The Alps and the Apennines presently form two independent and adjacent segments of the Alpine orogen. They have opposite tectonic vergence, W/NW for the Alps, and E/NE for the Apennines, both oriented roughly perpendicular to their arcuate trends. The junction area of the two chains is characterised by tectonic domains (MOLLI et al., 2010) resulting from the kinematically complex interaction between the opposite dipping subductions active in the last 30 Myr, i.e. east-southeast "alpine" and west-northwest "apennine". At the junction deformation is represented by extensional fault system and basins development overprinting distributed, crustal-scale contractional structures and widespread block rotation.

Our understanding of the tectonic evolution of this junction can take advantage of comparisons with modern convergence systems such as the Ryukyu-Taiwan, Southern Chile-South Sandwich, Colombia-Lesser Antilles, Hikurangi-Puysegur, Manila-Philippine, New Guinea-Solomon-New Hebrides. In these other modern systems we can identify tectonic architectures controlled by both the structural association and the relative evolution of single structures and basins.

Here we analyse the differences of structural/tectonic evolution of junction areas as a function of the ways that plates kinematically interact. We also present the Alpine-Apennine junction as a key area to understand the dynamics of crustal evolution of interfering convergence systems.

MOLLI, G., CRISPINI, L., MALUSÀ, M.G., MOSCA, P., PIANA, F. & FEDERICO, L. (2010): Geology of the Western Alps-Northern Apennine junction area: a regional review. In: (Eds.) Marco Beltrando, Angelo Peccerillo, Massimo Mattei, Sandro Conticelli, and Carlo Doglioni, Journal of the Virtual Explorer, volume 36, paper 10, doi: 10.3809/jvirtex.2010.00215

Low thermal evolution of the Southern Veporic Unit crystalline basement (Central Western Carpathians) constrained by new fission track data

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New thermochronological data, combined with a previous one and geological knowledge enable to constrain the Late Cretaceous to Neogene tectono-thermal evolution of the southern zone of Veporic crystalline basement. Presented zircon and apatite fission track (FT) data can be correlated with sixth principal tectono-thermal stages. During the late Early Cretaceous period (TS1; ~120–90 Ma), the Veporic crystalline basement was buried below the palaeo-Alpine nappe stack in the depths of ~20–30 km and suffered a greenschist- to amphibolite-facies metamorphic overprint (~350–600°C and ~500–800 MPa). The Alpine metamorphism culminated with maximum temperatures at ca. 120–90 Ma and cooled below the 40Ar/39Ar blocking temperature on mica mostly between 90 to 80 Ma ago. After burial an orogen-parallel extensional exhumation and unroofing of the Veporic domain occurred during the Late Cretaceous to Palaeogene (TS2; ~90–35 Ma). The exhumation of the Veporic domain is documented by zircon FT ages of 75–71 Ma and apatite FT ages of 63–55 Ma, indicating a "rapid" cooling phase during the Late Cretaceous to Palaeocene followed by moderate cooling phase from the Palaeocene to Early Eocene. The exhumation of the Veporic domain continued till the Late Eocene–Bartonian, as it was revealed by preservation of its erosion level due to transgression of the Late Eocene sediments. The Late Eocene to Early Miocene period (TS3; ~35–20 Ma) is related to burial beneath the Upper Eocene to Oligocene strata. The Oligocene sedimentary sequences with thickness less than ~1.5–2.0 km were deposited on uncovered Veporic crystalline basement with only minor indication of reheating. The Early to Middle Miocene period (TS4; ~20–13 Ma) is characterized by uncovering of the Veporic domain after the deposition of the Late Palaeogene to Early Neogene sedimentary sequences. The Early to Middle Miocene denudation of the Veporic domain almost completely removed the Palaeogene sedimentary sequence before the creation of the Sarmatian Veporic volcano-plutonic complex. The obtained apatite FT data of Palaeogene cooling ages from the Slávča and Hrdzavá valleys near the Tisovec intrusive complex revealed that the wider area was not regionally reheated by the mid-Miocene thermal event. The volcanic activity at the centre of the Veporic volcano-plutonic complex occurred during the Middle Miocene (TS5; ~13–11 Ma), according to $^{40}Ar/^{39}Ar$ dating results. The mid-Miocene thermal event was revealed also by zircon FT age of 13 Ma. However, the extent of contact aureole did not exceed more than 1 km, according to maintain of low-thermal Palaeogene record in its neighbourhood. The final exhumation of the Veporic domain occurred in the Neogene to Quaternary times (TS6; ~11–0 Ma). An intensive denudation processes were documented by removing of at least the 1500 m of volcano-sedimentary rocks of upper stratovolcanic structure (cone) during the last 10 Ma. In addition, preservation of the planation surfaces suggests a relatively young (Pliocene and Quaternary) but most probably not so intensive exhumation of the mountains.

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Permian metamorphism and magmatism in the internal Western Alps: Constraints from high spatial resolution U-Th-Pb geochronology

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Evidence of the late Paleozoic HT-evolution in the Western Alps remains a controversial issue. As in other parts of the Alps, magmatic and metamorphic effects in the basement reflecting the Variscan HT-orogeny are well known, but the situation is not so clear for the subsequent Permian evolution. Permian extension in the Adriatic lithosphere has been linked to asthenosphere upwelling, causing high temperature metamorphism at medium pressure and widespread partial melting, which led to upper crustal magmatic activity (e.g. MAROTTA & SPALLA, 2007). However, the relation of the magmatism to the associated metamorphism is well documented in a few areas only, and age control is generally poor. This is particularly true for the Western Alps, where Permian metamorphism has long been proposed, but so far radiometric age data are lacking.

In this study, the use of high spatial resolution geochronology (SHRIMP and LA-ICP-MS U/Th-Pb dating) in combination with structural and petrological methods has proved successful to fill some of the gaps in the current knowledge on the pre-Alpine metamorphic evolution of several Austroalpine units of the Western Alps.

In the SW part of the Sesia Zone, in the II DK unit, upper amphibolite to granulite facies metamorphism was dated at ~277 Ma and at ~270 Ma in metapelites. A leucosome dates at ~290 Ma.