Icriospathodus crassatus (Orchard), *Neospathodus robustispinus* Zhao & Orchard, *Novispathodus abruptus* (Orchard), *Nv. brochus* (Orchard), *Nv.* aff. *brochus* (Orchard), *Triassospathodus* ex gr. *homeri* (Bender), *Tr. hungaricus* (Kozur & Mostler), *Tr.* ex gr. *hungaricus* (Kozur & Mostler), *Tr. symmetricus* (Orchard), *Tr.* aff. *symmetricus* (Orchard), and *Triassospathodus* sp. Based on the dominant occurrence of the species *Tr. symmetricus*, the recovered fauna is attributed to the *Tr. symmetricus* Zone. The absence of some stratigraphically important Tethyan taxa is noted, such as *Icriospathodus collinsoni*, *Nv. waageni*, and *Nv. pingdingshanensis*, which are missing in the Tulcea Veche Quarry, as well as in the Dinarides and Albanides.

ARTHABER, G. von (1906): Die alpine Trias des Mediterran-Gebietes. In: Lethaea geognostica II. Teil, Mesozoicum, Band I, Verlag der E. Schweizerbart'schen Verlagshandlung (E. Nägele), Stuttgart, 223–475.

BALTREȘ, A. (2003): Unitățile litostratigrafice Mezozoice, Pre-Cenomaniene din Dobrogea de Nord. Partea I. Studii și cercetări de geologie, 48, 49–90.

CAVIN, L., GRĂDINARU, E. (2014): *Dobrogeria aegyssensis*, a new early Spathian (Early Triassic) coelacanth from North Dobrogea (Romania). Acta Geol. Pol., 64/2, 161–187. DOI: 10.2478/agp-2014-0010

GRĂDINARU, E. (2000): Introduction to the Triassic Geology of North Dobrogea Orogen – an overview of the Triassic System in the Tulcea Unit and the ammonoid biostratigraphy. In: Grădinaru, E. (ed.): Workshop on the Lower-Middle Triassic (Olenekian-Anisian) boundary, 7–10 June 2000, Tulcea, Conference and Field Trip. Field Trip Guide, Romanian Academy & University of Bucharest, Bucharest, 5–37.

KITTL, E. (1908): Beiträge zur Kenntnis der Triasbildungen der nordöstlichen Dobrudscha. *Denksch.* Kaiserlich. Akad. Wiss., Math.-Naturwiss. Kl., 81, 447–532.

KOLAR-JURKOVŠEK, T., CHEN, Y.-L., GRĂDINARU, E., JURKOVŠEK, B. (2023): Spathian (Lower Triassic) conodonts from the *Tirolites cassianus* beds in Paleotethys-issued North Dobrogea Orogen (Romania). Rivista Italiana di Paleontologia e Stratigrafia, 129/1, 61–74.

PÉRON, S., BOURQUIN, S., FLUTEAU, F., GUILLOCHEAU, F. (2005): Paleoenvironment reconstructions and climate simulations of the Early Triassic: Impact of the water and sediment supply on the preservation of fluvial systems. Geodinamica Acta, 18/6, 431–446.

SĂNDOLESCU, M. (1995): Dobrogea within the Carpathian Foreland. In: Săndolescu, M., Grădinaru, E. (eds.), IGCP Project 369, Comparative Evolution of Peri Tethyan Rift Basins. Central and North Dobrogea, Romania, October 1–4, 1995. Field Guidebook. Geological Institute of Romania & University of Bucharest, Bucharest, 1–4.

SIMIONESCU, I. (1908): Über das Vorkommen der Werfener Schichten in Dobrogea (Rumänien). Verh. k. k. geol. Reichanstalt, 7, 159–161.

SIMIONESCU, I. (1927): Aperçu géologique sur la Dobrogea. In: Guide des excursions, Cultura Națională, Association pour l'avancement de la géologie des Carpates. Deuxième réunion en Roumanie, Bucarest, 353–378.

