

Factors controlling core complex initiation and magmatism: Implications for the North China Craton

Kun Wang (1,2,3), Laetitia Le Pourhiet (2,3), Charles Gumiaux (4), Yan Chen (4), and Liang Zhao (1)

(1) Université Pierre et Marie Curie, Paris, France (wangkun@mail.iggeas.ac.cn), (2) Sorbonne Universités, UPMC Univ Paris 06, UMR 7193, Institut des Sciences de la Terre Paris (iSTeP), F-75005 Paris, France, (3) CNRS, UMR 7193, Institut des Sciences de la Terre Paris (iSTeP), F-75005 Paris, France, (4) Institut des Sciences de la Terre d'Orléans (ISTO), Université d'Orléans- CNRS/INSU (UMR 7327), Campus Géosciences, Orléans, France

Metamorphic core complex (MCC) is a key detectable feature of continental lithospheric extension. World-wide intensive investigation of their dynamics and evolution has been performed using a number of techniques. Among them, there are two regions with particular respect to cratonic thinning both represent multi-stage shortening and stretching, as well as large-scale crustal driven magmatism coeval with or before MCC development. However, unlike the strip distribution in a near north-south ward direction of the MCC cradle in Cordillera, East China together with the adjacent area exhibit much wider geographical area of MCCs (>3,000,000km² extension). These MCC seems to form in a synchronous manner and postpone the implacement of magmatic intrusion.

Thermo-mechanical model of MCC's publish in the literature mostly focus on the formation of one isolated MCC's and sometimes show the formation of MCC's in sequence but none of them explore how to form synchronously multiple core complex at the same time. Here we perform 2D thermo-mechanical model at the scale of East China extensional area to test how the initial thermal structure of the lithosphere influences the of timing between magmatic intrusion and exhumation in the dynamics of domes as well as their spacing.

We find that the resulting extension mode depends a lot on the starting thermo-rheological structure. After the delamination of the lithosphere, it is possible with very small stretching or compression to implace intrusions, which later serves to localise the formation of metamorphic core complex once the lower crust becomes weak enough on a thicker section to flow massively. This episodic magmatic process and the formation of multiple MCC is in good agreement with the particular case in northern boundary of the North China Craton in terms of kinematic patterns, and temporal and spatial distribution of the MCCs and brings new constrains to the warmly debated geodynamic setting of East China.