

Various-scale controls of complex subduction dynamics on magmatic-hydrothermal processes in eastern Mediterranean

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Various-scale controls of complex subduction dynamics on magmatic-hydrothermal processes in eastern Mediterranean

Introduction

Ore deposits and related magmatism in subduction and post-subduction environments are controlled by the thermal structure and hydrous and magmatic fluid dynamics from the underlying mantle to the upper crust.



Large-scale evolution: input from kinematic reconstructions



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Major

In regions where the **3D subduction dynamics is complex** such as in

> Which processes affect the distribution of mineralization and magmatism?

> Considering this evolution at different scales, can we better constrain the dynamics of subduction in eastern Mediterranean?

200 km 15 Ma

In the Cyclades, the activity of large-scale detachment systems such as the North Cycladic Detachment System (NCDS) and the West Cycladic Detachment System (WCDS) is contemporaneous with the emplacement of magmatic intrusions and ore deposits



Using a simple large-scale model of subduction, can we





Conclusion

Barren
transpre
accretion
<i>Cu</i> -rich
from the
partial m
<i>Au</i> -rich
mantle f
or the ba

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Small-scale evolution: the Miocene geodynamics of the Aegean and western Anatolia

Since 35-30 Ma, fast slab retreat resulted in the opening of the Aegean back-arc domain. However, 15 Ma ago, a major change occurred in the dynamics of this back-arc opening.



Field evidences

- > Block rotations [van Hinsbergen et al., 2005]
- > Appearance and westward migration of alkaline volcanism [Dilek & Altunkaynak, 2009]
- Westward migration of plutonism from the Menderes Cyclades with an **increase of the** mantle component [Altherr & Siebel, 2002]

Combined scales: numerical modeling of subduction dynamics



In eastern Mediterranean region, a southward migration of magmatic-hydrothermal systems is observed from the late Cretaceous to nowadays

> periods are associated to dominant compressional or essional tectonics within the upper plate (e.g. continental

> periods are related to stagnant magmatic arc resulting dehydration of the subducted oceanic crust and the melting of the mantle wedge

> periods are related to fast slab retreat and associated flow inducing the partial melting of the lithospheric mantle base of the crust where Au was previously stored











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Mykonos island

- Syn-extensional granodiorite below the NCDS
- Au-bearing silica breccia and base metal-barite veins





Serifos island

- Syn-extensional granodiorite below the WCDS



25 km-depth horizontal cross-sections (base of stretched crust)



During the Miocene, a secondary westward migration of the magmatic-hydrothermal activity is observed from the Menderes massif to the Cyclades

> Possible consequence of a slab tearing event below western Anatolia and related hot asthenospheric flow

References

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