

## ***Interactive comment on “CranSLIK v1.0: stochastic prediction of oil spill transport and fate using approximation methods” by B. J. Snow et al.***

**Anonymous Referee #2**

Received and published: 15 April 2014

### **General Comments**

The paper presents a simpler model called CranSLIK for oil spill tracking using stochastic methods instead of a Lagrangian model. The paper compares the output of the CranSLIK with an open-source Lagrangian model called MEDSLIK II for a single case study. Comparison of the results show that within its limitations, CranSLIK performs adequately compared to MEDSLIK. However, a more significant discussion of the advantages and disadvantages of the two models is needed.

The authors note that the case study is from the Mediterranean sea where the currents are slower. It would also be interesting to see the comparison of results for case studies in other regions.

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Many of the ideas are scattered over different parts of the paper; the paper needs to be edited and rearranged to make it more cohesive and focused. The audience of the paper would happen to be more familiar with the physics of oil spills than the stochastic methods used; the paper needs to explain these methods and their advantages vs traditional Lagrangian modeling.

I think the concepts and ideas presented illustrate the usefulness of a very simplistic model especially in the initial stages of tracking an oil spill. However, the presentation does not make that very clear but it can be achieved with some reorganization of the paper.

### **Specific Comments**

I would recommend that

\* Section 2 be reduced to a summary and moved into the introduction because the objective is not to introduce the physics of oil spill modeling since CranSLIK explicitly ignore them except to chose the variables driving the stochastic model.

\* Section 4.1 also be moved to the introduction because it brings focus to MEDSLIK II which is not the new model being developed.

\* Section 3 be expanded, especially increasing the description of uncertainty modeling using Stochastic methods, and also expanding further on the advantages of the Latin-hypercube vs. other methods of sampling.

\* A new methodology section that significantly expands the list at the end of Section 1 should be written. It should also includes Sections 4.2 and 4.3 that describes the implementation in much more detail.

Finally, Section 5 needs to be reworked to better explain the significance of the results. For example, what is the significance of the most sensitive variables; what is the significance of the bimodal peak. It is also not clear what the criteria for success is. Lines 19-20 in 7061 discuss the "lowest proportion of oil captured." This has not been

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introduced fully previously. Does this mean the area overlap between CranSLIK and MEDSLIK?

I think that an expanded theory section (3) can lay the ground work to make the results more understandable to the audience.

Section 5 introduces hindcast modeling without context. The introduction and explanation needs to be expanded.

CranSLIK is much simpler than MEDSLIK II so the expectations would be tempered when it comes to accuracy. However, the discussion only points out that CranSLIK is restricted to modeling point spills. The discussion needs to be expanded further. For example, how can CranSLIK be modified to distort the circular shape of the spill. How else can the model be improved: more variables, more or higher order cross-correlations, etc.

I would also recommend that the regression modelling be described better: order of polynomials, cross-correlations, coefficients, r-squared value, etc.

Section 5.3 includes a reference to runs using 5,000 and 10,000 samples. Model results using different sample sizes should be presented to illustrate the significance or lack thereof of sample size.

7049: "Often the computational cost involved in running a full simulation is too high." What is the usual run time for Lagrangian oil spill models?

### **Technical Corrections**

General technical correction comment 1: "the model" or "the developed model" or variations thereof are used everywhere in the paper. It would be better to use CranSLIK instead. Especially in the results and discussions section where it is often not clear what "model" refers to.

General technical correction comment 2: There are repeated sentence clusters, for

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example, lines 8-11 in 7049 and lines 20-24 in 7050; lines 22-26 in 7051 and lines 4-8 in 7055. They should be rephrased.

General technical correction comment 3: There are many run-on sentences that need to be edited. For example: 7050: "However, significant advances have been made since then, for example, the role of microorganisms in biodegradation is now better understood as discussed in McGenity et al. (2012)" 7056: "Primarily it is performed to simplify the problem however it also means that the developed methodology can easily be applied to data from any source." 7057 "Note however that it is not possible to predict the shape of the resultant graph beforehand however it is expected to be more simple than the test shape." 7057: "The result was that the destination can be determined by the current and wind velocities, and the size of the spill depends on the initial spill size as well as the spill age, that is time since initial spill." 7061 "It is possible in this case to apply an interpolation since the quantities for the next time step are known however this would not be possible in a real scenario."

General technical correction comment 4: In a few places, some ideas are introduced without prior context. For example, Abstract: What is "the Algeria scenario?" It is introduced without context. 7050: design hypercube is introduced without context.

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Interactive comment on Geosci. Model Dev. Discuss., 6, 7047, 2013.

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