# Triassic rift-type basalts and related deep-water sediments in the western ophiolite belt of the Hellenides–Dinarides (from Othrys Mts., Greece to Darnó Hill, NE Hungary)

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The lecture provides characteristic phenomena, selected among others, which gives a way to recognition of the extension, intensity, and time span of the advanced rifting, one of the longest time periods in the Alpine Wilson cycle.

Triassic rift-related magmatism was dominantly intermediate in character. It produced basalts, andesites and dacite at the extrusive level, and gabbro, diorite, granosyenite and granite in the intrusive levels and lasted at least 40 to 50 Myrs. It is spatially and genetically related to the volcano-sedimentary formation as the foundation of the Gondwana passive continental margin and later on totally covered by the Mesozoic carbonate platform sediments. The spatial extension can be traced along the whole Alpine-Himalayan orogenic belt. Its equivalents in time, on the Euroasian diverging margin, are not easily recognized. They were subjected to long-term destructive, subduction related processes, during convergence, since the Jurassic to the Early Cretaceous. The intensity of the magmatism ceased with the opening of the Tethys, and accompanied ophiolite formation, a result of sea-floor spreading. Study of Triassic magmatism and its products, including ore deposits, is a key to palinspastic interpretation and geological evolution of the Tethys.

Triassic rift-type basalts associated with deep-water sediments of usually red colour are common constituents in the melanges of the western ophiolite zone of the Hellenides–Dinarides, extending from Othrys Mts. and Northern Pindos Mts. (Northern Greece) to the Medvednica and Kalnik Mts. (NW Croatia), then displaced along the Mid-Hungarian Zone up to the Darnó Hill and western Bükk Mts. (NE Hungary). They form meter to kilometer-sized blocks in the mélanges. Pillow basalts are reddish or greenish in colour, usually amygdaloidal, with a characteristic “peperite facies”, in which basalts are mixed with red, normally limy sediments. They are geochemically of various types: WP, MOR or even IA. Associated sediments are red Hallstatt-type limestones, red radiolarites and red Bódvalenke-type cherty limestones representing transitional facies between them. Biostratigraphic data (conodonts, radiolarians) show Late Anisian to Lower-Middle Norian age of this volcanism, but in the Northern Pindos Mts. even Late Scythian data were found. These blocks occur in a

Jurassic-Cretaceous accretionary mélange zone and bear witness of the the advanced rifting in the NW-part of Neotethys.

The complex lithostratigraphy of the Triassic formations, including sediments and magmatic rocks, supports existance of Advanced rifting processes, at the former passive continental margin of Gondwana, but deny creation of the Oceanic crust in the Lower and Middle Triassic time, in the Neotethyan evolution.

## Triassic pillow lavas on the head of the obduction front of the Zlatibor Mt. ophiolite, SW Serbia

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The Tethyan evolution in Dinarides includes rifting, sea-floor spreading, ophiolite genesis and emplacement, mélange accretion, ocean basin closure and collision. Advanced rifting of Adria (Gondwana) in Triassic time opened a deep rift basin but still not floored by oceanic crust. The basin was intensively filled up by volcano-sedimentary successions; deep water carbonates, clastics, cherts, and extensive basaltic magmatism, with spilites and keratophyres, preferentially as lava flows and pillow lavas. The intra-oceanic subduction and consequent obduction of the two colliding oceanic crusts, after reversal from extension to compression regime, created bulldozing effect on the head of the obducting ophiolite front. The incorporated deep-water formations, underwent different degree of metamorphism and turned into the diabase-chert formation. This feature along the obduction ophiolite front from the Zagorje-Mid-Transdanubian megaunit, to Dinarides, Albanides and Helenides, and up to the Zagros ophiolites, with due delay in time, is a common large-scale phenomenon. Recognition of peperite facies within pillow lava complexes, with its paleontological records in the sedimentary part, gives an efficient tool for distinction of the sea-floor pillow lavas (ophiolites) from those rift-originated, which usually stacked together in the mélange.

The abstract deals with peperite in pillow lavas sampled at the Bistrica locality, on the road Prijepolje-Priboj, near to the dam where Bistrica rivulet flows into the Lim river, at the southern slopes of Zlatibor Mt. At the locality, the diabase-chert formation consists of sliding and gravity mass flows of unconsolidated, chaotically distributed rocks, m-sized blocks of sandstones, siltstones, claystones, m-km sized olistolith/olistoplakes of Jurassic and Triassic limestones. Magmatic rocks are represented by diabases and spilites (olistoliths, flows, “pillow” lavas etc.), gabbros, ultramafics (harzburgites, serpentinites). The ultramafics of Zlatibor Mt. lie over Ophiolite mélange. North of Bistrica rivulet, at confluence into the Lim River, the terrain is built of ultramafics, lherzolite, amphibolites, epidot-amphibolites, eclogites, gabbro-amphibolites and metamorphosed diabases, shists, metasandstones, etc. On the road between Bistrica and Pribojska Banja, the mélange contains massive amphibolites and amphibolite schists with corundum and garnet. The amphibolites are a product of Jurassic subduction and exhumation during the collision and tectonic emplacement. The pile of pillow lavas stacked together with ultramafics and amphibolites, has been interpreted as a dismembered ophiolitic unit. It consists of m-sized lobs, closely spaced pillows, with accommodation emplacement and younging upward. The chilled, dark green, chloritized rims separate the green, gray and reddish, densely spaced lobes. The peperites, made of pink micritic limestone within highly contorted lobs, contain small but diagnostic conodont fauna: *Paragondolella tadpole* (Hayashi), CAI, medium light gray, 61/2, Triassic in age from the Cordevolian to the Lower Tuvalian. The peperite facies, within a huge pile of pillow lavas corroborates rifting magmatic activity in Triassic time, and supports obduction of oceanic crust on the elements of the passive continental margin, including volcano-sedimentary formations with basalt extrusives.