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## News & Views

### Slab breakoff: A causal mechanism or pure convenience?

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The idea of lithosphere delamination has long been conceived as a mechanism to cause tectonic uplift, metamorphism and magmatism in active orogenic belts [1-3]. Since the publication of the two seminal papers by Davies and von Blanckenburg [4,5], the idea of slab breakoff has been better accepted over the last ~ 20 years as the favored mechanism to cause collision zone magmatism and exhumation of subduction-zone metamorphosed rocks. These two papers demonstrated the physical probability of slab-breakoff during continental collision and illustrated the geological consequences using the Alpine geology as an example. Currently, slab-breakoff seems to have been axiomatically accepted as the causal mechanism in studies of continental collision-related magmatism. In this short communication, I do not intend to deny the probability of slab breakoff nor the possible geological consequences, but emphasize that caution must be exercised when invoking “slab-breakoff” as a causal mechanism without physical and geological justifications or if evidence clearly indicates otherwise.

Figure 1 is a set of histograms using the data from the Web of Science. Fig. 1a shows the number of papers on “slab breakoff” published each year since 1995 (blue histogram) and the total number of papers published on the subject up to each of these years (red cumulate curve). Fig. 1b shows the citations of these papers and reads accordingly. Fig. 1c-d gives the same type of the information on papers that invoke slab breakoff as the mechanism causing observed magmatism. Fig. 1e-f shows the similar on papers that consider slab breakoff as a possible or probable mechanism responsible for the exhumation of subduction-zone metamorphosed rocks (blueschist and eclogite facies rocks). From the increasing trend over the years, it is expected that the number of papers and citations both will continue to rise. It is possible that such increase and rise may indeed reflect more research that offers support or verification of the breakoff related interpretations, but it could also be a bandwagon effect because of the increasing popularity and convenience. While slab breakoff may indeed take place [6], and this could in some way facilitate magmatism and ease tectonic exhumation [7-11], we can readily see, however, that the effect of the “slab-breakoff” is likely overstretched in the current literature.

Figure 2 shows a few examples from the literature that use slab-breakoff to explain geological observations. Fig. 2a invokes slab-breakoff to explain the exhumation of high- and ultra-high-pressure eclogites produced from subducted passive margin crustal lithologies. But slab-breakoff may not be required because the eclogites are

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