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Interactive comment on “Ventilation of the Mediterranean Sea constrained by multiple transient tracer measurements” by T. Stöven and T. Tanhua

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We would like to thank the Anonymous Referee #1 for the comment and the suggestions to the paper “Ventilation of the Mediterranean Sea constrained by multiple transient tracer measurements”.

The “age” modelling of the ocean is a very complex field whereat several models have been revised, evaluated or stated invalid (see page 9, line 18 – page 12, line 5). Terms and definitions such as apparent age, tracer age, water age as well as ventilation time and ventilation rate are used within different models and estimations. It is obvious that different models lead to results, which are in some cases strongly deviating from each

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other. For the definition of ventilation rates we refer to Primeau et al. (2006)[1] and Hall et al. (2007)[2] which can be currently taken as state of the art estimate. It is based on a cumulative ventilation rate distribution similar to the Transit Time Distribution model. However, such model investigations with our transient tracer measurements are not part of this paper but will be more in focus of future work.

We think that comparisons with existing “age” and ventilation rate estimates of the Mediterranean Sea should be avoided due to significant differences of the underlying models and approaches. In fact it is more reasonable to keep the TTD model results separated from others in order to prevent any further confusions of the concepts. Anyhow, we will rewrite the belonging introduction part to highlight the differences of the age concepts with respect to previous publications for a better and easier understanding of the specific issues. The abstract will be revised and mean age results will be added. A clear definition of a sufficient sample resolution will be provided.

Concerning an extended methodology we refer to the diploma thesis by Stöven (2011)[3] which is published at the Geomar OceanRep (see page 6, line 17-19). The diploma thesis includes a complete technical overview, data statistics, calibration methods and descriptions of sampling and measurement procedures.

[1] Primeau, François W., Mark Holzer, 2006: The Ocean’s Memory of the Atmosphere: Residence-Time and Ventilation-Rate Distributions of Water Masses. *J. Phys. Oceanogr.*, 36, 1439–1456, doi: 10.1175/JPO2919.1

[2] Hall, Timothy M., Thomas W. N. Haine, Darryn W. Waugh, Mark Holzer, Francesca Terenzi, Deborah A. LeBel, 2007: Ventilation Rates Estimated from Tracers in the Presence of Mixing. *J. Phys. Oceanogr.*, 37, 2599–2611, doi: 10.1175/2006JPO3471.1

[3] Stöven, T.: Ventilation processes of the Mediterranean Sea based on CFC-12 and SF6 measurements, GEOMAR OceanRep, diploma thesis, Christian-Albrechts-Universität zu Kiel, Kiel, 2011.

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