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Interactive comment on “Intrusion of coastal waters into the pelagic Eastern Mediterranean: in situ and satellite-based characterization” by S. Efrati et al.

Anonymous Referee #2

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Review of “Intrusion of coastal waters into the pelagic Eastern Mediterranean: in situ and satellite-based characterization,” by Efrati et al.

The authors present a study of near real time in situ data (hydrographic, biogeochemical) and remote sensing data (ocean color, altimetry) in the eastern Mediterranean. Lagrangian Coherent Structures (LCS) extracted from the altimetry derived flow are used to optimally designed sampling strategies. The authors conclude that horizontal stirring is the main responsible process controlling the intrusion of nutrient rich coastal water into the oligotrophic open sea water of the Levantine basin. The topic is suitable for publication in *Biogeosciences Discussions*. Listed below are a few points that need

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clarification.

1. The use of altimetry derived velocities in near coastal applications should be discussed in the paper.
2. The authors should make a clear case for employing ridges of FSLE for identifying LCS, particularly given recent formal developments (Haller 2011; Haller and Beron-Vera 2012).
3. I find it difficult to see any correlation between the *overall* structures revealed in the FSLE plot and those in the chlorophyll and SST pictures in Fig. 2. This makes me wonder about the validity of the explanation provided for the intrusion.
4. The authors speculate on several possible sources of nutrient rich coastal water. I wonder if (numerical) tracer release experiments can help elucidate the most likely nutrient source as done, for instance, in Olascoaga et al. (2008).

References

- Haller, G. (2011). A variational theory of hyperbolic Lagrangian Coherent Structures. *Physica D* **240**: 574–598.
- Haller, G., and F. J. Beron-Vera (2012). Geodesic theory of transport barriers in two-dimensional flows. *Physica D* **241**: 1680–1702.
- Olascoaga, M. J., F. J. Beron-Vera, L. E. Brand, H. Koçak (2008). Tracing the early development of harmful algal blooms on the West Florida Shelf with the aid of Lagrangian coherent structures. *J. Geophys. Res.* **113**: C12014.

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