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Background/Objectives.

The SURICATES project (Masson et al., this conference) is a research initiative funded by the European Union aiming at increasing the reuse of dredged sediments. Despite limitations due to current waste status, sediment reuse is an increasing alternative to minerals extraction for civil engineering.

Applications for coastal defence, erosion and flood risk mitigation (strengthening or regeneration of harbour/river banks, beach nourishment) require extensive monitoring programs (pre-works baseline at the site, sediment contamination evaluation during dredging, works monitoring, post-works site control).

On-site analytical technologies were developed and tested during previous research projects (CEAMaS, GeDSeT, Lemiere et al., I2SM 2016). While technology development continues, we investigate how far available techniques can be used to facilitate reuse project by allowing rapid on-site decisions, and how far on-site measurements can be reliable for these decisions.

Approach/Activities.

SURICATES will run large size demonstration pilot tests (2,000 to 200,000 tonnes) of reuse alternatives on sites in the Netherlands and in Scotland. All sites will be monitored using on-site techniques for baseline conditions first, and for final state after sediments application. If necessary, sediments may be submitted to mineral processing techniques to make them more suitable. The sediments will be monitored for contamination and physicochemical properties during dredging or during application, and during treatment.

In the port of Rotterdam, dredged sediments will be used in estuarine works to improve the channel and the resilience to major flood events. In Scotland, sediments will be used for coastline defence, land restoration and development. This requires monitoring for potentially toxic elements and organic substances, and monitoring for critical matrix properties. On-site, quasi real time results offer a significant advantage for daily operational decisions compared to more precise but lengthy and expensive laboratory work.

Results/Lessons Learned.

The degree of maturity of on-site analytical technologies is highly variable. Elemental analyses for inorganic contaminants or matrix elements by pXRF (handheld X-ray fluorescence) are now a routine technique, for which Standard Operating Procedures (SOPs) can be designed for most applications. Light elements (below Si) are currently beyond pXRF capabilities but may be measured by a competitor technology, LIBS, still at the emergent stage. Besides inorganic chemical information, mineral characterisation and organic substances contamination data are necessary for reuse applications. Several techniques are currently investigated: pXRD (portable X-ray diffraction), GC (gas chromatography), FTIR (infrared spectrometry) and micro-Raman spectrometry. Most are still at the development stage and will need advanced signal analysis (chemometrics, machine learning) to provide operational information. GC only can provide routinely data on volatile organics.

The expected outcome is an increase in sediment reuse projects in NW Europe and the development of a support industry, services and application sector.