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Frequency-Magnitude of extreme events of suspended sediment concentration and load: Regional estimation for 22 rivers in California

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Sediments are considered to be the most widespread pollutant in river systems by the US Environmental Protection Agency. High suspended sediment concentrations (SSC) are a threat for aquatic life and possibly carry high amounts of pollutants. Only a few countries have hydrometric networks that are monitoring SSC daily. There is a need to develop regional estimation methods for sediment transport in ungauged basins to have more knowledge of the frequency and magnitude of rare events. The estimation of sediment transport during infrequent extreme events is necessary for the calculation of long-term sediment yields from river basins. The objective of this study is to estimate several characteristics of extreme events of suspended sediment transport using the watershed attributes. 22 non-regulated rivers in California with long records of SSC were selected to test the approach. In semiarid environments, most of the suspended sediments are transported during flash floods. In the selected rivers with a Mediterranean climate, high concentrations and load of suspended sediment are observed during winter months. For each station, series of annual maximum SSC and load for different durations were modelled using probability distributions in order to estimate quantiles of concentration and load for different return periods. Other characteristics of extreme events were calculated, including the percentage of annual load carried during different durations and percentiles of SSC and load. Correlations between extreme SSC with the corresponding discharge were also analysed, in an attempt to relate high quantiles of discharge with SSC. A database of catchment attributes was created including land cover, soils, topographic and climatic characteristics, for the whole watersheds as well as for sub-basins of 5 km and 20 km radius

that are more representative of local characteristics. Regression models were built for each sediment transport characteristic using the catchment and sub-basin attributes. A Jack-Knife re-sampling method was used to assess the relative efficiency of each model. Preliminary results show that regional estimation of the percentage of annual load carried during different durations (2 - 7 days) is quite feasible. Uncertainties are greater for the estimation of extreme loads than extreme SSC.