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## Sediment size and shape observation in a mountain river, southern Brazil

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The aim of the present study was to characterize the size and shape of sediments along a reach of a mountain river in Maquiné municipality, southern Brazil, to establish an efficient methodology in river sediments analysis. In Brazil, this might be a pioneering study of mountain rivers characterized by the presence of gravel, cobble, and boulders sediments. The study catchment, covered by Dense and Mixed Rain Forest and high-altitude grasslands (Campos de Cima da Serra), has an altitude difference of 900 m. Its geology is characterized by the Serra Geral Formation (basaltic rocks) and pedology by Cambisols and Neossols. The mean annual rainfall is 1200 mm. According to the Köppen classification, the regional climate is humid subtropical with hot summers (Cfa) in lower areas and humid subtropical with mild summers and cold winters (Cfb) in higher areas. The catchment outlet has a fluvimetric station, and at its headwater, there is a rainfall gauge, both of which perform automatic measurements every 10 min. For the bed sediments diameter analysis, 500 grains were sampled, following the Wolman Pebble Count methodology. The measurements were carried out along the same reach (100 m) in five stages (December 2019; February, May, August, and November 2020) to observe sediment dynamics over time. During these measurements, the mean values of water depth and discharge were 0.4 m and 0.8 m<sup>3</sup>/s, respectively. To determine the size and shape, the three axes A (longest), B (intermediate), and C (shortest) were measured by using the tree caliper. With the axes' values, the sediment shape was classified into four types: sphere, rod, disc, and blade. Linear correlation and multiple regression analyses were performed to evaluate the influence of each sediment axis on determining the nominal diameter ( $D_n$ ). The mean values of  $D_{max}$ ,  $D_{90}$ ,  $D_{84}$ ,  $D_{50}$ ,  $D_{16}$ , and  $D_{10}$  of all the sampled sediments were 290.61, 114.40, 103.52, 56.27, 35.89, 28.0, and 18.40, respectively. Preliminary results indicate that 38% of the sampled sediments corresponded to the disc format and did not vary over the year. The characteristic diameters remained constant throughout the monitoring period, even though strong rainfall-runoff events sometimes occurred (~ maximum runoff was 33 m<sup>2</sup>/s in July 2020). The  $D_n$  values calculated with the multiple regression model based on the analysis of the axes ( $D_n = f(A, B, f(A, B))$ ) were very close ( $R^2 = 0.95$ ) to those calculated through an original definition of  $D_n$ , i.e.,  $D_n = (A \cdot B \cdot C)^{1/3}$ . During the monitoring period, notable changes in the size and shape of the sediments were not observed. The axes analysis confirms that the  $D_n$  value can be estimated only with the measurement of axes A and B, without axis C. Therefore, this methodology (without the axis C) may be recommended to characterize the size and shape of bed sediments in mountain rivers. Finally, the present study highlights the importance of fieldwork to advance basic river sciences in Brazil.

