

Global sensitivity analysis for the Gironde Estuary hydrodynamics with TELEMAC2D

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This paper presents a global sensitivity analysis study applied to a TELEMAC2D numerical flood forecast model of Gironde estuary which aims at identifying which input variables should be better described for water levels to be better simulated and forecasted. A variance sensitivity study (ANOVA) was carried out, by calculating Sobol' indices for all numerical parameters (wind influence coefficient, Strickler friction coefficients for 4 zones) and time-dependent forcings of the model (rivers discharges and maritime boundary conditions). It led to the identification of parameters and forcings to which the model is most sensitive for each area of the estuary. Sobol' indices for 2003 event show a predominance of the influence of the maritime boundary conditions and of Strickler coefficients all along the estuary. A mesh convergence study shows that the results don't depend on the mesh. Moreover, a special focus on the eigenvalues of the tide signal correlation error function shows no predominance of one mode on the other. These results were used to implement a sequential ensemble Kalman filter improving both the state of the system and the maritime boundary condition and optimizing the friction coefficients over the Gironde estuary.

Bibliography :

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