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Supplement for

Seeing through the Sea with Satellites: Reconstructing Ocean Subsurface Temperature and Salinity with Satellite Observations

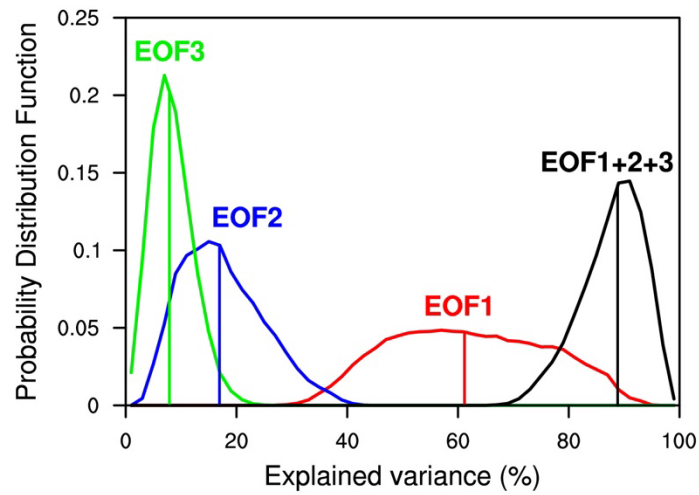
Shizuo Liu and Shineng Hu *

Nicholas School of the Environment, Duke University, Durham, NC, USA

* Corresponding author. Email: shineng.hu@duke.edu

This PDF file includes:

Fig. S1 to S6



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36 **Figure S1.** Probability distribution function for the explained variance of EOF1 (red
 37 curve), EOF2 (blue curve), EOF3 (green curve) and the sum of the first three EOFs
 38 (black curve) for the global ocean. Instead of grid number-based, each grid is weighted
 39 by its area weight (see Data and Methods for details). The solid vertical lines show the
 40 median levels of the explained variance of each EOF or the sum of the first three EOFs.

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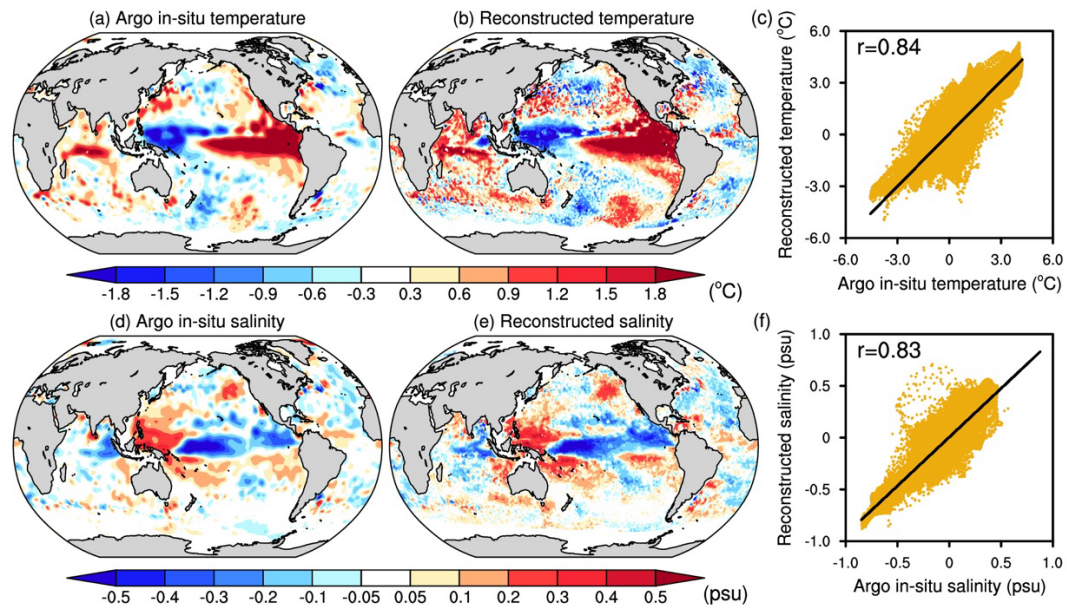
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56 **Figure S2.** Comparisons of the spatial distribution of Argo in-situ (left column) and
 57 reconstructed (middle column) ocean subsurface temperature (a, b) and salinity (d, e)
 58 anomalies for the average of 1-100 m in January 2016 at 0.25° x 0.25° resolution.
 59 Scatter plots (right column) of Argo in-situ versus reconstructed temperature anomalies
 60 (c) and salinity anomalies (f) for all the global grids in January 2016. The correlation r
 61 between Argo in-situ data and reconstruction is shown in the left-upper side of each
 62 panel.

