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Preface: Special issue - The Alps as part of a larger system of Circum-Mediterranean orogens: papers presented at the 13th Alpine Workshop held in Zlatibor (Serbia)

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This Special issue of Swiss Journal of Geosciences encompasses a series of papers that were presented at the 13th Workshop on Alpine Geological Studies (Emile Argand Conference sponsored by EGU), held in Zlatibor (Serbia) located in the Dinaridic ophiolite belt. The Alpshop 2017 was organized by members of the Faculty of Mining and Geology from the University of Belgrade, with the support of the Serbian Geological Society and the Serbian Academy of Sciences and Arts. The conference was held on September 7th–18th 2017, and the plenary sessions were accompanied by pre- and post-conference field trips. After Sopron (2003), Opatija (2005) and Corsica (2011) this was already the fourth time the Alpine workshop was held outside the Alps proper. Namely, it is felt necessary to occasionally leave the genuine Alpine domain, because the Alps are part of a larger system of Circum-Mediterranean orogens straddling between Spain and Western Turkey.

The main idea of the organizers of the 13th Alpshop was to revisit our present day knowledge about the Circum-Mediterranean orogens but this time with a perspective from the Dinarides. With 100 participants from 26 countries, six sessions could be realized. They covered many aspects of geological research: (1) micropaleontology, stratigraphy and facies, (2) Triassic to Neogene tectono-stratigraphy, (3) tectono-magmatic and metamorphic response during Alpine-Carpathian-Dinaride orogenesis, (4) collision and post-collision geodynamics in the Alpine-type orogens of the Alps–Carpathians–Dinarides–Hellenides and (5) active tectonics and geophysical imagery of orogenic belts. During two pre- and one post-conference excursion the participants had the opportunity to exchange field work experience and learn more about the intriguing geology of the Dinarides. Out of a wide spectrum of presentations, the 14 contributions briefly commented below have been successfully submitted, many of them authored by young researchers.

A first paper by *Winterberg and Willett* analyses the evolution of Danube, Rhine, Rhône and Po river systems, applying the latest state-of-the art methods. The authors argue that the Danube has lacked erosional power throughout its history and has therefore been victim to capture and area loss. They show that ongoing capture in the Alps is related to events that took place far away from the Alps, such as the formation of the Pannonian basin and the Carpathian loop that was cut by the Danube at the Iron Gate at the Serbian-Romanian boundary.

The following two papers deal with the Eastern Alps. *Oswald* et al. present a case study from the Northern Calcareous Alps, elaborating in detail how Jurassic-age rift-related graben shoulders did influence the geometry of thrust-related structures during thrusting of the Lechtal nappe over the underlying Allgäu nappe. Shortcut thrusts that cut across the footwall of former normal faults due to its unfavourable angle for inversion cause complex geometries. The authors argue that such situations are likely to be also encountered in other geological settings. *Griesmeier* et al. present a detailed study of the contact area between a Cretaceous eclogite facies tectonic unit (Koralpe-Wölz nappe system) and originally overlying low-grade metamorphic units (Drauzug-Gurktal nappe system) located south of the Tauern Window and north of the Periadriatic line. Their careful study for the first time clearly discriminates between faults formed during Late Cretaceous exhumation of the eclogitic units and those formed in Oligo-Miocene times and related to N-directed

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indentation of the dolomites and exhumation of the Tauern Window.

