



Erosion modelling and sedimentary balance in an early anthropised watershed during the Holocene

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The ria of Renaires, on the western part of a small calcareous range between Marseilles and the Rhône delta, is a natural, elongated and narrow calanque drained by only one stream, the Reraïlle. The reduced size of its catchment (12km²) enables the easy identification of the local influence of climate and sea level fluctuations on sedimentation rythms. The relative sea level rise was revealed by peat deposits located only 10 kilometers away from the ria (Vella et al., 2005). Human occupation is deduced by archaeological data on the catchment area (Martigues Local council Services) allowing comparison between diachronic maps of human occupation from the Neolithic to medieval period. As such, the watershed of Reraïlle is the perfect site to study influences of human impact on erosion and sedimentation during the Holocene.

Sedimentation in the upper part of the basin has been completely excavated by recent archaeological works prior to urban development. Sediment accumulation is totally quantified and dated by archaeological remains and radiocarbon datings.

In the bottom of the basin, erosional products are measured from the sedimentation trapped in the highly protected ria. Quantification of the trapped sediment was determined from 10 geotechnical drillholes, 5 cored holes of 10m length, and an electrical resistivity survey comprising a longitudinal profile and 4 cross-sections. The data sets were integrated into a GIS program and allowed a 3D reconstruction of volumes trapped at the exit of the system. Although the outgoing volumes are considered as unimportant, an offshore seismic reflection survey is planned for september 2009 to establish baseline data. The results indicate that the sedimentation speed increased in the upper part of the catchment : sedimentation was low before VIth century BC, it increased for 1500 years and was highest during the modern period. This sedimentation dynamic could suggest an increased destabilization of hillsides particularly during the modern period. In contrast, sedimentation in the ria is very high in the early Neolithic and is almost ended by 688 +/- 98 Cal. BC. This could favor the hypothesis of sediment export from the head of the watershed down to the ria by the Reraïlle stream during the Neolithic while sedimentary retention is very low upstream. These results are compatible with preliminary results obtained from the model WATEMSEDEM of erosion/sedimentation (verstaeten et al., 2002) based on Revised Universal Soil Equation (RUSLE).

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