

Validation of GRACE gravity field products with globally distributed in situ ocean bottom pressure observations

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Poster-
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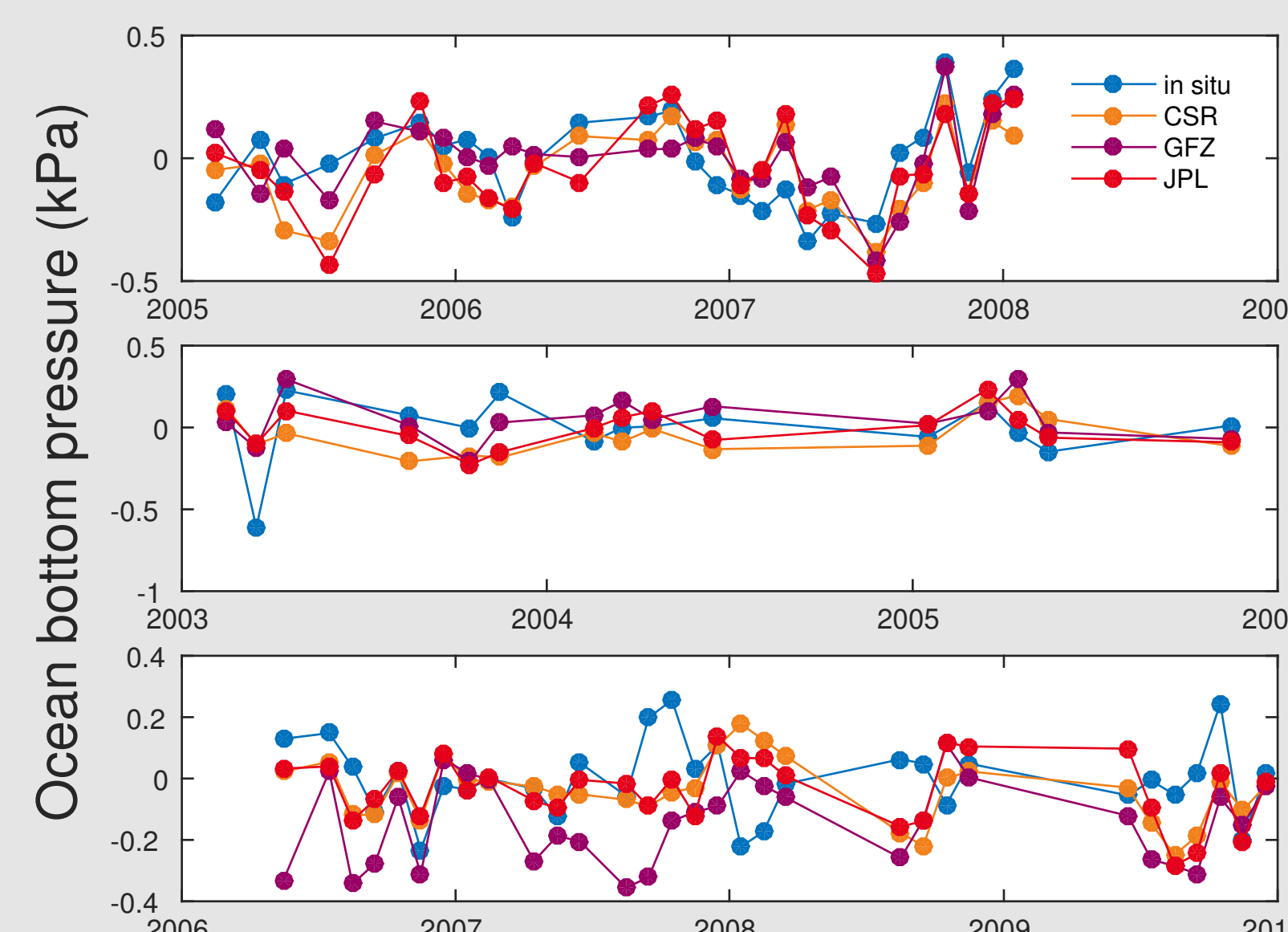
Introduction

Time variable global gravity field models are processed by different research institutions world-wide. Currently, the solutions are compared and subsequently combined within the "European Gravity Service for Improved Emergency Management (EGSIEM)" project funded by the European Union. To objectively assess the differences between the results from different groups, and also to evaluate the impact of changes in the data processing at an individual institution in preparation of a new data release, a validation of the final GRACE gravity fields against independent observations is required. Ocean bottom pressure data from globally distributed sensors can be used for such a validation.

GRACE data

GRACE Level-2 solutions from three different processing centers (CSR, GFZ and JPL) are validated against in situ observations. All solutions were postprocessed in the same way to obtain gridded data and the time series from four closest grid points are bilinearly interpolated to the in situ station location.

