Mass Balance in Eulerian-Lagrangian Transport Simulations in Estuaries

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Summary

This paper investigates the generation of flow mass errors in finite element shallow water models and the effect of these errors in the mass conservation of Eulerian–Lagrangian transport simulations. Flow mass errors are shown to be similar for several primitive and wave equation formulations. These errors occur primarily in areas of steep bathymetric gradients and near complex boundaries. Forcing Eulerian–Lagrangian transport simulations with nonconservative flow fields generates important mass imbalances, which can be mitigated by refining the flow grid. Comparatively, refining the transport grid only reduces marginally the mass errors.

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

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