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A new photo-sieving approach: quick and effective semi-automated method for gran size counting for gravel beds, and application to a Chilean Patagonia river

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Many rivers in Chilean Patagonia are difficult to access, experience high flow variability and frequent sudden floods, which make traditional grain size distribution sampling and analysis extremely challenging. There are several diverse methods and software that attempt to determine grain size using analysis of photographs. Manual methods, although of high precision, are extremely labour and time intensive as they process particle by particle by hand. On the other hand, automated methods although fast, still produce low precision in particle identification and size determination, This motivated us on developing a field and desktop method that is fast, precise and requires light equipment. It includes good natural light management with a light and inexpensive kit, considering a good representative selection of the study site. Preliminary to the automated method, the photographic sample is calibrated regarding tones, colours and brightness, with the aim of generating high contrast between clasts and therefore an easier recognition by the software ImageJ. We tested the method with 50 photographs analysed with manual and other (semi)automated methods, characterizing the surface depositions of río Simpson between the towns of El Blanco and Coyhaique, in Chilean Patagonia. We identified and mapped sediment patches using an UAV. Results show that our method has a lower error and processing time. Ongoing challenges include the underestimation in size and number of some clasts, and overestimation of sand, with respect to the manual method, but it still outperforms other (semi)automatic methods.