and other geophysical and geochemical data, the thermal structures of China lithosphere were calculated with the assumption of 1-D steady condition. Then, the rheological profiles were established by the three-layer model of lithosphere. The results show that the rigid blocks or massifs are the Tarim and Yangtze platforms, in where lower heat flow values are observed; meanwhile, the weak zones or belts correspond to the high heat flow regions such as the most of orogens, the western and eastern margins of Yangtze platform, and the eastern part of NCP. This pattern coincides with the present deformation pattern of China, which is exhibited by seismic activities and active tectonics. It is noted that the thermal state is the key factor to influence the strength of lithosphere, and the lithospheric composition structure is the secondary one. Therefore, the thermal state of foreland is also important to influence the mechanical coupling between orogen and its environs, besides the strength of orogen itself.

The spatial range of present far-field deformation induced by India–Asia collision is an important problem for continental tectonics of China; and the arguments focus on whether there is large-scale eastward excursion of the tectonic domains in east of Tibet plateau (i.e., the Yangtze and NCP). The results of this study on thermal and rheological structure of China lithosphere show that the Yangtze platform is a rigid block but its western margin (west Sichuan and Yunnan) is very weak. So the stress from west is absorbed by the deformation within the west Sichuan and Yunnan region, and the eastward excursion of Yangtze platform is insignificant. Meanwhile, the strength of NCP is much weaker than Yangtze platform, especially its eastern part and the periphery of Ordos block. The intensive seismicity in the NCP indicates that the stress from west is absorbed by the deformation within the platform. This explains why there are no penetrative strike-slip faults along the northern and southern margins of NCP, and why NCP does not happen large amount eastward excursion as a whole.

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Dynamic links between internal zone extension and external zone shortening in the Alps: mapping, dating and modelling

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To understand the dynamics of a mountain belt requires knowledge of the geometry and timing of movements as well as of the thermal history. This is true of both shortening and extensional events. Ten years of mapping and geochronological work by us has focussed on constraining extensional events in the Alps, in particular those related to unroofing the Piemonte high and ultra-high pressure eclogites. These eclogites were unroofed by SE-directed extension, in other words along a surface subparallel to the subduction zone but with opposite movement sense. This unroofing occurred in the period 45–36 Ma. In the external zones, a marine foreland basin was actively migrating away from the orogen, and receiving clastic detritus at this time. This migration is of the same order of magnitude as the displacement induced by internal zone extension. They must have been strongly dynamically coupled, and local buoyancy played a key role. Numerical modelling confirms this profound coupling and leads us to reappraise the dynamics of foreland basin evolution in this mountain belt.