and 450-490 °C to 22-28 kbar and 460-500 °C. All the analyzed samples were subject to a clockwise P-T trajectory, which includes an almost isothermal exhumation path.

To study the mechanism for exhumation of the Voltri Massif we performed a series of 2D numerical simulations (Gerya & Yuen, 2003): the starting set up depicts an oceanic basin of prescribed amplitude surrounded by continental margins. To best reproduce the intra-oceanic subduction that started in Mesozoic time inside the Ligurian-Piedmontese branch of the Western Tethys, we defined an oceanic lithosphere with a non-layered structure typical of slow and ultra-slow spreading ridges; gabbros form discrete bodies inside the serpentinized lithospheric mantle and a discontinuous basaltic layer covers the latter.

We tested two different rheologies of serpentinites (Gerya et al., 2002; Hilairet et al., 2007) and in both cases slab dehydration causes formation of a viscous serpentinitic channel in the mantle wedge. Ductile deformation of serpentine (Hilairet et al., 2007) favors the mixing of sediments in the serpentinitic channel also during the initial stages of subduction. Furthermore the serpentinitic mélange includes slices of subducted oceanic lithosphere which are scraped from the slab; in this way serpentinite deriving from the mantle wedge hydration are therefore closely associated with slab-derived serpentinites. The serpentinitic mélange is finally exhumed thanks to the buoyant effect of the ultramafic rocks that decreases the bulk density of the high-pressure terrains below the mantle value (Hermann et al., 2000).

The P-T paths predicted by the model for the exhumed metagabbro and metasediments are comparable to the clockwise P-T path obtained for the Voltri Massif. The peak metamorphic conditions vary from P= 12,5 kbar and T=250°C to 20<P(kbar)<25 and 420<T(°C)<500 and the exhumation path is almost isothermal. In addition the size of exhumed units in the model grossly fits the size of the different rock bodies actually cropping out in the Voltri Massif.

Such evidence suggests that buoyancy could be considered an effective mechanism that contributed to the final exhumation stages of the high-pressure rocks of the Voltri Massif.

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7-3 BTH 17 Farahat, Esam S.

NEOPROTEROZOIC EGYPTIAN CENTRAL EASTERN DESERT ARC-BACK-ARC SYSTEM AS EVIDENCED BY SUPRA-SUBDUCTION OPHIOLITES

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Ophiolites are broadly distributed in the Central Eastern Desert (CED) of Egypt, occurring as clusters in its northern (NCEDO) and southern (SCEDO) segments. They show supra-subduction zone geochemical signature with prevalent island-arc and minor boninitic affinities in the NCEDO and MORB/island arc association in the SCEDO. Mineralogical and geochemical data on the volcanic sections of Wizer (WZO) and Abu Meriewa (AMO) ophiolites as representative of the NCEDO and SCEDO, respectively, are presented.

The WZO volcanic sequence comprises massive lower part of more MORB-like compositions intruded by minor boninitic dykes and thrust over island-arc metavolcanic blocks in the mélange matrix, pointing most likely to formation in a protoarc-forearc setting. Chemical compositions of primary clinopyroxene and Cr-spinel relicts from the WZO volcanic section further confirm this interpretation. Such compositional variability in the WZO crustal sequence is comparable with its mantle section that varies from slightly depleted harzburgites of MORB/IAT affinities to highly depleted harzburgites of IAT affinity containing small dunite bodies of boninitic affinity. Source characteristics of the WZO different lava groups indicate generation via partial melting of MORB source progressively depleted by melt extraction and variably enriched by subduction zone fluids. MORB-like magma may have derived from ~20% partial melting of an undepleted lherzolite source, leaving slightly depleted harzburgite as a residuum. The generation of island-arc magma can be accounted for by partial melting (~15%) of the latter mantle source, whereas boninites may have derived from partial melting (~20%) of a more refractory mantle source previously depleted by melt extraction of MORB and IAT melts, leaving ultra-refractory dunite bodies as residuum.

On the other hand, the AMO volcanic unit occurs as highly deformed pillowed metavolcanic rocks in mélange matrix. They can geochemically be categorized into LREE-depleted (La/Yb_{CN}= 0.41-0.50) and LREE-enriched (La/Yb_{CN}= 4.7-4.9) lava types that show a MORB/within plate to island arc geochemical signature, signifying back-arc basin setting, consistent, as well, with their mantle section. Source characteristics indicate depleted to slightly enriched mantle sources with overall slight subduction-zone effect as compared to WZO.

Such polarity in geologic and geochemical characteristics of the NCEDO and SCEDO, along with the abundance of mature island-arc metavolcanics which are close in ages (~750 Ma) to ophiolitic rocks, systematic enrichment in HFSE of ophiolites from north to south, and lack of crustal break and major shear zones, is best explained by a geotectonic model whereby the CED represents an arc-back-arc system above a southeast-dipping subduction zone.

