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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "The effect of cyclones crossing the Mediterranean region on sea level anomalies at the Mediterranean Sea coast" *by* Piero Lionello et al.

Anonymous Referee #2

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In this paper, the authors tried to relate the sea level anomalies at 9 stations in the Mediterranean on a climatological basis with cyclonic tracks, cyclone position and intensity and to further analyse this relationship. The paper is well structured. However, I have to admit that I tried very hard to follow all the methodological steps and to understand some explanations. At some points, verification is required. Furthermore, I have many queries concerning the relationship of negative SLA with cyclones. More specifically: 1. Abstract, page 1, line 2: ". . .... with dynamics involving different factors". I think that this not valid since the authors discuss only the inverse barometer effect. The effect of the wind is also speculated as I will mention in a subsequent comment 2. Section 1, page 2, lines 24-29: the objectives are not clear and robust. In the whole

paragraph, the same objective is actually repeated with other words. 3. Section 2: the hindcast is based on a 2D barotropic model. I think that this allows many simplifications in the results since the temperature variations are not considered. This is an important limitation and could account for the big differences of SLAs in the observed and simulated time series. 4. Page 4, line 15: What the author mean "depth of the cyclone"? 5. Section 3.1, page 4, lines 24: I am really surprised about these results. The differences are enormous!!!!!The authors should comment on that. I am wondering about the reasoning for the hindcast. 6. Sections 3.3-3.4: The association of the SLAs with the density of cyclones is rather arbitrary. For instance: why a radius of 20 degs from the coast station is selected for search of MSLP? Why the computation of the relative frequency is based on 10 deg radius? Why a time step of 10 days is selected? Why the reference point is located in the Ioanian sea based on a subjective criterion? These thresholds should be verified. 7. I am wondering why the negative SPAs are related with cyclones and not with anticyclones. This seems a more realistic thought and approach. 8. I am not convinced about the reliability of the results in sections 3.3 and 3.4. Many findings are speculated and not verified. The positive SLAs could be related with frontal systems that are not considered in this study. 9. Section 3.5, page 11, line 4: why a linear regression is used? A lag correlation should be attempted since the effect of cyclones on the storm surges is not always instant. 10. Section 3.6: The term "dynamics" is not relevant since there is no discussion on the flow regime.

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