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Interactive comment on "Turbulent dispersion properties from a model simulation of the western Mediterranean" *by* H. Nefzi et al.

Anonymous Referee #2

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The study describes particle dispersion processes in two-dimensional turbulence using ROMS model. The study is however poorly written taking into account both language and content. It is not mentioned why this study is important and what new aspects it introduces. In addition, the terminology is very confusing, e.g. we can find 'asymptotic regime', 'anomalous regime', 'Richardson regime', 'intermediate regime', 'intermediate range', 'inertial range' – all without a clear definition how they are different. Furthermore, the results are meager with mismatching text and figure information.

Abstract

Analyze dispersion properties, which properties? Why those two depths? 'Three well-known regimes of relative dispersion' – then what is new? Why it is important that this model gives such day intervals for different regimes?

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Introduction

First paragraph has weak argumentation, better to delete it at all.

Confusion between absolute dispersion, relative dispersion

Fails to introduce new aspects in this study. After all, the authors agree that there are many numerical studies showing the three regimes.

ROMS model

Who developed it? - Reference is needed earlier

Relative dispersion

Very short and confusing description. Richardson regime is described for 3D and 2D isotropic homogeneous and stationary flows. Does the study investigate 2D flow or 3D? In 3D the authors talk about one asymptotic regime, while in 2D about two inertial ranges. Again confusion in terminology.

Eq.1 should be average instead of sum.

Equation in (1104) line 18 has bad notation: the second term in the equation should have brackets inside the square brackets. Here Dx, but everywhere else just D.

Results

Why those depths are chosen? Here authors do not talk about regimes, but about phases - again change in terminology.
(1106) line 5 – should be - 'until about day 10', not 'until about day 20'.
(1106) line 13- units of 0.05?
Figure 3a – strange symbols in ordinate axis
Figure 3c – label of this and other figures could be more informative. E.g. what D0 is in 3a. Why is this figure in logarithmic scale, while 3a in linear scale. Show in the figure that b is roughly equal 1.

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(1106) Lines 17-18: a link to equation how Z is computed would be useful
(1106) Lines 19-21: why only zonal dispersion investigated?
Figure 4a – absolute disagreement between day intervals in text and in the figure. In text it says that regimes change at day 3 and day 20 – in the figure though it seems more like day 1 and 20. What is the criteria for choosing the number?
Can not see in figure that the growth in second phase is between 1.6 and 3. The figure must be more self-explaining. Can not see that after day 20 the growth is linear. Overall, why logarithmic scale? Almost no discussion about different D0s. Besides, the shape of all D0s look almost the same.

(1107) line 5. Sentence is not understandable. First linear than exponential, so which one? All three D0 cases look very similar, so why in text only two D0 mentioned? Do not see in figure that k varies between 0.74 and 0.82.

(1107) lines 12- 19. Again all three D0 cases are very similar, just shifted (Figure 5a). However, only two are described as having plateau. Plateau width is computed just for the first D0, but actually is observed in all. Overall description inconsistent. Even less can be found about Figure 5b. Why 11km and 55km in Figure 5b? Mark it. Actually, plateau of red line starts at about 6 km, green line 12km, and blue 20 km. How do you define those positions, by visual inspection, or have some criteria?

(1108) line 11: where do 5 and 15 days come from? Which figure? When compared figures 4a and 7 it seems that the first phase is only 1-2 days longer.
(1108) line 14: Do not see that at 500m turbulent processes are much different from 44m. Therefore this last sentence is not appropriate.

(1108) lines 16-18. how consistent? Really consistent?

Conclusion

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What is new in the study? Looking through comments in Result section, I find results overall dubious. I would recommend the author first to make the figures self-explaining; such that all the results would be clearly visible on them. Because now one asks oneself where do the results come from.

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