

Geosci. Model Dev. Discuss., referee comment RC2  
<https://doi.org/10.5194/gmd-2021-400-RC2>, 2022  
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## **Comment on gmd-2021-400**

Anonymous Referee #2

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Referee comment on "ROMSPath v1.0: offline particle tracking for the Regional Ocean Modeling System (ROMS)" by Elias J. Hunter et al., Geosci. Model Dev. Discuss., <https://doi.org/10.5194/gmd-2021-400-RC2>, 2022

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### **Summary:**

The manuscript ROMSPath v1.0: Offline Particle Tracking for the Regional Ocean Modeling System (ROMS) describes the details and benefits of a new offline particle tracking (OPT) tool for analysis of hydrodynamic model output. The new OPT, ROMSPath, is assessed by comparing particle tracking results to an existing OPT code, the LTRANS Lagrangian transport model, and online particle tracking by enabling ROMS floats. The comparisons were conducted for various configurations of the code in order to assess and demonstrate the utility of a range of new features available to ROMSPath.

My general assessment is that this paper presents a substantial advance in modelling science. The approach and methods are valid and the approach and assumptions underlying the particle tracking framework were clearly structured and explained. However, in the specific comments below I have outlined some areas where the results section in particular could be improved in order to support the interpretations and conclusions, in addition to some minor formatting comments.

### **Specific Comments:**

Line 101: Include a comparative analysis of the number of particles that run aground in order to support this claim.

Lines 284-286, 291, 312: How was this specific method chosen? Was there sensitivity to using starting positions in different parts of the domain, for example? Were these based on dynamics or patterns observed in previous analyses?

Line 329: What does it mean that “The ROMSPath OTP output is always closest to the ROMS floats output”? Is this at each time, on average, or also for each particle trajectory? Please specify and quantify this distinction.

Line 340, Figure 4: Include additional quantitative support to summarize this comparison, such as dispersion, offshore transport, and trajectory of the center of mass.

Lines 377-379: Comment on the implications, and how this compares across particle tracking models (note, this relates to the previous comment re: Line 340). For example, is there evidence to suggest that the increased dispersion apparent with including small scale hydrodynamics through nesting and turbulent parameterizations in ROMSPath simulations improves the accuracy of this model compared to other formulations?

Line 393-394: It is hard to see from this figure that the particles tended to be closer to shore. Is there a statistic you can use for comparison, such as the mean distance from shore between the two, or the mean water depth of particles to test the significance of this observation?

Line 405: Where is the improvement in “efficiency” with ROMSPath relative to LTRANS demonstrated in the results section? Also, is the improved “accuracy” in relation to the native ROMS result? These two points should be clarified in the text of this summary.

Summary (i.e. Line 403): Can the authors comment on the results and features of ROMSPath in the context of other OPT applications (e.g. Lines 39-41), and in the context of previous works?

### **Formatting Comments:**

Line 41: remove extra space after the parentheses

Line 63: “we use hydrodynamic model output generated for the larval transport study mentioned above” — this is not specific, please specify what study is referenced

Line 313: add a space after the period

Line 328: Capitalize “table”

Line 391: "thetwo" should be the two (space needed)