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Linear and non-linear modelling of sediment mobility and continental shelf bedform dynamics

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The seabed is of interest regarding many engineering applications (e.g. buried pipelines, windmills implantation, dredging). The presentation will deal with the numerical modelling of seabed sediment mobility and the seabed evolution. This will be based on three main examples.

To investigate the sediment mobility over the continental shelf, a first approach can be based on wave, sea-level and current inputs, coming from either field measurements or modelling. Based on this hydrodynamic data, a simple method has been set up to estimate the sediment mobility on continental shelf environment [1,2]. An application to the Pertuis Charentais area (Charente-Maritime, France) will be presented, based on hydrodynamic finite difference numerical models (MARS and SWAN). Such type of modelling can be useful for dredging strategy.

Then, 2DH linear and non-linear morphodynamic modelling of submarine tidal sandbanks will be presented and compared [3,4]. Linear stability analysis method appears quite useful to study sandbanks dynamics and shows a reasonable agreement with field observations. Application on the North Sea area will be presented.

To finish, the stability of pipelines is one of the applications of research on megaripples and sandwaves dynamics. Here, 3D numerical modelling of tidal megaripples and sandwaves will be presented [5], based on finite element model (TELEMAC).

The use, advantages and limits of such types of models will be discussed regarding practical engineering applications (e.g. buried pipelines, windmills implantation, dredging).

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