



## **Isostasy, dynamic topography, and the elevation of the Apennines of Italy: insights into deformation of subducting lithosphere**

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The elevation of an orogenic belt is commonly related to crustal/lithosphere thickening. Here, we discuss the Apennines as an example to show that topography at a plate margin may be controlled not only by isostatic adjustment but also by dynamic, mantle-driven processes. Using recent structural constraints for the crust and mantle we find that the expected crustal isostatic component explains only a fraction of the topography of the belt, indicating positive residual topography in the central Apennines and negative residual topography in the northern Apennines and Calabria. The trend of the residual topography matches the mantle flow induced dynamic topography estimated from regional tomography models. We infer that a large fraction of the Apennines topography is related to mantle dynamics, producing relative upwellings in the central Apennines and downwellings in the northern Apennines and Calabria where subduction is still ongoing. Comparison between geodetic and geological data on vertical motions indicates that this dynamic process started in the early Pleistocene and the resulting uplift appears related to the formation and enlargement of a slab window below the central Apennines. The case of the Apennines shows that the topography of mountain can be used to infer rate and evolution of processes dynamically controlled by mantle convection.