# On the Role of Non-Conservative Flow Fields on Transport Mass Conservation

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## Summary

We examine the generation of mass errors in depth-averaged finite element hydrodynamic simulations in coastal systems, and their impact on the mass conservation of Eulerian-Lagrangian transport solutions. The analysis is conducted both with a controlled synthetic test and a complex estuary. We find bathymetric gradients and complex boundaries, typical features of most estuaries, to be the primary sources of local flow mass errors. There is a strong correlation between flow and transport mass errors, which leads to very severe transport mass imbalances for typical horizontal resolutions in coastal applications. Grid refinement is shown to improve mass conservation both on flow and transport simulations.

Key Words: Flow mass conservation. Transport mass conservation. Eulerian-Lagrangian methods. Shallow Water Models. Numerical experimentation.

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