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Geoscientific Model Development Discussions

Interactive comment on "MEDSLIK-II, a Lagrangian marine oil spill model for short-term forecasting – Part 1: Theory" *by* M. De Dominicis et al.

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The Authors thank the Referee #1 for the request of useful clarifications that will be added in the text, improving the model understandability.

In the following we list our answers:

1. General Comments:

The main object of this paper has been to provide a complete description of the equations and formalism behind MEDSLIK-II, wishing to act as a good reference to the oil spill community, as pointed out by Anonymous Referee #2. The novelty with respect to

Mackay et al. (1980), Al-Rabeh et al. (2000) is the comprehensive explanation on how to build concentrations from particle advection/diffusion and transformation processes, which has never been described before in present-day literature for oil spill. In addition, our current field formulation, with corrections due to winds and waves, is novel since it is related to the newly available data sets from numerical oceanographic models, which were not present at the time of the other papers. We have added a phrase in the introduction to make clear from the beginning the novelty of Part I of our paper, as described above.

2. Specific Comments:

- We thank the reviewer for asking to clarify the first two points since we found that they were not clearly stated in section 7.1. The sentence "They are normally supplied on a different numerical grid than the oil tracer weathering or advection grid. Interpolation is thus required to compute the appropriate advecting velocity field at the particle location" has been rephrased the following way: "They are normally supplied on a different numerical grid than the oil slick centre or particle locations. Interpolation is thus required to compute the currents and winds at the particle locations for the advection calculation. On the other hand, sea surface temperature and wind are interpolated at the slick centre for the transformation processes calculation. "

About the calculation time, the interpolation is done now on a single processor machine, using hourly current fields and a high number of particles (up to 400.000) and it takes less than 5 minutes for a three days simulation.

- The Authors thank the Anonymous Referee #1 for the third comment since we did not explain the method well enough. We omitted in the manuscript the detailed explanation about the extrapolation of the currents near the coast, thus a short description and a figure will be added in Section 7.1:

"MEDSLIK-II employs a procedure to 'extrapolate' the currents over land points and thus add a velocity field value on land. If XE(i),YE(i) is considered to be a land grid

node by the model, the extrapolated environmental variable (the current velocities components) qXE(i),YE(i) at the coastal grid point XE(i),YE(i) is set equal to the average of the nearby values, when there are at least two neighbouring points (NWP>=2), that means:

qXE(i),YE(i)=(qXE(i+1),YE(i)+qXE(i-1),YE(i)+qXE(i),YE(i-1)+qXE(i),YE(i+1))/NWP.

The result of this extrapolation is shown in Fig. 4. If the currents are given on a staggered grid, an initial interpolation is also needed to bring both currents components on the same grid point before the extrapolation is done."

3. Technical Corrections:

For the technical corrections we have made all the suggested changes.

Interactive comment on Geosci. Model Dev. Discuss., 6, 1949, 2013.

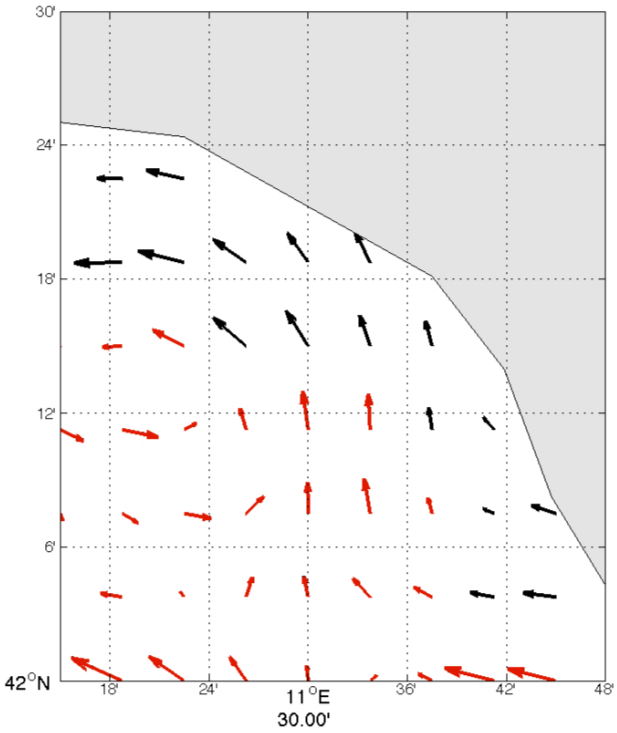

Fig. 1. Figure 4. Results of the near coast extrapolation procedure: in red the original hydrodynamic current field and in black the extrapolated one.