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Geomorphological feedback between watershed erosion and marine sedimentation in the Gulf of Lion margin (SE France).

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Margins are the place of transfer, deposit and accumulation of sediment whose geometry is controlled by sea level fluctuation, subsidence and sedimentary fluxes. Surface processes (sedimentation, erosion), vertical movements and deep dynamic are also intimacy linked. Due to the numerous data acquired over the last 10 years, the Gulf of Lion can be considered as a privileged area to understand the feedback between erosion, sedimentation and associated vertical displacements.
We tried to improve the understanding of the temporal and spatial evolution of erosion processes in the sedimentation and therefore in the geodynamic evolution of the Gulf of Lion margin during the Quaternary, using available offshore data and comparing them with data from the continental domain. A compilation of offshore seismic profiles allowed us to determine the spatial and temporal evolution of the sedimentary volumes through the Quaternary. In the continental domain, the quantification of eroded volumes allowed us to estimate the respective part of each structural domain within the sedimentation of the Gulf of Lion. Marine and continental data are consistent and show a strong increase of erosion rates since 900 ka, resulting from global climatic changes. 75% of the quaternary sedimentation come from the alpine domain, where erosion rates are 2 or 3 times higher than other orogenic domains as the Pyrenees or the Massif Central mountain belts. A quantitative geomorphology analysis suggests that erosion processes are more consistent with climatic than tectonic parameters. The relationship between marine subsidence and continental uplift is also studied. Vertical displacements of the margin are mainly controlled by isostasic processes, at least during the last 900 ka.