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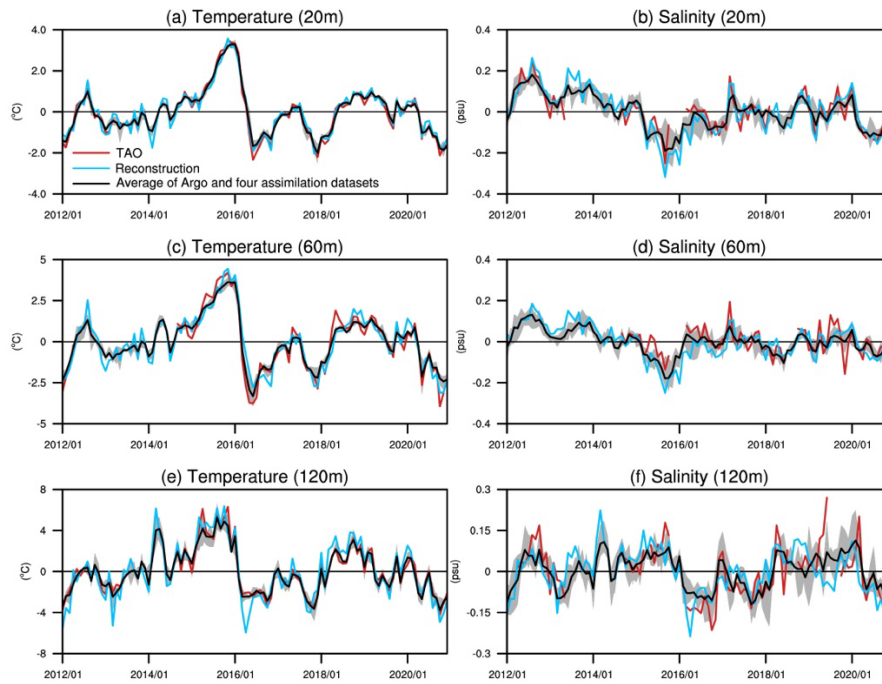
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85 **Figure S3.** Comparisons between TAO/TRITON, our reconstruction, and other
 86 subsurface datasets at the site of EQ, 140° W for the depths at 20 m, 60 m and
 87 120 m. The TAO/ TRITON time series is represented by the red curve, the reconstructed time
 88 series by the blue curve, and the average of Argo in-situ data and four assimilation data
 89 (ORAS5, SODA3, ECCO4r4, IAP) is depicted by the black curve. The gray shading
 90 curve denotes one standard deviation across the Argo, ORAS5, SODA3, ECCO4r4, and
 91 IAP datasets.

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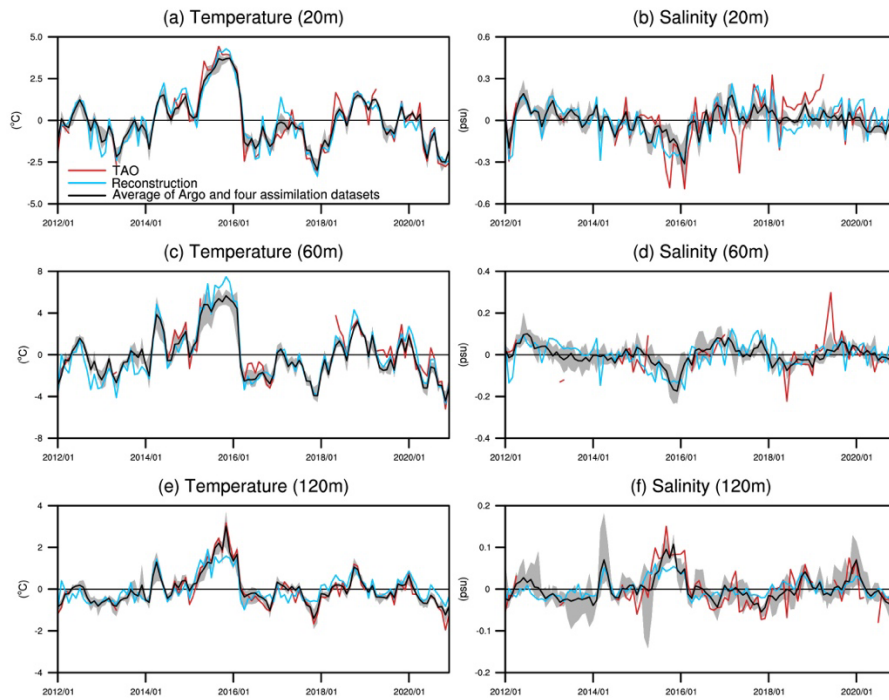
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103 **Figure S4.** Comparisons between TAO/TRITON, our reconstruction, and other
 104 subsurface datasets at the site of EQ, 110° W for the depths at 20 m, 60 m and 120 m.
 105 The TAO/ TRITON time series is represented by the red curve, the reconstructed time
 106 series by the blue curve, and the average of Argo in-situ data and four assimilation data
 107 (ORAS5, SODA3, ECCO4r4, IAP) is depicted by the black curve. The gray shading
 108 curve denotes one standard deviation across the Argo, ORAS5, SODA3, ECCO4r4, and
 109 IAP datasets.