SESSION NO. 8, 08:30

Monday, 4 October 2010

Strike-slip and transform fault tectonics. Posters (*Dogrultu atim ve transform fay tektonigi*)

METU Convention and Cultural Centre, Exhibition Hall

8-1 BTH 18 Esat, Korhan

DETERMINATION OF MAIN STRAND OF A STRIKE-SLIP FAULT BY USING SUBSIDIARY STRUCTURES: ESKISEHIR FAULT ZONE AS A CASE STUDY

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Eskisehir Fault Zone is one of the important neotectonic structures of Turkey and extends from Bursa-Inegol to the west of Tuzgolu. Although most studied section lies between Bozuyuk and Eskisehir, there is no consensus on the structural style of the Eskisehir Fault Zone in this region. Some of the recent studies report the Eskisehir Fault as a transtensional structure whereas others suggest that earlier strike-slip faulting superimposed by younger normal faults.

On the contrary, our field observations on the subsidiary structures indicate an active right lateral strike-slip regime. Between Bozuyuk and Eskisehir, Riedel shear surfaces, overturned fold axes, small thrust surfaces, calcite filled open fractures and dyke systems indicate a theoretical main strand of strike-slip fault trending N 60-80 W. When this result is taken into account, two segments of the main strike-slip fault have been recognised between Bozuyuk and Eskisehir. In the NW of Inonu town, Sarisu Cayi is diverted 4.5 km right laterally by Bahcehisar segment. Further to east, the course of Sarisu Cayi is again deflected 18 km right laterally by en echelon Cukurhisar segment. Toward south, Porsuk river is also diverted right laterally by Kizilinler, Gokcekisik and Akcapinar segments. It is clear that E-W trending normal faults are not compatible with NW-SE trending right lateral strike-slip system. Indeed E-W trending Inonu fault is cut by N45W trending right lateral R shear in the Turkish Aeronautical Association Training Centre and the right lateral strike-slip faults control the drainage system of the region. All these data indicate that the E-W trending normal faults must belong to the earlier extensional tectonics and the region is under the influence of the current strike-slip tectonics.

This working hypothesis should be tested by geophysical methods especially on the Cukurhisar segment which is highly important to evaluate seismic risk of Eskisehir settlement.

8-2 BTH 19 Isik, Veysel

GEOLOGY OF THE SAVCILI FAULT ZONE, CENTRAL TURKEY

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Understanding the nature of fault zones is sometimes essential to interpret their regional geology. There are two contrasting tectonic models proposed for origin of the Savcili fault zone. One view has been that this zone is characterized by the development of structures typically associated with crustal contraction. The others have interpreted that this zone refers to crustal extension.

The Savcili fault zone is one of the significant structural features exposed in the western portion of the central Anatolian core complex. It contains numerous parallel to sub-parallel thrust/reverse faults mainly a WNW-striking and SW-dipping and is cross-cut by later normal and strike-slip faults. Along the zone, the faults mostly places metamorphic and granitoidic rocks over Paleogene sedimentary rocks, which are overlaid by Miocene-Pleistocene deposits. It is therefore inferred that movement along the SFZ was ceased by Miocene.

The Savcili fault zone possesses a well-developed zone of brittle deformation, called here cataclastic zone, in both the hanging wall and footwall. The cataclastic zone is characterized by two main architectural components; core and damage zone. The core is characterized by cohesive and non-cohesive fault rocks (mainly cataclasite and gauge). The damage zone surrounding the core consists of a well-developed fracturing and cohesive and non-cohesive fault rocks (mainly breccia). Kinematic indicators include steps, fractures, trains of inclined planar structures and asymmetric cavities, suggesting that hanging wall block has moved up approximately northwards with respect to footwall block.

The models for evolution of the Savcili fault zone advocated in the literature do not fit our integrated field and microstructural data providing evidence of episodic cataclasis and diffuse mass transfer deformation mechanisms.

8-3 BTH 20 Çinar, Seray

KINEMATICS OF THE GANOS FAULT, NW TURKEY: IMPLICATIONS LATERAL EXTRUSION OF THE ANATOLIAN BLOCK SINCE LATE MIOCENE

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Ganos Fault, is a right lateral strike-slip fault, represents the further western segment of the dextral North Anatolian Fault Zone and has about 100 km length. It is namely the Gaziköy-Saros segment and connects the western Marmara Sea and Aegean Sea in continent around the Gulf of Saros. Ganos Fault has been active both in historical and instrumental periods. Historical earthquakes (M>6) occurred in 542, 824, 1063, 1343, 1344, 1354, 1542 and 1766. Besides in last century, 1912 Mürefte (M=7,3) earthquake occurred on the Ganos Fault was the largest and most destructive. The aim of this study is to present the kinematic characteristics of the Ganos Fault. According to kinematic measurements on fault planes and some earthquake focal mechanism solutions, Ganos Fault is regarded as an active and right lateral strike-slip fault with a normal component. Kinematic analysis results or inversions of these fault-slip data show an active transtensional tectonic regime and presented the maximum horizontal stress (σ_1) axis as NW-SE and minimum horizontal stress (σ_3) axis as NE-SW. Rm value is smaller than 0.5. This result is thought to be related with the continental collision in eastern Anatolia, slab-pull forces on African plate in SW Turkey and combined effect of the Anatolian extrusion to the west since late Miocene time.