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SOME PROBLEMS OF THE TECTONIC-METALLOGENIC EVOLUTION OF THE EASTERN MEDITERRANEAN

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By terminating IGCP Project 169 the present state of the tectonic-metallogenic development of the Alpine-Himalayan orogenic belt was displayed. However this compilation has only opened the door for further unsolved questions. Here the part concerning the Eastern Mediterranean is being described :

The groups of deposits are corresponding with the plate tectonic stages of development. In the Eastern Mediterranean area they are in principle the same as within the whole belt between Algeria and Afghanistan. The extension of the crust began during Permian; during Triassic it was leading to the formation of a long rifting-zone, which progresses in SSE - NNW direction from the Peleponnes as far as Slovenia. The attatched magmatism is porphyric-diabasic. Various deposits of Mn, Pb, Zn, Ba, Sb and Hg are connected with it. A second incipient rift progresses C - W at the southern margin of the Alps; it is connected with the deposits of the type Bleiberg. An important suture zone separated the Eurasian and the African Plate and extended to an arm of the Neo-Tethys, by forming the Vardar trough. The obducted ophiolites of this ocean floor contain well known chromium ore and copper ore deposits of Mazedonia, Albania and Greece. The following, partly Laramian, partly Tertiary collisions were creating granitoid magmas with various porphyry-copper deposits in the Southern Carpathians, Northern Serbia and Bulgaria. The late tectonic compression caused a thickening of the earth crust and metamorphism in the Alps, palingenic magma and base metal deposits within the inner arc of the Carpathians.

Now we come to the open problems: the map published in EPISODES, September 1987, displays the present position of the tectonic-metallogenic units, formed during different epochs. Already 1972 and later, the present author pointed to the unanswered or most hypothetically answered question concerning the former position of the displaced and rotated micro plates, detatched from Africa and

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Eurasia. Only after their rearrangement, a connection of metallogenic units will be recognized. A. H. RObertson 1984 described some, partly contradictory models, proposed by some authors. A first, most carefully undertaken attempt to draw palinspastic maps of the mediterranean area from the Lower Jurassic until the present was undertaken by J. Dercourt and collaborators in 1986. A good basis is the map of the mediterranean area by Aubouin (1984), in which the areas of a European and an African basement are being distinguished. However the affiliation to the large continents has changed within the course of development. Also the ten palinspastic maps in the paper by Dercourt generally are basing on paleomagnetic data and kinetic considerations. Registrations of tectonic structures and facial connections are incomplete. So the metallogenic connections can only be derived by analogies. Nevertheless the sketches of the maps give evidence of some former metallogenic misinterpretations by the present author. The map of the Tortonian shows that the large Pb-Zn districts of SE-Europe are not limited to the northern margin of the African Plate, but are lying at both sides of the suture. A series of geological-metallogenic palinspastic maps with all data relevant for the metallogenesis, would be an interesting IGCP-Project. From such maps the respective relevant facts for the metallogenesis could be more easily derived.

One for the frequency of deposits relevant fact is, according to J. Ilavsky (1977), the thickness of the continental crust. This author found out in the Western Carpathians, that the number of deposits is minor if the thickness of the crust is larger. Similar aspects are valid for the Tertiary deposits of the Eastern Alps and perhaps also for the Rhodopes. On the other hand the conditions at the Levant Continental Margin are contradictory to this assumption. The continental crust underlying Israel and Syria is thinning out towards the Mediterranean (Ginzburg and Ben Avraham 1987), furthermore there are evaporites and high heat flow at the Jordan Graben, but inspite of these metallotects no remarkable mineralization is existing. Maps of the depth of the Moho since the Neogene would be an international geophysical Project. Steps in this direction have been undertaken in Slovakia and Yugoslavia. Furthermore it seems that there are deposits which in former times were considered to be magmatogene, as they are hypogene, which however are not connected with any recognizable magmatism. However one can perceive spatial and temporal relations between mineralization and metamorphism. Responsible for the mineralization most likely are fluids, set free by rock metamorphism. W. Frank and collaborators recognized such relations in the Eastern Alps from the relation of the strontium isotopes in the ore and in neighbouring rocks. Also a far reaching migration of typical elements from ophiolites has been found out. (Ivan 1982, Karamata 1983). The relations between metamorphic fluids and metallogeny in the alpine-mediterranean orogen would be a topic for IGCP.

FInally the history of sea level changes in the Mediterranean from Tertiary until today, is a mediterranean problem, to be studied by special methods. It has significance for the formation of karst, hydrology and also an important aspect for understanding the formation of bauxite, as well as of the supergene alteration of deposits.

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