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# Linkage between crustal shortening in collisional orogens and the long-term strength of the continental lithosphere

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How shortening within collisional orogens relates to the pre-orogenic strength of continents is not well understood. Continental deformation is known to preferentially focus in tectonically young provinces where the lithosphere has been weakened during former subduction, rifting and orogeny. Here, we present a global compilation of geological estimates of crustal strain from 30 fold-thrust belts that are compared to estimates of long-term strength of the continents (Te) and lithosphere's thermotectonic ages. We show that crustal strain variations between mountain belts primarily reflect the lithosphere thickness and geothermal gradient inherited from the last tectonic and magmatic event. Among other factors, we infer that higher temperature in younger continental margins, promotes the development of middle to lower crustal deformation and reduces shortening. By contrast, more resistant, colder continents localize shortening in the shallower crust. Such a linkage between crustal strain and temperature supports the counterintuitive result that the weaker the lithosphere the lower the shortening in collision orogens.