A tomography imaging in the mantle of the Alpine orogen belt and flanked tectonic zones into terrane from Iberia to the Himalayas

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New large scale 3-D P-velocity models of the mantle beneath the Alpine orogenic belt and flanked tectonic zones into terrane from Iberia to the Himalayas (sector 20°W–80°E 30°-50° N) to 850 km depth and more has been reconstructed. Examined area covers the eastern margin of the Atlantic fringing Iberia and northwestern Africa, the Southern Europe, Mediterranean, northern coast of Africa, Asia Minor, Near East, Black Sea, Caucasian region, Caspian Sea, Kazakhstan, Middle Asia, northern India and northwestern China. As initial data have been exploited the set of first-arrival times of P-waves from strong earthquakes and explosions. For data recovering a new traveltime tomography method, has been employed proposed by V. Geyko, that compared to the usual linearization method distinguishes the considerable preferences. The following solid mantle properties of the explored terrane have been explained: 1) The mantle falls into the two shells by the global boundary situated at 350–680 km depth. The upper shell (tectonosphere) is notably inhomogeneous laterally, while the lower one is almost radial-symmetric (deeper than 750–780 km); 2) Into velocity inhomogeneities of the recovering model found contrast mapping not only major tectonic structures but also locates and traces of sutures and boundaries between great structures. Into zones flanking to sutures and boundaries immediately observes usual anomalous velocity varying that reflects effect of the smoothness, diffusing of the contact region stipulated by coupling, interacting and collision of the associated structures. The clearly expressed sutures are greatest from the suture between the EEP and Turanian plate and the Palaeezoic, Mesozoic structures of Western and Central Europe and the Alpine structures in the south-east, suture between the northern border of the African platform and the Alpine structures of the Atlantic and Mediterranean and between the African platform and the structures of the Anatolian and Caucasian–Iranian segments of the Alpine orogens; (3) Age and genetic type of the tectonic structures reflect in the thickness and structure of the tectonosphere. The tectonic structures of the first order (plates) have roots piercing full the tectonosphere, while those of higher order are clear-cut in the upper and unclear in the lower tectonosphere; (4) The intermediate boundary into tectonosphere situated at 390–450 km depth and the astenosphere are not global. The former is peculiar to the ancient and formed tectonic structures and later to those actively living now.

New paleomagnetic data from Fatricum and Hronicum in the Tatra Mts (Poland) — further evidences for Cretaceous remagnetization in the Central West Carpathians

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The Tatra Mts contain the northernmost occurrence of "core mountains" in the Central West Carpathians (CWC). It is a horst of crystalline pre-Mesozoic rocks covered by sedimentary sequence of Early Triassic–Late Cretaceous (Turonian) age. The Late Cretaceous (pre-Senonian) orogeny resulted in the formation of a nappe pile thrust northward. The Tatric, Fatric and Hronic tectonic units are distinguished. The Tatric units were subjected to only minor horizontal displacements. The Fatric (Križna) and Hronic (Choč) units were detached, transported from the south and thrust over the Tatric units. Paleomagnetic investigations have been carried out for several years in order to establish the paleotectonic position of the Mesozoic sedimentary series of the CWC in relation to the European, African and Adriatic plates. All paleomagnetic data gathered so far mainly from Jurassic rocks indicated the proximity of the CWC to the European Platform, however, the age of magnetization was poorly constrained and there were strong suspicions of remagnetization. In this study the entire profile of the Fatricum (from the Middle Triassic to the Lower Cretaceous) in several Križna sub-units was investigated. Additionally, Middle Triassic limestones were sampled from the Choč unit in the Western Tatra Mts. In all localities a single, normal polarity component of magnetization was encountered (D = 56°, I = 64°, a = 7, k = 62, n = 8 localities). The best clustering after partial tectonic correction reveals its synfolding age. It represents, most probably a Late Cretaceous remagnetization which took place during the pre-Senonian thrusting about 90 Ma. The inclination is about 10° steeper than that expected for the southern margin of the European Platform. This might indicate that the rocks dipped gently to the south during the remagnetization event (now they are tilted 30–70° to the north). The same overprint had been previously described also from the Tatric units. These data give further constraints for the paleolatitude of the CWC in the Late Cretaceous and amount of possible rotations and/or strike-slip movements in the northern part of the area in the Tertiary.