

HOW WERE ULTRADEEP ROCKS BROUGHT UP? EVIDENCES FROM DISEQUILIBRIUM MICROSTRUCTURES

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The ultrahigh pressure (UHP) metamorphic rocks were brought up from mantle depth during post collision uplift. The disequilibrium microstructures in these rocks are visual records for this process.

A wealth of disequilibrium microstructures have been discovered from the UHP metamorphic rocks in Dabieshan. Most of them are in different patterns of coronas and symplectites from which a spectrum of metamorphic reactions can be deduced. There are 5 types according to the nature of the metamorphic reactions: (1) exsolution lamellae; (2) pseudomorphic replacements by polymorphic transformation; (3) coronal reaction textures caused by solid-solid reactions; (4) coronas and symplectites induced by retrograde metamorphic reactions involving fluid; (5) metamorphic reaction involved in anatexitic processes.

These microstructures convincingly reveal how are the primary UHP metamorphic mineral assemblages influenced by retrometamorphic reactions subsequent to the collision event and how are these UHP metamorphic rocks uplift and exhumed to the present earth surface. At least two stages of retrometamorphic processes can be recognized. The first stage: UHP metamorphic mineral assemblages are replaced by those of high pressure eclogite and amphibolite facies with prominent features of nearly isothermal decompressive retrometamorphism which reflects the nearly adiabatic uplift from mantle depth to the lower-middle crust. The second stage: starts from amphibolite facies through albite epidote amphibolite facies to greenschist facies. This stage is tectonically related to the post orogenic uplift and the crustal extension regime subsequent to the collision event.

The crustal extension was accompanied by the doming of the Dabieshan gneiss-complex. The large scale crustal extension and partial melting are the response to the lithospheric delamination process in the Western Pacific Domain of East Asia during the Mesozoic time.