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Partially molten crust cannot drive the growth of the Tibetan plateau

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Since the first results of the INDEPTH experiment in Tibet, and especially the observation of "bright spots", widespread partial melt is thought to occur beneath the plateau (*e.g.* Nelson *et al.*, 1996). This observation gave strong support to the emergence of the channel flow concept (*e.g.* Royden, 1996), which is today a popular mechanism to explain the growth of the plateau. However, a major drawback is that it is uncertain whether partial melt is restricted to rift zones, or occurs beneath all Tibet (Yin, 2005).

Here we present observations based on new seismological data from the Hi-CLIMB experiment. The high-resolution (9 km station spacing in average) receiver function profile in Central Tibet shows low-velocity zones in the upper crust, which we identify as bright spots indicating partial melt or free aqueous fluids. However, in contrast with previous studies, our results suggest that these have a limited vertical extension; moreover, the low-velocity zones lie beneath the two graben systems along which the experiment's line passed. An additional 2-D deployment of 25 stations throughout the Southern Tibetan plateau (at 35 km average spacing) enables us to investigate whether these features are continuous along strike or not. The various locations of these stations allow to confirm that clearly resolved low-velocity zones occur beneath grabens but not elsewhere. These correlations underline the importance of station coverage in such a large study area, and point to the fact that partial melt occurs on a local scale, in relation with grabens. Whether the rifting in Tibet is active or passive should be further investigated, but our results, together with the observed regular value of V_P/V_S-ratio, exclude the possibility that widespread partial melt characterises the crust.