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How should sparse marine in situ measurements be compared to a continuous model: an example

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Abstract. This work demonstrates an example of the importance of an adequate method to sub-sample model results when comparing with in situ measurements. A test of model skill was performed by employing a point-to-point method to compare a multi-decadal hindcast against a sparse, unevenly distributed historic in situ dataset. The point-to-point method masked out all hindcast cells that did not have a corresponding in situ measurement in order to match each in situ measurement against its most similar cell from the model. The application of the point-to-point method showed that the model was successful at reproducing the inter-annual variability of the in situ datasets. Furthermore, this success was not immediately apparent when the measurements were aggregated to regional averages. Time series, data density and target diagrams were employed to illustrate the impact of switching from the regional average method to the point-to-point method. The comparison based on regional averages gave significantly different and sometimes contradicting results that could lead to erroneous conclusions on the model performance. Furthermore, the point-to-point technique is a more correct method to exploit sparse uneven in situ data while compensating for the variability of its sampling. We therefore recommend that researchers take into account for the limitations of the in situ datasets and process the model to resemble the data as much as possible.

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