We thank the reviewers and associate editor for their efforts on behalf of our manuscript. We submit a final version which addresses the following technical correction from Reviewer 3:

“Please note that the use of Optimum MP (Tomczak and Large 1989) versus MP (Tomczak 1981) is incorrect and requires correction. "Optimum" indicates that the results of the analysis are "non-negative" - with the expense in losing one degree of freedom (4 parameters can resolve up to 4 source waters). Technically correct would be that with 4 parameters only 3 source waters can be resolved to ensure the system is "overdetermined" (not only determined).
Furthermore, if one uses the "extended OMP" one more degree of freedom is lost because a new unknown (amount of remineralized material) is added.
Please adjust the references and methods naming accordingly.”

We agree with the distinction made by the reviewer and have changed the use of ‘OMP’ to a more generic ‘mixture model’ where relevant. We explain the differences between our implementation and the traditional usage of OMP in the appendix which details the method:

“We note that the mixing model used in this study differs in several ways from the traditional extended OMP. We solve a ‘mixing-triangle’ of three source water types, rather than four as used in, for example, Tomczak Jr (1981). Adding an extra degree of freedom to track remineralization, we thus have a total of four degrees of freedom. Typically, remineralization is tracked as the conversion of oxygen to phosphate and nitrate using the Redfield Ratio. Since we do not have access to full nutrient fields for the ESM experiments used in this study, we simply allow for the conversion of oxygen to AOU with a ratio of -1. As constraints, we use potential temperature, salinity, dissolved oxygen, AOU and mass conservation. Since AOU is a function of dissolved oxygen, potential temperature and salinity, we have four unique constraints. Thus, our mixture model is equivalent to a determined set of linear equations, rather than an over-determined set (i.e. ‘Multiparameter Analysis’, rather than ‘Optimum Multiparameter Analysis’; Tomczak Jr, 1981; Tomczak and Large, 1989). However, since AOU must also be included in the calculation, we leverage the least squares method used in solving the over-determined problem.”