Dear Editor

The paper has been fully rewritten and the title changed accordingly to Referee 1. Figures have been updated in order to answer to the well-posed questions of the reviewers. The general structure of the paper has been changed and additional paragraphs introduced. All typos have been corrected.

Answer to the General Comments of Reviewer # 1:

(1) "There are several areas where this paper could be improved. I think the main one is in terms of model verification and validation of the underlying physics. Since this is an operational system there should be routine error metrics for each of the components. The paper would benefit from a brief section that illustrates and summarizes the error characteristics of the system's hydrodynamics. Operational systems also use data assimilation. It appears from the diagram in Figure 2 that this is done in the coarser domains but not in the nested regional model that is used for the oil transport. Not much is said about the skill of the ocean forecasts in the high resolution domains or the initialization of this. Does each forecast run from cold or warm starts and how is the finer domain corrected and kept in track with observations?**"**

The paper has been fully rewritten and its structure updated. In this new version the main aim of the paper is clearer. In particular the job is focused on the operational use and application of a pre-existing operational system, which has been already described, calibrated and validated in Cucco et al. (2012). In this paper all information about the model error in predicting the surface water circulation and surface transport as well as the numerical methods and the nesting procedures are fully described.

The new version of the paper contains a summary of the operational system whereas it is mostly focused on describing the operational system set-up, the forecasting chain and its applications, in forward or backward mode. These two different modes are

described and discussed: the first mode dealing with the system operational usage in response to local emergencies; the second mode dealing with the production of scenarios analysis and risks maps aimed to mitigate the risk of environmental damage due to oil spill impact on the coast.

(2) "The introduction would benefit from brief comments on the general oceanographic nature of the Strait, marine ecosystems likely to be impacted by oil spill events and any unique and interesting features in this region."
Pag. 2 line 42 :
Detailed descriptions of the water circulation in the SoB and of the morphological features of the area can be found in Cucco et al. (2012) and in De Falco et al. (2011).

(3) Towards the end, including a discussion on the limitations of the system and scope for improvements will help to improve the balance in article.
The discussion now is in line with the updated content and aim of the paper.

(4) The paper also needs further work improving the writing. There are numerous English grammar issues.
Its grammar has been completely revised thanks also to Referee comments.

(5) The web graphical user interface is mentioned several times in the paper, however, is not relevant to the science. I would only mention this once at most.
It is mentioned only in two cases for completeness of the description of the system.

(6) The system presented is highly technical and complex and the Authors deserve commendation for such an achievement. From a readers perspective, however, it was not entirely clear what the science objective of the article was and what new information or knowledge was been provided. I think this needs to be spelt out more clearly and promoted more strongly in the article.

The paper has been strongly revised introducing new paragraphs in order to give more information on the system, its innovation and related applications.

(7) "One further question I have is how is diffusion dealt with in the backward investigation, since this is an irreversible process?"

Pag. 6 line 175:

Both advection and diffusion processes are taken into account in the backward mode in order to simulate both the mean trajectory followed back in the time and to estimate an area of probability where the pollutant source can be located.

Answer to the Recommended changes of Reviewer # 1:

All requested changes, removals or adds in the text or on pictures have been made.

Any change was made for requests (15), (19) , (20) , (21) , (22) given that the sentences have been completely rewritten.

Answer to the General Comments of Reviewer # 2:

(1) " The abstract, introduction and conclusions seem to be a bit misleading as far as the subject of the paper is concerned. The reader is told that the paper deals with the implementation of the system, while it seems that the real purpose is to present some sample applications. Indeed the implementation of the system has apparently already been documented in Cucco et al., 2012. The authors should rework the text to make clear the distinction between the two papers and show that there is no overlap."
Please, see the above answer (1) to the General Comments of Reviewer # 1.

(2) "The system is purported to be innovative, in as much as models with unstructured grids are used; the advantage is said to be the avoidance of using nesting techniques. However, the system apparently does use nesting from basin-scale to sub-basin scale on regular grids before nesting to the FE grid. Why?"
The advantage of using finite element based model is that the downscaling of the coarser open ocean model can be carried out by means of simplified procedure without dealing with multiple nestings, needed in case of finite difference models where the managing of spatial scales ranges from km to meters. Furthermore, the coupling between structured and unstructured grid based numerical models can take place far from the areas of interest without the need of multiple nesting procedures. This reduces the risk of particles leaving the unstructured grid domain toward the structured grid domain, and benefits the advantages provided by the already existing and well tested open ocean forecasting system based on structured grid.
Pag. 2 line 51
These systems are generally not adequate in coastal waters as they use a fixed spatial resolution generally not lower then few kilometres (Chen et al., 2007). So, multiple nesting techniques to downscale the larger hydrodynamic model solutions are needed to forecast sea currents and waves in the coastal area. In any case, these techniques must be overcome when simulated oil-droplets leave the high resolution restricted

domain to enter into an extended domain (Wang et al., 2008). Unstructured grid models are a solution as they allow both to reproduce the fluid motion and oil slick transport processes over different spatial scales, and to adopt simplified nesting techniques to downscale the open ocean model solutions to coastal areas (Cucco et al., 2012).

(3) The paper needs improvement of English grammar. Section 3.2 is obviously written by someone with a good command of English. He/she should clean up the rest of the paper!

Done as requested. Please, see the above answer (4) to the General Comments of Reviewer # 1.

Answer to the Specific comments of Reviewer # 2:

Section 3.1: I don't understand the connection between the first paragraph (describes an ordered set of scenarios) and the rest of the section (describes a simulation of a single real event). I'm lost.

The paper has been completely revised in order to improve the understanding of the system and its operational use.

Answer to the Technical comments of Reviewer # 2:

- *I am unable to see Fig 3 in the pdf.*

Inserted.

- *Fig. 4: change "hh" to "hr"*

Changed, also in figure 9

- *Fig. 5: Color codings are mixed up. The caption and the text in section 3.1 are wrong.*

Inserted green close symbols in figure 5 (now figure 9) in order to improve its readability. Changes made in par. 3.1 and in figure caption.