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Sedimentation problems in a lateral dock on the Paraná River

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The Paraná River is one of the largest water courses in the world and along its reach in the Argentine territory, it receives a large load of sediments from the Pilcomayo and Bermejo Rivers, through the Paraguay River, in the upper basin at the North of Argentina and South of Bolivia. The suspended sediment load is estimated in 100 Million ton/year. This unique characteristic drives the Paraná River morphology downstream, as well as the Paraná delta morphodynamics.

On top of its natural behaviour, the Paraná-Paraguay river system is an important inland waterway transport corridor, with a significant amount of sea going vessels and inland barges navigating throughout stretches of more than 3000 Km. Consequently, there are numerous port complexes and terminals along the river banks. The typical wet infrastructure of these terminals is usually composed by jetties and quay walls, and occasionally with side or lateral docks. Whereas, the case included within this study presents all these components.

This study presents a hydrodynamic and sedimentology 3D model to predict the velocity fields and the associated shear stresses that will drive morphological processes in the lateral dock. The terminal layout, side dock configuration, and sedimentation issues will be analyzed from multidisciplinary point of view, under different hydrological events and considering the correlated sediment loads.
Recent bathymetry studies had been carried out and this set of data will be implemented to build the domain geometry. The flow series is as well extended with the up to date gauged flows and levels, to carry out statistical analysis and identify the design flows for different probabilities.

The main objective of this analysis will be to understand and identify the scour and deposition processes and the possible problems to the structures safety and the operation of the docks, and introduce variations to the baseline design, if necessary. Results will be contrasted and validated with empirical formulae and criteria.