



Bedload transport rates estimated in two gravel bed streams from NW Spain

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The rivers located in the northern side of Cantabrian Mountain Range (a mountain range which runs parallel to North-western Spanish coast) drain to the Gulf of Biscay, saving a difference of height of roughly 2,000 m in a short path. The climate is Atlantic, with annual rainfall averages around 1,100 mm. The hydrological regime of the main channel is pluvial, with maximum winter discharges and a relatively regular water discharge along the whole year. These facts give place to rivers with a high gradient and with an important contribution of coarse bedload transport to its sedimentary dynamics. In the present work, bedload transport rates were estimated in two gravel bed streams through the use of tracer stones. These two gravel bed streams are a part of the drainage network of Narcea River basin.

Narcea River drainage basin has got a catchment surface of 1,800 Km². Lithology of the basin comprises a diversity of Paleozoic sedimentary rocks (mainly siliciclastic lithologies: quartzarenites, shales and slates) and the vegetation cover shows an alternation of bush areas (mainly heather), beech and oak forests and pastures. An important extension of the basin is represented by headwater channels, with highly-coarse bed sediment, very irregular hydrologic regimes and the occurrence of periodic debris-flow like mass movements. By its side, higher order channels are mainly alluvial reaches with cobble and gravel beds. These reaches develop floodplains, generally with little areal extension and limited spatial continuity (except in the lower parts of the basin). In this work, two gravel bed streams from this basin were selected for estimating bedload transport rates, the Pigüeña river and the Coto river. The both are tributaries of the main Narcea river.

Bedload transport rates were estimated through the use of tracer stones. This technique consists on feeding channel bed with tagged stones and measuring its travel distances after flood events capable of moving bed sediment. Here, the tracer stones were taken directly from the channel bed on the study sites. Tracer stones were tagged by two means: painting clasts and inserting magnets inside the stones (using a drill and filling the void with epoxy resin). Tracer stones were fed directly over the bed surface of two side channel bars placed in the study reaches. Tracer clasts were deposited following a straight line transverse to the main flow direction.

Six flood episodes with ability to carry sediment were studied (three for each study site). Then, the first bedload transport rates, for rivers placed in the Northern Cantabrian range, have been estimated. Bedload transport rates of 0,01 to 0,1 Kg/m*s have been measured. These transport rates lay inside the same range of values to those rates compiled from scientific literature in other gravel bed rivers. The measured bedload transport rates are relatively low, indicating a low-transport regime for the Narcea River basin.