The next group of five papers "moves" eastward to the West Carpathians, the Pannonian basin and crystalline basement units belonging to the Tisza and Dacia mega-units located east of the Pannonian basin and the Dinarides. *Plašienka* et al. present a petrological study of the Meliaticum s.l., a heterogeneous and often chaotic mélange-type assembly that constitutes a mid-Jurassic accretionary wedge. The mélange contains blueschist facies slivers and blocks metamorphosed in the late Jurassic, and, amongst other lithologies, blocks derived from the enigmatic Meliata Ocean representing a Triassic age part of Neotethys. The authors also show that glaucophanite pebbles of Meliata origin were most probably reworked in Albian–Cenomanian flysch formations of the Pieniny Klippen Belt (Klape Unit), thereby solving a longstanding controversy about the origin of such exotic high-pressure pebbles. *Sebe* et al. investigate syn-rift deposits in the Mecsek Mts. in SW Hungary. Applying a tectono-sedimentary approach, using stratigraphy, paleontology and structural observations, the authors constrain paleo-environment and tectonic background. They show that a rift-related phase of lacustrine deposition in the Carpathian–Early Badenian (late Burdigalian–early Langhian) preceded flooding caused by Paratethys transgression in the Badenian (Langhian). *Reiser* et al. shed new light on the polymetamorphic overprint (Pre-Alpine and Alpine) of basement complexes in the Apuseni Mountains and easterly adjacent Rodna Mountains, largely based on electron-microprobe U–Th–Pb dating of monazite. They show that the effects of Cretaceous (Eoalpine) metamorphic overprint of the Alcapa mega-unit formerly extended further eastwards into the boundary area between the Tisza and Dacia mega-units. *Jovanović* et al. present new LA-ICP-MS zircon U–Pb data as well as major and trace element analyses from the Variscan granitoids that intrude the basement of the Getic and Danubian nappes of the East Serbian Carpatho-Balkanides. The granitoids of the Getic unit reveal high-quality concordia ages suggesting that magmatism post-dating syn-collisional Variscan granitoids lasted longer than previously thought, namely until Early Permian times. *Mladenović* et al. report a paleostress study based on brittle fault analysis, also located in the East Serbian Carpatho-Balkanides. An older Oligo-Miocene phase of deformation was triggered by the activation of faults accommodating clockwise rotations of the Dacia mega-unit around the rigid Moesian promontory. A younger phase is interpreted to result from the far-field stress generated by the ongoing collision of the Adriatic microplate with the Moesian promontory affecting the Getic nappe located in between.

Another group of five papers is devoted to the Dinarides. *Rožič* et al. analyze Mid-Jurassic mega-breccias that are possibly connected to the initiation of intraoceanic subduction within the Neotethys in order to reconstruct a platform-basin transitional zone between the Dinaridic (Adriatic) platform and the northerly adjacent Slovenian basin. This zone of transition is no more exposed due to Miocene overthrusting of the eastern continuation of the Southern Alps over the northernmost Dinarides. *Kapuralić* et al. present a geophysical study using local earthquake tomography in the boundary area between the northern Dinarides and the adjacent Pannonian basin in a larger area that encompasses northern Croatia, southern Slovenia and western Bosnia and Herzegovina. The authors add new constraints regarding Moho-depth and P-wave velocity structure within the Dinaridic and Pannonian crust. The paleomagnetic study by *Lesić* et al. carried out in the West Vardar and Jadar-Kopaonik units of central Serbia fills an important gap regarding the complex pattern of vertical axis rotations that occurred during Late Cenozoic times in the Peri-Pannonian realm. They propose 30°–46° clockwise vertical-axis rotation of the units in the study area, i.e. opposite to the well documented counterclockwise vertical-axis rotation of Adria. *Porkoláb* et al. present a detailed structural study, combined with K–Ar dating of illite, on the Drina-Ivanjica tectonic unit directly underlying the obducted West Vardar ophiolites. In the area adjacent to the ophiolites, they document an earlier phase of deformation related to Late Jurassic to Early Cretaceous top-W to –NW ophiolite obduction, preceding syn-collisional latest Cretaceous to Paleogene deformation, locally associated with top-NE back thrusting. *Bragin* et al. report the results of a micropalaeontological analysis of radiolarites from a sub-ophiolitic mélange formerly underlying obducted West Vardar ophiolite that is no more preserved due to erosion. The presence of blocks of Triassic as well as of Jurassic age within the same mélange is typical and diagnostic for mélanges found elsewhere beneath obducted West Vardar ophiolites in the Dinarides. This allows for better constraining the exact location of the Sava suture in the broader Belgrade area.

A micropalaeontological study of radiolaria from a mélange is also presented by *Ozsvárt* et al., this time from a large block confined within a sub-ophiolitic mélange related to the obduction of the Cretaceous Mersin ophiolite near Adana in Turkey. A rich fossil assemblage provides new data on the diversity of the Tethyan radiolarian fauna during the Late Carnian and contributes to a better understanding of the Mesozoic geodynamic evolution of the Mediterranean region.

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