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Ocean Science
Discussions

Interactive comment on "Predictions for oil slicks detected from satellite images using MyOcean forecasting data" *by* G. Zodiatis et al.

Anonymous Referee #2

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General comments

The article presents a state of the art oil spill forecasting system based on high resolution operational forecast running in the Levantine Basin and in the Cyprus coastal areas. The paper correctly highlight the importance of the downscaling approach that is at the basis of an operational sub-regional and coastal forecasting system. The paper presents a strongly integrated satellite and forecasting monitoring system that is the one needed for modern applications for maritime safety. In addition the interesting integration with AIS data is shown and is used to identified potential polluters through performing backward simulations that we believe is of strong interest for the competent agencies (i.e. EMSA, REMPEC, Coast Guards). MyOcean products are used for downscaling to CYFOFOS forecasting system and this is an important aspects of the

system. I'm fully supportive to this paper and I believe it presents a very well advanced system for forecasting the oil spill in the Mediterranean Sea in support of maritime safety.

The article presents some weak aspects that should be corrected before consider the article ready for publication: 1) The differences that results form the two alternative approaches presented in paragraph 3.1 and 3.2 should be better documented. Too large emphasis is given to this two approaches that are indeed very similar. I understood that the only physical difference is the inclusion of diffusion in the method with particles distributed within the slick (paragraph 3.2). In my opinion the 2nd option is better because more physical processes (i.e. diffusion) are included and this 2nd option should be recommended in the conclusions. The 2nd approach is also more relevant because it considers the fate of the oil slick that is clearly not taken into account in the first approach. 2) In the Title of the paper and in the paper (see i.e. page 1977 line 5) the Authors present the capacity of MEDSLIK to run with MyOcean products (Specifically MyOcean-MED-MFC and MyOcean-Black Sea-MFC) regional products. This coupling of MEDSLIK and MyOcean regional products is welcome but the paper does not present any results of MEDSLIK oil spill model forecast with the MyOcean MCS MED regional products. Either Authors would present the comparison of a simulation with CYCOFOS and with MyOCEAN MED MFC products or they should not present in the paper the capacity of MEDLSIK to be coupled with MyOcean MED MFC. Of course it remains of great importance that authors explain that CYCOFOS is nested in MYOCEAN MED MFC and therefore supported by MYOCEAN. 3) Figure 1 is very interesting and present the result of a multiyear monitoring of the north-east Levantine. I would like to ask if there are any of the slicks in figure 1 being confirmed by national authorities. In this paper there is no validation of the capacity of the model to forecast oil spill and this is a weak aspect of the paper that should be corrected. It would be very useful if a test case could be identified in the present set of satellite images (i.e. two images of the same slick at different time or a slick detected by the satellite and later confirmed by competent authorities by local inspection or aerial flight) and presented

in the paper. The authors could then show how the forecasting system is capable of predicting the oil slick detected from satellite. Alternatively a clearer references to previously validation experiments using satellite products and MEDSLIK should be provided . 4) In page 1980 lines 15 and 16 the authors present the number of particles that can be used in the MEDSLIK simulations. I suggest that a sensitivity experiments is performed or presented from literature to assess how results of a set of simulations change by changing the number of particles. 5) page 1984 line 15 and following. The authors should provide the relevant mathematic formulation of the transformation processes in the same way that has been done for the transport part of Medslik in section 2.

The authors propose to use the terms hindcast to identify the backward simulations. I believe the term hindcast is commonly used in operational oceanography modelling community to refer to simulation done in the past but not only backward. Therefore I propose that the authors use the term 'backward simulation' instead of 'hindcast'.

Specific comments

page 1974 line 2: the phrase 'provision of ocean state data from various platforms' might be interpreted as it refers to provision of observations from different observing platforms. In this context I recommend to change the phrase to 'provision of ocean state observations from various platforms and analysis and forecasting products'.

line 3: 'downscaling' is commonly used instead of 'downscaled'. Please consider to substitute it.

line 17: why only in the forecasting mode the diffusive spreading is taken into account? I believe that this information is too specific for the Abstract section and should be removed. I suggest to provide this information and related motivation in the section 2.

line 25: Please provide references to support the information that there is a particularly heavy traffic of merchant vessels for transporting oil and gas in the Mediterranean. I

suggest to use EMSA or REMPEC publications. References could be also interested on the numbers of coastal and offshore installations related to the oil and gas industry.

page 1975: line 2: Please spell out 'EMSA'.

line 6: I believe that the concept of 'fast track services' is not used anymore. I suggest that you replace it with 'initiative'.

line 11: I suggest to remove the word 'implementation' because it is not clear what it refers to.

line 13: I suggest not to use capital letter for 'Marine Safety.'

line 14: I propose to remove 'and floating objects' because they are not treated in the paper.

line 21: if MyOcean regional products refer to MFS please provide references to MFS modelling products.

page 1976 line 3: please provide references or further information on how the MyOcean and CYCOFOS products are provided to REMPEC and EMSA

line 6: 'images' should be replaced with observations.

line 12: 'five year period' should be corrected to five years period'.

line 15: Please check on the EMSA website and verify the history of the agency that was set up after the Prestige as far as I have red. Therefore you should verify if it is correct to directly referring to the Lebanese accident of 2006.

line 26: please spell out 'CSN'

page 1977 line 5: please specify the name of the MyOcean product in the Mediterranean (i.e. MFS) and provide references

line 17: since you describe also the remote sensing products you should change the title to 'A brief summary of the monitoring and prediction systems'

line 21: I suggest to remove the words 'less urgent but equally important' or provide a references to a user requirements.

