

Supplementary Information for

Detecting regional deep-ocean steric changes remains challenging with sea level budget analyses

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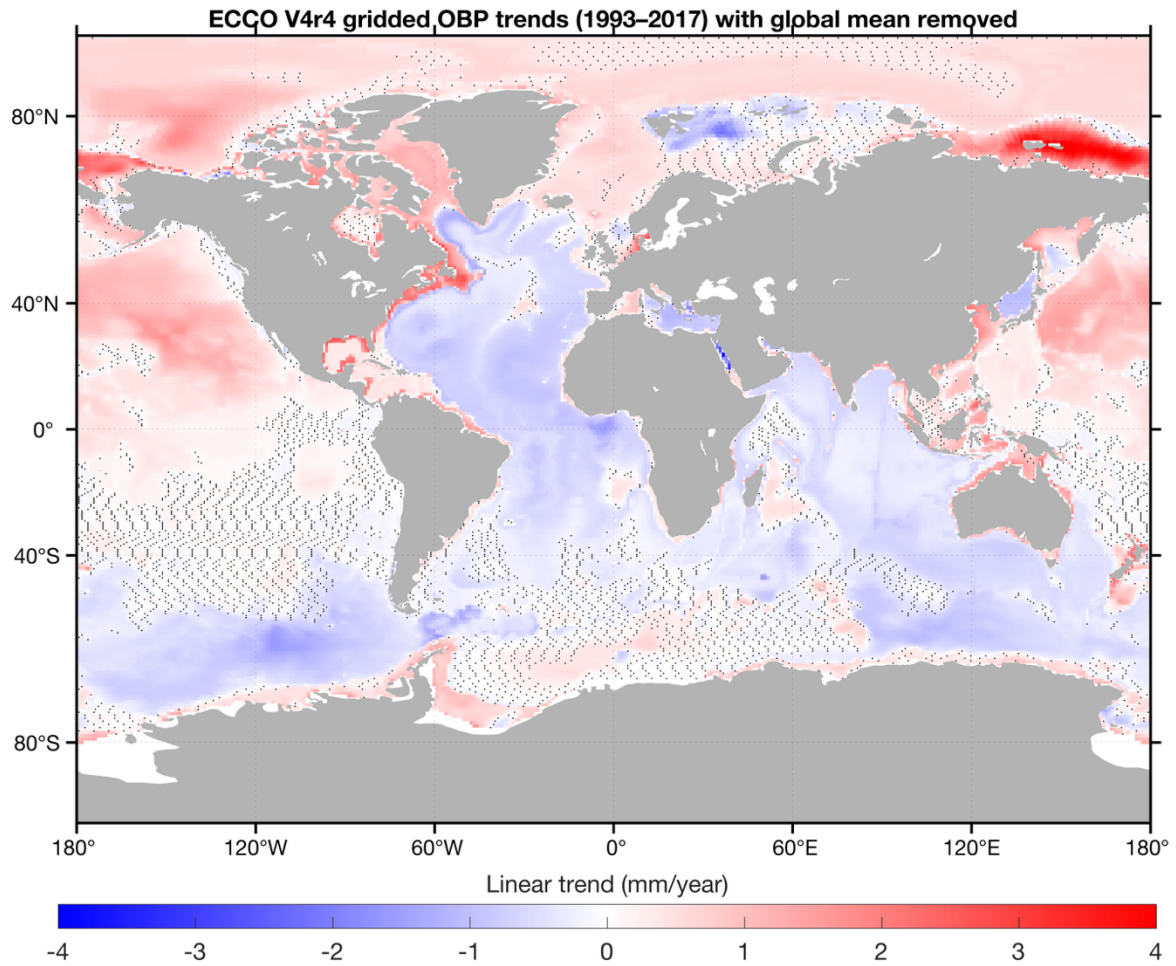
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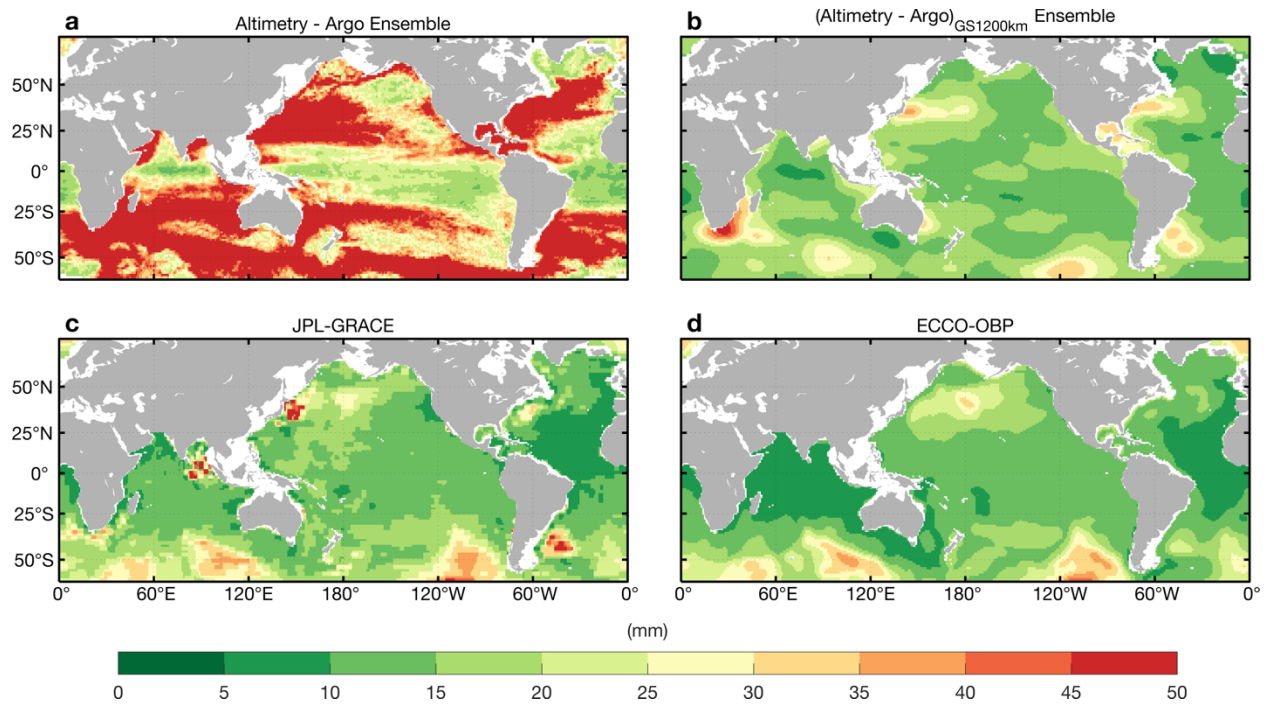
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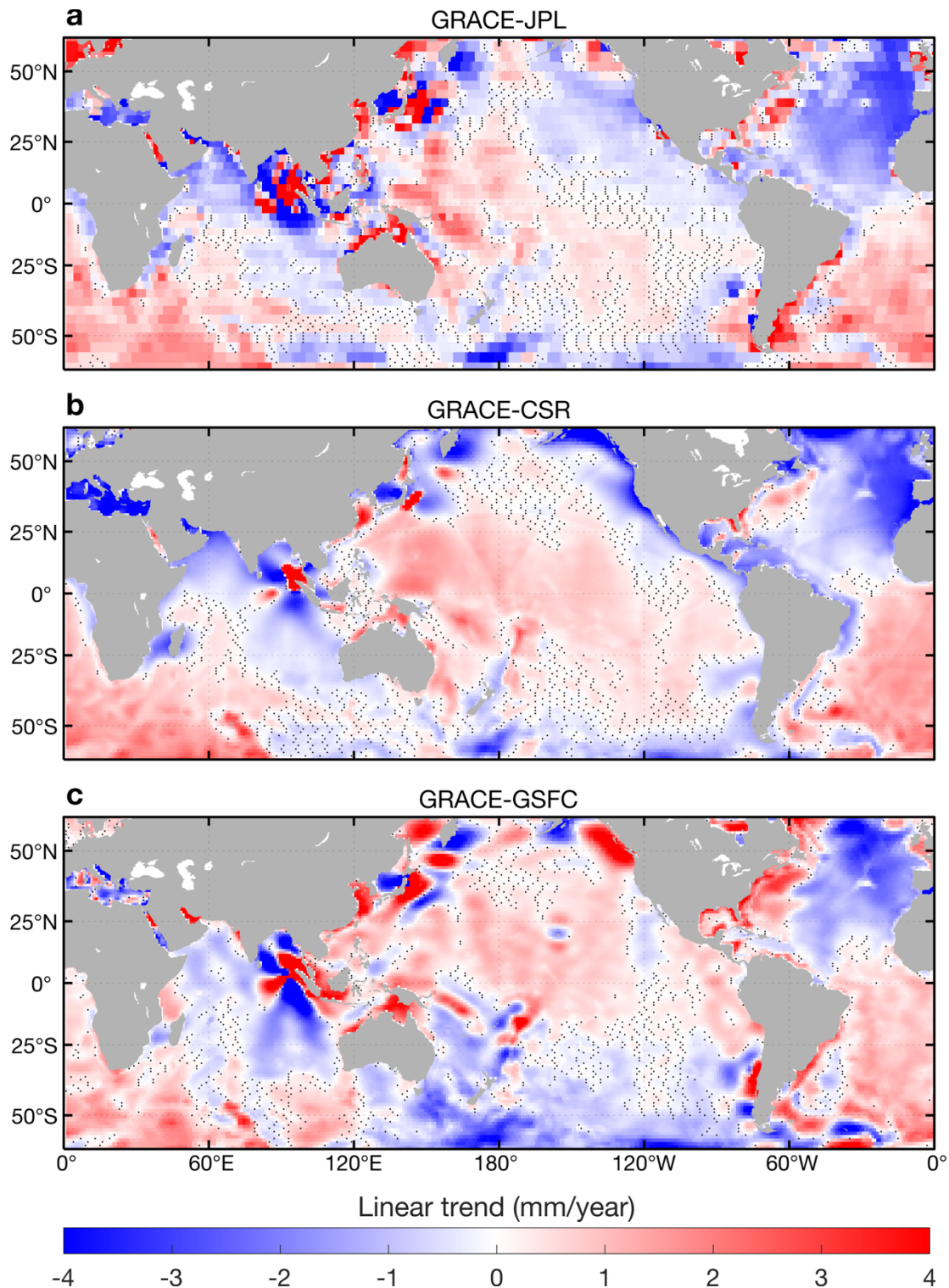
Supplementary Figs. 1 to 3



Supplementary Fig. 1 | Linear trends of ECCO ocean bottom pressure (OBP) after removal of the area-weighted global mean over 1993–2017. Dots mark regions where the trend is not statistically significant at the 95% confidence level.



Supplementary Fig. 2 | Spatial patterns of variability in sea-level budget terms. Shown are the standard deviations of **a**, the residual term computed as altimetry minus Argo upper-ocean steric sea level (Altimetry–Argo); **b**, the same residual after Gaussian spatial smoothing; **c**, GRACE/GRACE-FO ocean bottom pressure (OBP) from the JPL mascon product; and **d** OBP from ECCO. The localized extrema in **c** over the Cocos Basin and the northwest Pacific reflect earthquake-related mass redistribution signals.



Supplementary Fig. 3 | Linear trends of GRACE/GRACE-FO ocean bottom pressure (OBP) across three mascon solutions after removal of the area-weighted global mean over 2005–2022. a, JPL; b, CSR; and c, GSFC. Dots mark regions where the trend is not statistically significant at the 95% confidence level.