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Reconstructing the geometry of Central Anatolia during the Late Cretaceous, a rotational paleomagnetic study on granitoids.

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The Central Anatolian Crystalline Complex (CACC) is considered as a micro-continent sitting in between the Pontides and the Taurides in the central part of Turkey. Its modern geometry forms a triangular shape (∼300x300x300 km) bounded by major tectonic movement zones. The massif consists mainly of metamorphic, ophiolitic and igneous rocks covered by Cenozoic deposits. This crystalline domain experienced a complicated history involving late Cretaceous burial of Paleozoic-Mesozoic sediments below ophiolites, followed by widespread intrusion and exhumation in Paleocene times. The intrusives, mainly of granitic, granodioritic, monzonitic and syenitic composition have been emplaced between 95 and 75 Ma. Granites and some mafic intrusive bodies are distributed along the outer margin of the massif while the monzonites and syenites occur in a more internal position.
In this study we applied paleomagnetic techniques on Upper Cretaceous non-deformed granitoids to test the hypothesis that the initial shape of the CACC was not the same as seen today. We mainly focused on the outer granitic and mafic bodies, where fourteen sites equally distributed over the entire area have been sampled.
Our results show three distinctive domains where significantly different vertical-axis rotations occurred: (1) in the north-east, the Yozgat-Sorgun block records ∼30° of clockwise rotation, (2) in the north-west, the Kırıkkale-Kaman block has no significant rotation and (3) in the south-west, the Ağaçören-Aksaray block shows ∼40° of counterclockwise rotation. These rotational motions must have occurred after crystallization of the intrusives, and emphasize the importance of internal deformation within the CACC since late Cretaceous. We propose that rotations of central Anatolian intrusives are the consequence of collision of the CACC into the Pontides and are likely linked to the recently established oroclinal bending scenario of the central Pontides that took place in latest Cretaceous to earliest Paleocene times. Considering the scale of the massif, the inferred early-stage configuration of the CACC may have serious implications for the tectonics of central Turkey.