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Trace element and Sr-Nd isotope evidence of Saharan dust input in Quaternary sediments from the Gulf of Lions (NW Mediterranean)

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Understanding the major processes controlling the formation of sedimentary systems on continental margins is of growing interest for the scientific community. Processes that need to be investigated include climate-related changes in sea level, oceanographic regime, and sediment fluxes. As a part of this integrated source-to-sink approach, one can use geochemical tools to characterize the source of detrital sediments on continental margins and assess how variations in the sediment provenance during the past has been connected to global climate changes. Here, we report preliminary trace element and Sr-Nd isotopes results for sediment samples collected in the Gulf of Lions (western Mediterranean sea). We chose the deltaic margin of the Gulf of Lions because high sedimentation rates in this area allow accessing a high-resolution record of climate variability in Western Europe during the Late Quaternary period. We also sampled different geographic area and time-period in the Gulf of Lions in order to better constrain the sediment source variability as a function of space and time.

Most analysed samples display relatively homogeneous Sr and Nd isotope signature ($^{143}Nd/^{144}Nd$: 0.512067-0.512092; $^{87}Sr/^{86}Sr$: 0.718498 - 0.719376). These values agree well with previously published data on sediments from the Rhône River and the Bourget Lake. One sample from the western part of the Gulf of Lions (KSGC32-20, $<$2000 yr ^{14}C) has a less radiogenic Nd isotope signature with a $^{143}Nd/^{144}Nd$ ratio of

0.512043 and a $^{87}Sr/^{86}Sr$ ratio of 0.721960. An older sample from the western part of the Gulf of Lions (KSGC31-671, 8000-10000 yr) has an almost identical Nd ratio but different Sr isotope signature with $^{143}Nd/^{144}Nd$ and $^{87}Sr/^{86}Sr$ ratios of 0.512095 and 0.717168 respectively. This sample, as well as two others from the western part (close to drill site PRGL1-4) also displays strong positive Ce and Eu anomalies whereas the remaining has either negative or no Ce and Eu anomalies. Such positive anomalies are also seen in Bourget Lake sediment samples whereas sediments collected from Sahara have negative anomalies.

These preliminary results can be interpreted in term of changes in the contribution of detrital material from distinct sources. Detrital sediments in the Gulf of Lions are dominated by material delivered from the nearby Rhône River, but there is clear evidence for contribution from another source, most likely Saharan particles from West Africa, Morocco or Mauritania. Our results suggest either, an increase of the Saharan particles contribution from 10000 yr to actual and consistent with an increase in aridity over the African continent, or a decrease in the sediment flux from the Rhône River during the same period.