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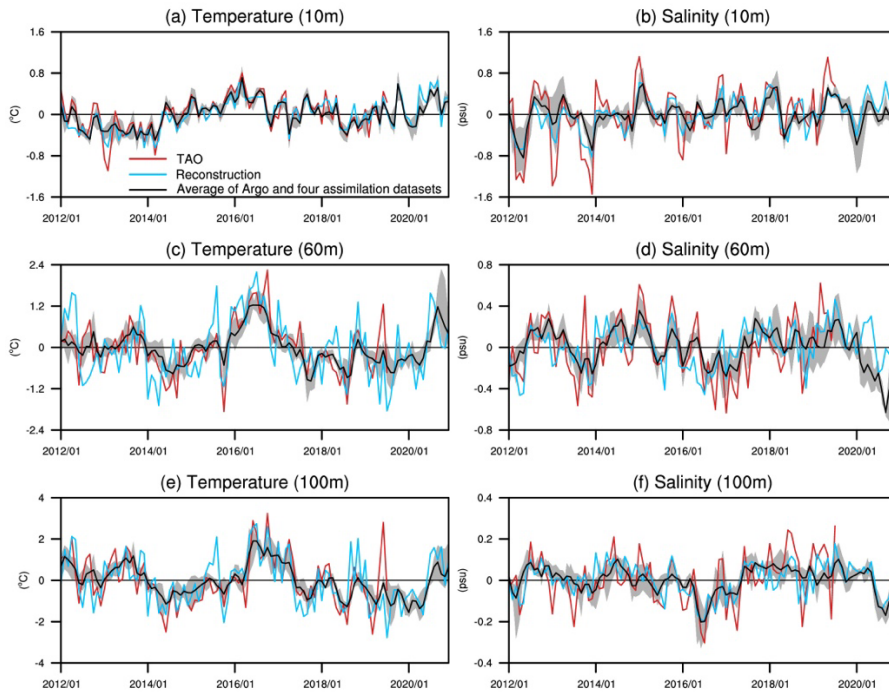
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121 **Figure S5.** Comparisons between TAO/TRITON, our reconstruction, and other
 122 subsurface datasets at the site of 15° N, 90° E for the depths at 10 m, 60 m and 100 m.
 123 The TAO/ TRITON time series is represented by the red curve, the reconstructed time
 124 series by the blue curve, and the average of Argo in-situ data and four assimilation data
 125 (ORAS5, SODA3, ECCO4r4, IAP) is depicted by the black curve. The gray shading
 126 curve denotes one standard deviation across the Argo, ORAS5, SODA3, ECCO4r4, and
 127 IAP datasets.

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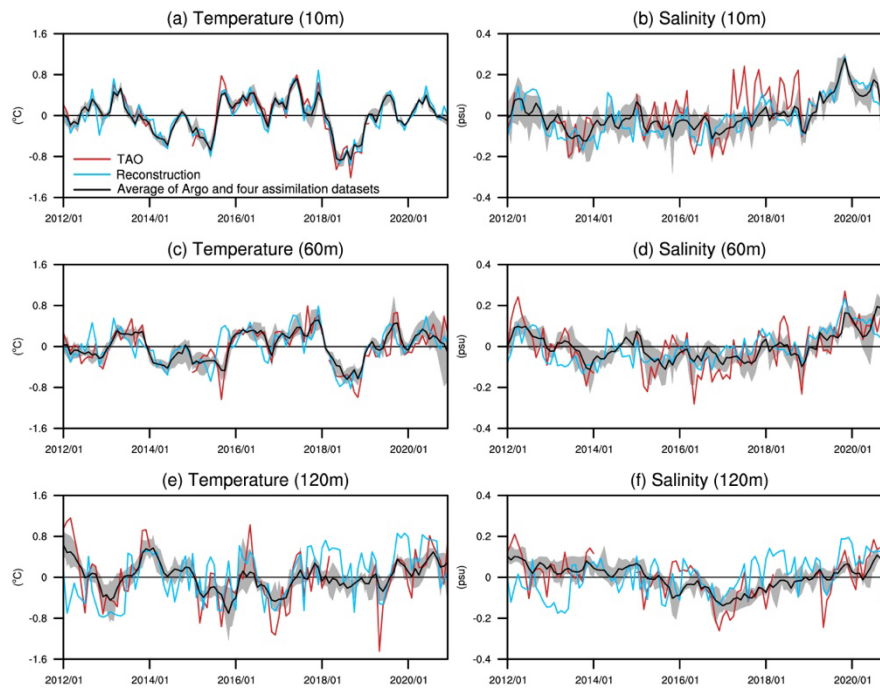
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139 **Figure S6.** Comparisons between TAO/TRITON, our reconstruction, and other
 140 subsurface datasets at the site of 20° N, 142° W for the depths at 10 m, 60 m and 120
 141 m. The TAO/ TRITON time series is represented by the red curve, the reconstructed
 142 time series by the blue curve, and the average of Argo in-situ data and four assimilation
 143 data (ORAS5, SODA3, ECCO4r4, IAP) is depicted by the black curve. The gray
 144 shading curve denotes one standard deviation across the Argo, ORAS5, SODA3,
 145 ECCO4r4, and IAP datasets.

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