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Abrasion and Fragmentation Processes in Marly Sediment Transport

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In the highly erosive marly catchments of Draix (Southern Alps, France), downstream fining of sediments has been observed and can not be explained by selective sorting. Moreover, high concentrations of suspended fine sediment (up to 800 g/L) are measured during flood events in these basins. These observations lead to the hypothesis that abrasion and fragmentation of marly sediments during transport play an important role in the production of fine sediments.

Several experiments are conducted in order to quantify these processes: material from the river bed is introduced into the water flow in a circular flume as well as in a large scale rotating drum. Abrasion rates range from 5 to 15%/km, depending on the lithology: marls from the upper basin are more erosive than those from the lower basin. Modifications of grain size distribution in the rough fraction are also observed.

Field measurements are also conducted. Downstream of the main marly sediment sources, the river bed is composed of marls and limestone pebbles. We have sampled the river bed for analysis of grain size distribution and lithology. First results show a decrease of the proportion of marls along the river bed. This is in accordance with the high erosion rates observed in our laboratory experiments. Further investigations are planned in order to study more precisely marl grain size distribution, especially in the finer fraction.