Seismic image of the top of Jurassic structure under Polish Outer Carpathians in the zone Southeast of Krakow

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The modeling is a method well supporting seismic research during projecting, processing and interpretation of seismic data. In the presented paper, the multivariate seismic modelling was used for evaluation of influence of changing structure of Carpathian flysch on the seismic image of Upper Jurassic (Malm) rocks. This research investigated Podgrodzie structure in the marginal part of the Outer Carpathian fold-and-thrust-belt. The gas deposits in this area are localized on tectonic uplifts, bounded by thrust dislocations.The complex structure and tectonics of the Carpathian flysch makes the interpretation of seismic image of the reservoir Upper Jurassic carbonates somewhat difficult. The poor recognition of velocities of flysch sequences makes this interpretation even more difficult. The multivariate seismic modelling is necessary in this situation. It allows evaluation of influence of selected model elements of the originating wavefield. It is possible finding the model correctly approximating investigated orogen by matching registered and theoretical field. The Outrider (*Divestco Inc*.) and Omega (*WesternGeco)* system were used for offset and zero-offset modelings. The performed modelling shows that influence of changing velocity and geometry of reflecting boundaries on underlying stratigraphic stages is insignificant. This influence is only significant in the zones of steep dipping flysch layers where large horizontal contrast of velocity significantly influences the seismic image of Jurassic rocks. Outside these zones the seismic image of the top of Jurassic reliably restores the real boundary. The obtained results show that the multivariate seismic modeling is a method, which can be used with good results, under the complex seismogeological conditions. The modelling could be also helpful evaluating the reliability of register seismic data.

On the link between the formation of the Pannonian basin and the extensional collapse of the Dinarides

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Classical models of evolution in the Alps-Carpathians-Dinaridic domain assume that the formation of the Pannonian back-arc basin is related to the rapid roll-back of European slab and the invasion of the Tisza-Dacia and Alcapa upper plate blocks into the so-called Carpathians embayment starting at ~20Ma. The general mechanism assumes a gradual evolution, an initial mechanical phase of extensional detachments being recognized near the transition between the Alps and the Pannonian basin, which was subsequently followed by upper crustal normal faulting and a thermal phase during the Middle-late Miocene, observed in the central part of the Pannonian basin. Hence, an always standing contradiction existed between the limited amounts of extension recorded in the crust and the large scale astenospheric upraise which took place beneath the basin centre. This apparent contradiction can be mechanically resolved by the existence of large scale extensional structures in other areas neighboring the Pannonian basin, such as the Dinarides. These structures can be large scale extensional detachments, unroofing the footwalls over the orogenic structures of the Dinarides and collapsing the hanging-walls in the area of the Pannonian basin. Our study demonstrates the existence of three such major extensional detachments in the central Serbian

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part of the Dinarides, at the transition towards the Pannonian basin. These Miocene detachments were mapped and dated in the areas of the Cer, Bukulja and Fruska Gora Mountains and in all cases follow a major weakness zone, inherited from the Cretaceous-Paleogene stage of mountain building, i.e the contact between the Dinaridic upper plate (Tisza-Dacia) and lower plate (Adria) along the Alpine Tethys (Sava) subduction zone. The footwall of these detachments exhume Jadar (Adria) basement and its Triassic-Jurassic cover (including obducted ophiolitic zones), altogether metamorphosed during previous phases of Cretaceous and/or Eocene crustal shortening. Detachment zones seem to be developed mainly in the Late Cretaceous-Eocene flysch of the Sava zone, which can be found metamorphosed in their footwall and non-metamorphosed in their immediate hanging-wall. The regional hanging-wall of these detachments is in all cases the Pannonian basin with its observed upper crustal extensional structures. In Cer and Fuska Gora Mountains these accommodate a Middle-late Miocene normal faulting, while the Bukulja detachment accommodate the formation of the lower Miocene Morava basin (or "peri-Pannonian" depression). By correlating these observations with other recent research in areas of Southern Serbia and Bosnia-Croatia, an overall image of large scale extensional collapse along detachment zones is observed along the entire central and internal Dinarides during the Miocene. Therefore, a full mechanical explanation can be provided for the Pannonian basin extension by incorporating this Dinaridic collapse. Two directions of extension were observed by field kinematic mapping, and initial Early-Middle Miocene top-N was followed by subsequent Middle-late Miocene top-E direction of extensional movement. While the second direction of movement is compatible with the invasion of the Tisza-Dacia block into the Carpathians embayment, the first might alternatively suggest the existence of a phase of Dinaridic extension driven by the roll-back of an Adriatic slab, prior to its detachment somewhere after the late Miocene.

The Early Miocene Carnivores from Sabuncubeli, Turkey

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Thanks to collobarative studies that have started from 1970's, numerous Early Miocene localities that have produced abundant micromammal fossils were found in Turkey. These micromammal fossil discoveries have added greatly to our knowledge in terms of distribution and paleoecology of these taxons. However, due to substantial sampling and collecting bias against macromammals, only very limited and somehow diverse artiodactyl fossils from the localities Hancili (MN1), Harami (2), Kilcak (MN1), Keseköy (MN3b) and Semsettin (MN4) are the total findings. This case has changed as a new locality, Sabuncubeli, which is situated along the road between the village of Sarnic and Sabuncubeli crossroad, 15 km NW of Izmir, was exposed near a small valley after an artificial cutting for the construction of the road in 1998. Collecting procedure from fine conglomerate lenses during 2000-2006 yielded numerous carnivore and relatively rich artio and perissodactyl fossils. Based on its previously collected micromammal assemblages, Sabuncubeli fauna is dated as Early Miocene (MN3a). Here, three new and three common taxa of carnivorous mammals from Sabuncubeli will be described.

The carnivore fauna comprises of an amphicyonid (*Cynelos* nov.sp.), a procyonid (*Broiliana* nov.sp.), three viverrids (Viverridae, new genus, new species; *Euboictis aliveriensis*, *Semigenetta elegans*), a mustelid (*Palaeogale* sp.) and undetermined Felidae which can not be yet formally assessed to any genus. European originated *Cynelos* is the widespread genera common to localities around Eurasia, Africa and America throughout Early-Middle Miocene. The new Sabuncubeli *Cynelos* has common similarities with *Cynelos macrodon*, *C. helbingi* and *C.bohemicus*, but has proportional as well as morphological differences in dentition. So far, *Euboictis* is a unique faunal element which has a sole record from the middle Orleanian (MN4) locality of Aliveri, Evia Island, Greece. For the first time, Sabuncubeli fossils provides lower dentition of this genera which remarks on the affinities between *Euboictis* and *Sivanasua* ssp. The oldest procyonid *Broiliana* is not a common

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