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A multidisciplinary study on the emplacement mechanism of the Qingyang-Jiuhua Massif in Southeast China and its tectonic bearings

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The Late Mesozoic geology of the lower Yangtze area in South China is characterized by the opening of sedimentary basins, the emplacement of numerous granitic plutons, and the formation of several world-class ore deposits. Although many studies have been recently carried out on plutons in this region in order to understand the geodynamic significance of the magmatism, they are mainly concentrated on geochronology and geochemistry, the contemporary tectonic framework remains poorly constrained. To overcome this weakness and to provide a comprehensive understanding of the granitoid emplacement, a multidisciplinary approach, including structural analysis, anisotropy magnetic susceptibility (AMS), paleomagnetism, AlTotal in hornblende geobarometery and 2D gravity modeling, has been carried out in the Qingyang-Jiuhua massif in the southern part of Anhui province. The Qingyang-Jiuhua massif is composed of the granodioritic Qingyang pluton dated at 141 Ma and the monzogranitic Jiuhua pluton dated at 131 Ma. Field structural observations show weak ductile deformation of country rocks and granitoid with limited contact metamorphism. In the contact aureole of the massif, the foliation follows the pluton contour, and the mineral lineation is rare. When present, the lineation exhibits a down-dip attitude. The AMS fabrics of 93 sites reveal a horizontal magnetic foliation pattern and scattered lineations with a low anisotropy degree (PJ<1.2). The paleomagnetic results indicate that (a) the younger Jiuhua pluton did not produce a remagnetization in the older Qingyang pluton, (b) no relative movement can be observed between these two plutons, (c) the entire massif did not experience relative movement with respect to South China considering the uncertainties due to the paleomagnetic method. The hornblende geobarometry shows that the Qingyang-Jiuhua massif emplaced at a shallow depth in crust. The gravity modeling documents that the structure of the massif corresponds with a laccolith, characterized by several NE-SW striking linear deep zones that may be interpreted as tension gashes acting as feeder roots of the massif and where the magma intrudes by injection. The integration of these results allows us to conclude that (1) the Qingyang-Jiuhua massif is fed by vertical NE-SW striking tension gashes; (2) The study area did not experience significant relative movements with respect to South China, (3) the late Early Cretaceous tectonics in the study area is characterized by a moderate NW-SE directed extension.