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# Historical shifts of the Rhone River and catastrophic flood events revealed by multi-proxy analysis of the Rhone prodeltaic sediments (Gulf of Lions, NW Mediterranean)

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The Rhone is the main sediment source to the shelf of the Gulf of Lions, with about 80% of the total sedimentary input. During the last ca. 20 kyr, the retreat path of the river in response to pulsed sea-level rise is marked by transgressive parasequences on the middle/inner shelf. The late Holocene sediments are accumulated, along the coastal zone, in the form of prodeltaic lobes in continuity with major deltaic lobes recognized onshore. These prodeltaic lobes are linked to the eastward migration of Rhone distributaries. They constitute expanded sedimentary archives of the post-glacial environmental changes because of high sediment rate (more than 1 cm/yr, on an average).
The present study is focused on the modern history of the subaqueous Rhone delta. In particular we focused on the most recent Peygoulier (XVIIIth century) and Roustan lobes (XXth century), that are part of the Grand Rhone system.
Core RHS-KS57 was retrieved from the Roustan prodeltaic lobe during the RHOSOS cruise in September 2008. It has been used for multi-proxy analysis, in order to characterize changes both in the continental and marine environments. Chronostratigraphy was established on the basis of radionucleids and 14C dates. In addition, benthic assemblages (ostracods and foraminifera) and organic and inorganic geochemistry were used for characterizing paleoenvironmental changes, in order to link those to rapid climate fluctuations.
Our work provides a detailed sedimentary history of prodelta lobes during the last four centuries. Historical shifts of the Rhone distributaries can be identified on the basis of benthic assemblages. The lower half of the core is marked by full marine and deep water ostracods (*Krithe* sp., *Cytheropteron rotundatum*...) and by foraminiferal faunas living in relatively stable environments (*Valvulineria bradyana*, *Ammonia beccarii* forma *inflata*, *Hyalinea balthica*...). This fauna reflects a weak influence of the Rhone River and consequently a distal source of sediment. The upper half of the core is characterized by dominance of estuarine ostracods (*Loxoconcha* spp.) and by increase of foraminiferal faunas tolerant to stress conditions and high riverine influence (*Quinqueloculina* lata, *Ammonia beccarii* forma *beccarii*, *Nonionnella turgida*...). The gradual increase of the riverine influence indicates a more proximal source and reflects the present situation, with the Rhone River flowing into the Gulf of Lions through the Roustan channel, where the studied core is located.
In addition the imprint of extreme climate events, i.e. chatastrophic floods, can be detected at discrete levels. They are pointed out by the punctuated occurrence of freshwater ostracods (*Candona* sp., *Ilyocypris* sp...) that correlate with increases of the grain-size and organic carbon content. The traces of flood events match perfectly with the events documented in the historical archives.
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