page 1978 line 16: please provide references to ALERMO.

line22: if you propose to refer to hindcast for the backward simulation how do you propose to refer to simulation done in the past? I propose to use backward simulation to refer to what you call hindcast. Hindcast in operational oceanography is used, as far as I know, to refer to simulation in the past time. I never heard of the term hindcast used to refer to backward simulation. See also the general comment on this issue.

page 1979 line 15: the authors mention the default values for the α and β parameters. References to these values should be provided. Did the authors test the model sensitivity to the changes of α and β parameters? How does it change from the situation/parameter when MEDSLIK is coupled with MyOcean MED-MFC regional in respect to CYCOFOS coupling? I suggest you should describe the result of such sensitivity experiment in the paper or provide references if existing.

line 19: I would suggest not to use the work 'object' but refer to 'particle'.

line 26: Please provide estimation of the extra computational cost of using higher accuracy, such as one of the Runge-Kutta method. If no experiment has been done in this sense I recommend to be much more careful in saying that this models should not use higher accuracy methods. Today with the large computational facilities that I suppose are available for an operational group like yours increasing the computational costs of a simulation should not be a problem if the benefit are so important. Finally if you do not have clear test of the extra computational costs I recommend to say that this experiments should be done the sooner in the future having in mind that, since your system is operational, one constrain will be the computational time.

page 1980 line 24: please provide references or estimation to the fact that the vertical velocities might be disregarded.

Page 1981 line 14: please add 'as initial conditions' after the word images.

page 1982 line 10: the authors should test backward simulation with diffusion and evaluate results. I do not understand why diffusion is not included. The authors might express the concept that adding diffusion to the backward simulation is complicated but I believe it could be important. I believe that authors should also mention that a probabilistic approach should be foreseen in the field of backward simulations.

page 1983 line 26: see above comment on diffusion

page 1984: line 4: if possible the experiment presented in figure 3 should be repeated for a slick that has been observed for more that one time so that the spreading of the slick can be checked and compared with the simulation done using the contour polygon. This would allow also to check the sensitivity to the number of particles that are used in the experiment. Since the authors present the two different approach is it important to evaluate the differences between the simulation of the slick contour only and the simulation of the slick using the particles.

line10: I would rephrase like that: 'The decision of the responsible agencies that need to plan how to respond to an oil spill would also depend on the amount and state of the oil.'

line: 28: i guess this file is provided with the satellite data. Please explain.

page 1985 line 20: I believe you could remove: 'with one mouse click', to me it is not needed.

page 1986 line 9. The sentence 'The coupling of MEDSLIK with ASAR images was initiated following a relevant request from EMSA.' should be moved to the introduction of paragraph 3.1 and the context should be better explain. Are the authors referring to a project with EMSA. What has been set up as a detection system? Please explain.

note 2: I believe note 2 should be removed from the final version of the paper.

page 1987 line 2: 'hindcasts of its past drift' could be easily misinterpreted. I suggest to use backward simulations. Otherwise how would authors refer to forward simulation in the past?

page 1988 line 3: The phrase mention the coupling with the regional product that is not shown in the paper. Please either show a comparison/results of MEDSLIK coupled with the regional MyOcean products or remove this comment.

line 6: MEDESS4MS is a EU project. Please cite the website and provide a very brief description of the project in the introduction of this paper.

lines from 6 to 18: This text should be put in the introduction of the paper because it is not referring to work presented in the paper but it introduce and comments on previous results on intercomparison with in situ data. If you will include a new intercomparison in this paper as advice in the general comments then you should comment on that in the conclusions.

lines 18 to 21: These lines are referring to a comparison that was performed in Coppini et al, 2011. If authors want to show the capability of MEDSLIK of running with MYOCEAN-MED-MFC and with CYCOFOS should first show some results also with MyOcean-MED-MFC and then comment on the fact that higher resolution hydrodynamic forecasts perform better in forecasting the oil slick transport. This part of the text should remain in the conclusion only if you present a comparison of the simulation done with MEDSLIK MyOcean MED MFC and CYCOFOS, otherwise this part is more appropriate for the introduction since you do not show this concept in the paper presently. I strongly recommend to have a comparison between MEDSLIK forced with MYOCEAN-MED-MFC and CYCOFOS.

line 22 to 24: This conclusion should be better explained in the discussion section, please describe in the discussion section which requirements are presented in EMSA, 2009 and how MEDSLIK is responding to these requirements.

page 1989 line 1: I believe you could aknowledge also MEDESS4MS since you strongly refer to it. Moreover some ESA images are presented and in my opinion it would be proper to acknowledge ESA.

page 1995 Caption of figure 4: I recommend not to use the words 'early morning' but report the exact time.

page 1996 Figure 5: Currents and wind should be shown at the centre of each slick and should be visualized at each time interval. Please specify in the caption which currents field is plotted. Please include the palette of oil concentration.

page 1997 Figure 6 seems to be redundant and could be removed since this MEDSLIK model capability is presented in figure 5. Also related text in the paper could be removed.

page 1998 Figure 7 a and b: The coloured captions of this figures are not very clear because the font is too small, please correct by increasing the font.

page 2000 Please zoom to the slicks because the figure is hardly readable.

Interactive comment on Ocean Sci. Discuss., 9, 1973, 2012.