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Subduction and tearing of continental lithosphere in central Taiwan: insight from flexural and sandbox modeling

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It has been recognized that the topographic load alone is insufficient to account for the depression of the foreland basin and the low gravity anomaly observed in central Taiwan. In addition, the deflection of the foreland basin shows strong along-strike variation. We investigate this problem by conducting flexural and gravity modeling. Our results suggest that the continental crust must have been torn apart from Hualien to Taichung along a distinct lineation of seismicity to account for the along-strike variation in plate deflection. Our model also shows that extra downward loading along the Longitudinal Valley where the Eurasian plate and the Philippine Sea plate suture is required to match the deficit depression beneath the mountain belt. The northward increase of the extra load is strongly correlated with the northward subduction of the Philippine Sea plate, which confirms an eastward subduction of the continental lithosphere. The subduction-induced crustal deflection, which results in a thicker crust and a larger basal slope in central Taiwan can also explain the existence of an abnormally narrow taper there by sandbox modeling.