SALTECTA – SALT DIAPIRS AND ACTIVE TECTONICS IN THE CENTRAL ADRIATIC

SALTECTA – SOLNI DIJAPIRI I AKTIVNA TEKTONIKA SREDNJEG JADRANA

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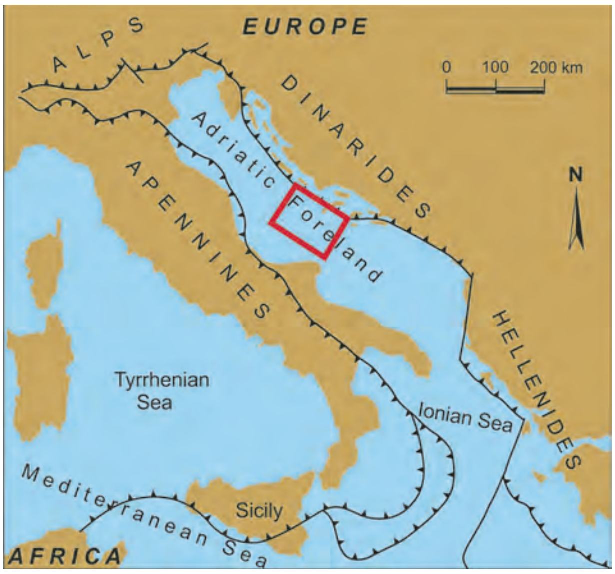
Ključne riječi: *Jadransko predgorje, solna tektonika, dijapiri, kvartarne naslage, potresi*

Srednji Jadran je predgorje dvaju orogenih sustava – Dinarida na sjeveroistoku i Apenina na jugozapadu. Osim velike debljine naslaga, to područje obilježava i specifična predgorska tektonika te brojne solne strukture. Te halokinetske strukture različito su prikazivane na objavljenim preglednim kartama i ilustracijama geoloških profila, a tek sporadično na interpretiranim seizmičkim profilima. Solni dijapiri čine impozantne potpovršinske strukture koje mjestimice izbijaju na površinu i tako utječu na morfologiju (batimetriju) tog područja. Solne strukture srednjeg Jadrana su znanstveno nedovoljno istražene, a nije istraživana niti uzročno-posljedična veza halokinetike i umjerene seizmičke aktivnosti koja obilježava to područje. Pretpostavlja se da je izdizanje soli vezano uz neotektonsku reaktivaciju mezozojskih rasjeda, od kojih su neki vjerojatno i danas aktivni. Projektom se namjerav-



Slika 1. Pregledna geotektonska karta s označenim područjem planiranih istraživanja (crveni okvir)

aju interpretirati najnoviji 2D seizmički profili odobreni od strane Agencije za ugljikovodike (AZU), reinterpretirati gravimetrijski podatci, definirati glavni rasjedi te 3D modelirati geometrija odabranih solnih struktura. Strukturno-tektonski sklop (re)definirat će se na pučinskim otocima srednjeg Jadrana (slika 1). Uspoređivanjem prostornog rasporeda epicentara i hipocentara zabilježenih potresa s interpretiranim geološkim strukturama, pokušat će se razjasniti povezanost aktivne tektonike sa solnim strukturama. Istraživanjem i datiranjem najmlađih (kvartarnih) naslaga pokušat će se definirati neotektonska aktivnost solnih dijapira. Istraživanjem odabranih markantnih (sub)recentnih erozijskih oblika nastojat će se procijeniti prošla i buduća seizmotektonska aktivnost i seizmogeohazardi.

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DEVELOPMENT OF A GEOLOGICAL MODEL OF THE THERMAL SPRING AREA IN DARUVAR USING GEOPHYSICAL RESEARCH

IZRADA GEOLOŠKOG MODELA TERMALNOG IZVORIŠTA U DARUVARU KORIŠTENJEM GEOFIZIČKIH ISTRAŽIVANJA

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Keywords: *ERT, Daruvar hydrothermal system, fault architecture, carbonate complex*

Geothermal energy is one of the renewable energy sources foreseen in the European Union's plans for the green energy transition. Its sustainable utilisation mostly depends on the characteristics of the geothermal resource from which it is extracted. Among others, detailed geological modelling and reconstruction of the subsurface is a key factor for estimating the potential of a geothermal resource. In particular, it is crucial to determine the geometry of faults and fractures since the associated highly permeable damage zones represent a preferential pathway for the circulation of thermal fluids and their uprising (BENSE *et al.*, 2013; FAULDS *et al.*, 2013).

This research focuses on the modelling and reconstruction of the geological and structural settings in the Daruvar thermal spring area using surface geophysical techniques. Electrical resistivity tomography (ERT) was employed to delineate the geometry of resistivity layers in the subsurface. The ERT results were combined with an integrated approach based on the passive Horizontal to Vertical Spectral Ratio (HVSR) method and the active Multichannel Analysis of Surface Waves (MASW) method to map the thickness of the Quaternary cover. The geophysical data were constrained using the stratigraphic logs of wells in the spring area and its surroundings obtaining a 3D reconstruction of the geological setting.

The spatial distribution of resistivity shows relatively low values from 10 to 150 Ωm (Fig. 1). Based on ERT results and the stratigraphic logs of the wells, three resistivity layers/geological units were identified (Fig. 1): (1) the Quaternary alluvial cover with resistivity ranging between 30 and 50 Ωm (layer 1); (2) the Neogene sediments with