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Assessment of catchment scale connectivity in different catchments using measured suspended sediment output

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Recent developments in hydrology and geomorphology include the connectivity principle, which describes how different elements in a landscape are connected and how water and matter moves between these elements. So far, studies on connectivity have been mainly of a conceptual nature and have been done on a small scale, while studies that map, quantitatively establish relations, and model water and sediment transport in connectivity are rare.

In this study we established a relation between change in connectivity within four catchments and the time of year by using suspended sediment data. The data were collected for four catchments in Navarra, Spain of which two catchments are dominated by forest and pasture, while the other two catchments are dominated by agriculture and have no forest. Data were collected during a 13 year period; 4 samples were taken a day at 6 hour intervals which were mixed to obtain a daily average suspended sediment concentration. This was then converted into daily suspended sediment output using the measured total daily discharge.

The effect of precipitation on the sediment output data was minimized by using an antecedent precipitation index (API), which consists of the precipitation of the current day added by the precipitation of the previous 14 days, where the influence of the previous days decays exponentially with time. The daily total suspended sediment output was divided by the API, to obtain a measure for sediment output independent of precipitation. This sediment output then serves as a measure for the connectivity within the catchment.

The connectivity of the four catchments throughout the years will be compared to each other and we hypothesise that the two catchments dominated by forests and pastures will change only slightly throughout the year, whereas we expect to see large differences in connectivity in the two agricultural catchments. The agricultural catchments are likely to display a highly varying connectivity throughout the seasons due to changes in vegetation cover of the fields throughout the year, whereas daily variations will likely be small due to a slowly changing connectivity.