

Interactive comment on “The transient distributions of nuclear weapon-generated tritium and its decay product ^3He in the Mediterranean Sea, 1952–2011, and their oceanographic potential” by W. Roether et al.

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We appreciate the favorable judgment of our work by the reviewer. To his technical comments we reply as follows: #1, add another section of tritium- ^3He ages? We have restricted the presentation of a tritium- ^3He age section to Fig. 11. The point is that our paper is meant to provide the basis for oceanographic uses of Mediterranean tritium and ^3He data, i.e., what are the available data sets, features of their distributions, procedure to separate the tritiogenic ^3He and how well that works. Section 7.3 gives ages in LIW and Fig. 11 simply as examples of application. Another age section would

C330

require a detailed comparison with Fig. 11, which we preferred to avoid. #2, omit Fig. 3? We believe that by showing both the figures 2 (decay-corrected to a common date) and 3 (corrected to sampling date) the effects of redistribution and tritium decay become more apparent, which we regard as useful. #3, rearrange Figs. 2, 5, 7, and 9? The reviewer is uneasy about this item, we prefer to leave the synchronous zonal view. #4, Mediterranean not completely unique for little terrigenous helium? We are of course well aware of Bill's seminal work. The point that we want to make that in the Mediterranean we can separate the tritiogenic ^3He over the entire water column (even when the tritium concentrations have become very much lower than those treated by Bill). We shall in the revision mention Bill's work. #5, fonts in figures too small. We have redone the figures with a larger font. #6, repeated word. Trivial error, thanks for alerting us. #7, mention WMT in Introduction? At present both the EMT and the WMT are only mentioned (and explained) in Section 2. We shall mention both also in the Introduction. #8, conversion of tritiogenic ^3He to TU? The conversion of tritiogenic ^3He from % to TU is in no way dependent on He isotope concentrations. #9, natural tritium a concern? Good question. Fig. 1 gives an approximate concentration of natural tritium (~ 0.3 TU), enough to produce somewhat above 1% of natural tritiogenic ^3He . Our actual tritiogenic ^3He is considerably higher and much of the pre-nuclear portion has been lost from the Mediterranean by the time of our observations, so that the natural portion can safely be ignored. In future applications using the Transient Time Distribution methodology the natural tritium will be accommodated naturally. We shall consider to add a remark on the natural tritium issue. #10, add equation for ^3He components. Equation will be added. #11, missing zero subscript. Thanks to the reviewer for pointing out our error. #12, agree with what? Sentence will be reworded. #13, comforting result? Argument will be removed. #14, error of the ratios in Table 2? The text says error $\sim 10\%$. #15, small panel in Fig. 1 useful? The panel will be removed and the result of it will briefly be mentioned in the text. #16, different cruise tracks for tritium and ^3He (Figs. 5 and 9)? Tracks are correct, tritium and helium isotopes were measured at different stations.

C331

