



The impact of mixing lithologies in clast shape measurements on its discriminatory power – a case study from a temperate Alpine glacier

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Clast shape measurements have become a standard tool in the reconstruction of transport histories in a variety of depositional settings (Demir et al., 2009). In glacial environments, the combined use of clast form and roundness has become an established tool in the past 15 years or so, and environments where this tool has been used range from temperate and polythermal to cold-based glaciers. In addition, the method has been transferred to palaeo-environments where the knowledge gained in aforementioned studies has taken the degree of accuracy in sedimentological investigations to a higher level (cf. Lukas et al., 2009, and references therein).

All of these studies use the approach originally advocated by Benn and Ballantyne (1994), but perhaps the most notable difference is that some researchers mix different lithologies within their samples of 50 clasts. However, the role of lithology on clast shape in a glacial environment has never been systematically analysed, except for one pilot study (Bennett et al., 1997). Likewise, some previous studies have highlighted the problem of distinguishing between fluvial and subglacially-transported clasts using co-variance plots, and thus, more work is needed in both these respects.

We here present a set of clast shape data gathered from the foreland and surrounding slopes of temperate Findelengletscher, Switzerland, to (a) test the versatility of clast shape in distinguishing of populations of clasts transported along different paths and (b) assess the role of lithology on the discriminatory potential of the method, most notably using co-variance plots.

The main result of this pilot study is that the sampled lithology has a marked effect on clast shape results within the same control group. This is manifest in an overlap of envelopes in both RA- or RWR-C40-covariance plots. If kept separate, all three lithologies display separate control envelopes, in this case in RWR-C40-co-variance plots, thus keeping their discriminatory power. Therefore, at each locality 50 clasts of the same lithology should be measured to allow a clear distinction of different transport paths.

References

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