



Controls and budgets of riverine sediment fluxes to the Gulf of Lions (NW Mediterranean Sea) : Do coastal rivers better than the Rhone?

Mahrez Sadaoui (1), Wolfgang Ludwig (1), François Bourrin (1), and Patrick Raimbault (2)

(1) Université de Perpignan Via Domitia, CEFREM UMR-CNRS 5110, 52 Avenue Paul Alduy, 66860 Perpignan, Cedex, France., (2) Institut Méditerranéen d'Océanologie, OSU Pythéas, Case 901 TPRI 5ème étage, Campus de Luminy, 13288 Marseille cedex 9, France.

Riverine sediment yields can be highly variable among the various river systems on Earth and, despite an increasing amount of data and studies during recent years. Small rivers can be more efficient in the evacuation of freshly eroded materials, attributing greater sediment delivery ratios to these rivers compared to large river systems. The Gulf of Lions (GoL), north-western Mediterranean Sea, is one of the most extensive shelf regions in the Mediterranean Sea. Riverine sediment fluxes from small coastal rivers (SCR) along the Languedoc-Roussillon coast can be compared to the fluxes of the Rhone River, one of the largest in the Mediterranean. Since the late 1990, however, several research programs got interested in these river systems and individual rivers were studied more in detail. Long-term monitoring of the Tet and Rhone rivers was established and finally integrated in the French oceanographic observation system MOOSE (Mediterranean Ocean Observing system of the Environment).

In this context, the present study aims to complete the existing studies by providing a reliable comparison of sediment load values for various catchments within lowland river basins. Therefore, we focused on the SCR and Rhone river basins, 7 catchments covering 86 % of this area. We first present a large database of area-specific suspended sediment yields (SSY) calculated from the suspended sediment concentration and flow discharge data over 46 years of measurements at gauging stations. A Simple Rating Curve Approach (SiRCA) using daily discharge data, which allows the estimation of mean annual sediment loads from infrequent sediment concentration data, was used to calculate sediment fluxes. Second, we analyze the temporal and spatial variability of the calculated of sediment load (SL) values, and the contribution of floods in the annual report of sediment yield. Finally, we estimate the contribution of the coastal rivers in total inputs in the GoL.

The SL values at the outlet of the catchments range from 0.045 Mt.yr⁻¹ to 8.37 Mt.yr⁻¹, and the SSY values range from 19 to 87 t.km⁻².yr⁻¹. A comparison with the limited values available in the literature for this region corroborates our estimations. The most of sediments are exported during episodes of flooding, more of 50% of sediment exported during flash floods events which occur only 1.5 of time. The watershed area of all SCR presents 13.03 % face to Rhone. The inputs of SCR present 9.19 % compared to those of the Rhone over the period studied (46 years). Seasonally, the contribution of the SCR is especially important during late spring and autumn, when flash-floods can occur. Under these conditions, they can even contribute to >90% of the total monthly sediment discharge.

Keywords: Gulf of Lion, SiRCA method, small coastal rivers, Rhone river, sediment load, specific sediment yields.