GEOSTATISTICS AS A TOOL FOR PREDICTIVE MODELLING OF THE SURFICIAL SEDIMENT DISTRIBUTION

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For the mapping of soft substrata habitats, it has been shown that the sedimentology is a very important factor to explain or predict the occurrence of the (macro)benthos (e.g. Van Hoey *et al.*, 2004). Although, sediment samples are much more available than biological ones, their overall distribution remains often difficult to 'predict' (or interpolate) and this especially over complex seafloors.

Geostatistical techniques (also known as kriging techniques) allow taking advantage of the spatial correlation between neighbouring observations to predict values at unsampled locations (Goovaerts, 1999). Moreover, secondary information (e.g. bathymetry) can assist in the interpolation, because of the correlation with the primary information (e.g. median grain size). Generally secondary information is more widely available and often cheaper or easier to obtain, and as such can complement the sparsely sampled (primary) observations. If there is a correlation between the first and the second variable, this can be used to predict the first variable more accurately.

A very valuable source of secondary information is the bathymetry when available as a digital terrain model (DTM). Leecaster (2003) compares triangulation and kriging techniques to map the grain-size in Santa Monica Bay, California, with the bathymetry as secondary information. The result of cokriging showed better predictions in the depth-defined zones.

At present, models are being developed (RCMG_UGent models) that test several kriging techniques to predict the sedimentology using bathymetrical information. The first output will be a full coverage map of the sedimentology. The reliability of the prediction will be expressed as the estimation of the variance between the observed and the estimated values. If this geostatistical approach seems to be successful, other environmental variables will be interpolated. In a later phase, this information will be crucial to obtain full-coverage maps of ecosystem components that are substrate driven.

References

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