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Optimal navigation with ocean currents: the VISIR ship routing model

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A new development of the VISIR ship routing model (Mannarini et al, Geosci. Model Dev., 9(4):1597-1625, 2016) is here presented.

The first version of the model has powered an operational service in the Mediterranean Sea (www.visir-nav.com) for about 3 years. Its source-code is distributed with an open policy (www.visir-model.net).

The new developments target large ocean-going vessels (such as cargo vessels, tankers, and cruise ships) and also accounts for ocean currents. In order to effectively use currents in a graph-search method, new equations are derived and validated versus an analytical benchmark. Also, a case study is computed in the Atlantic Ocean, using surface current fields from a data-assimilative global ocean model.

The results are discussed with a focus on assessing limits and potentiality of the algorithm for solving a path optimization problem in presence of dynamic currents.

VISIR as a community model will contribute to the energy efficiency of vessel operation (IMO SEEMP) through optimization of the route duration on the basis of forecast ocean state.

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