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# What triggers Alpine magmatism in the absence of slab breakoff?

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The long-lasting debate on the origin of Periadriatic magmatism in the European Alps has led to the formulation of one of the most successful theories of modern geology, the slab breakoff model (Davies and von Blanckenburg 1995) that is now extensively adopted worldwide (see review in Garzanti et al. 2018). In the Alpine region, recent tomographic data outline an unbroken European slab beneath the Western and the Central Alps (e.g., Zhao et al. 2016), which is incompatible with the hypothesis of oceanic slab detachment taking place in the early Oligocene, after continental collision between Adria and Europe (e.g., Schmid et al. 1996). In order to understand what triggers Alpine magmatism in the absence of slab breakoff, we present here the first comprehensive dataset of zircon U-Pb ages and Hf isotopic compositions from Periadriatic intrusives in the Western and Central Alps (Ji et al. 2019). Our data provide the first evidence of Eocene magmatism in the Western Alps (42-41 Ma in Traversella), and demonstrate that magmatism started synchronously in different segments of the Alpine belt, when subduction was still active. Zircon U-Pb ages define younging trends perpendicular to the strike of the European slab as imaged by seismic tomography, suggesting a progressive Eocene-Oligocene slab steepening. We propose that slab steepening enhanced the corner flow. This process was more effective near the edge of the European slab, and may have triggered Alpine magmatism in the absence of slab breakoff.

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