bilinear interpolation of 4 closest grid points to the station location



Comparison of in situ and GRACE based ocean bottom pressure time series

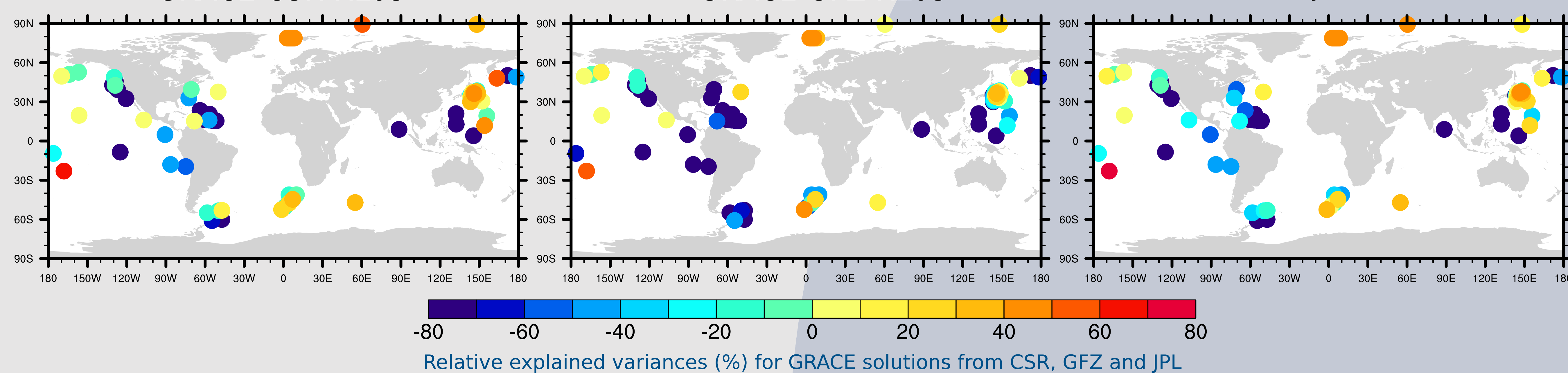
Conclusion

While there is relatively good agreement between all three GRACE solutions and in situ data in the higher latitudes, where GRACE data explains up to 60% of in situ measurements, in the lower latitudes the explained variances of all validated GRACE solutions are mostly negative due to typical GRACE striping artefacts.

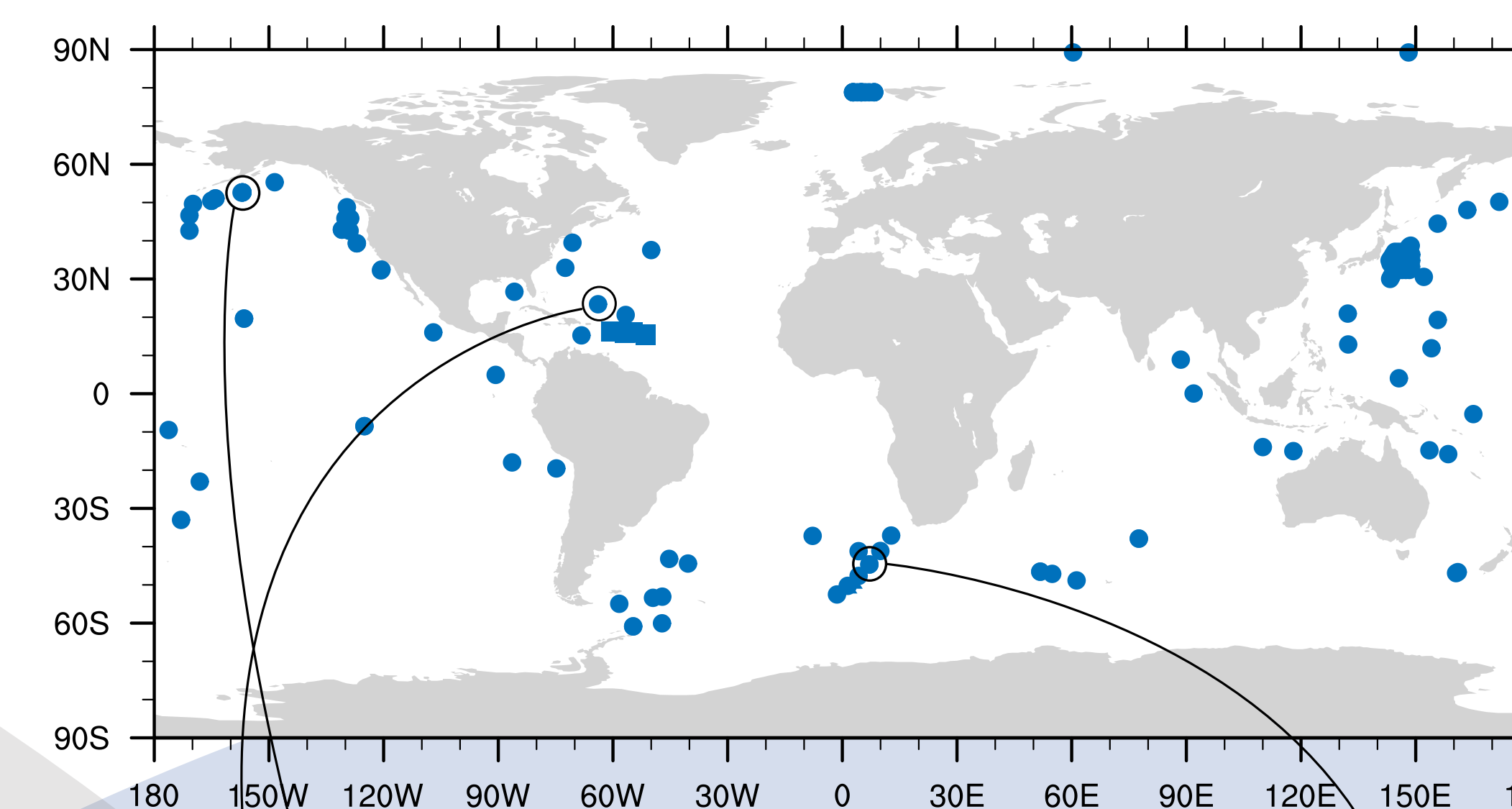
GRACE CSR RL05

GRACE GFZ RL05

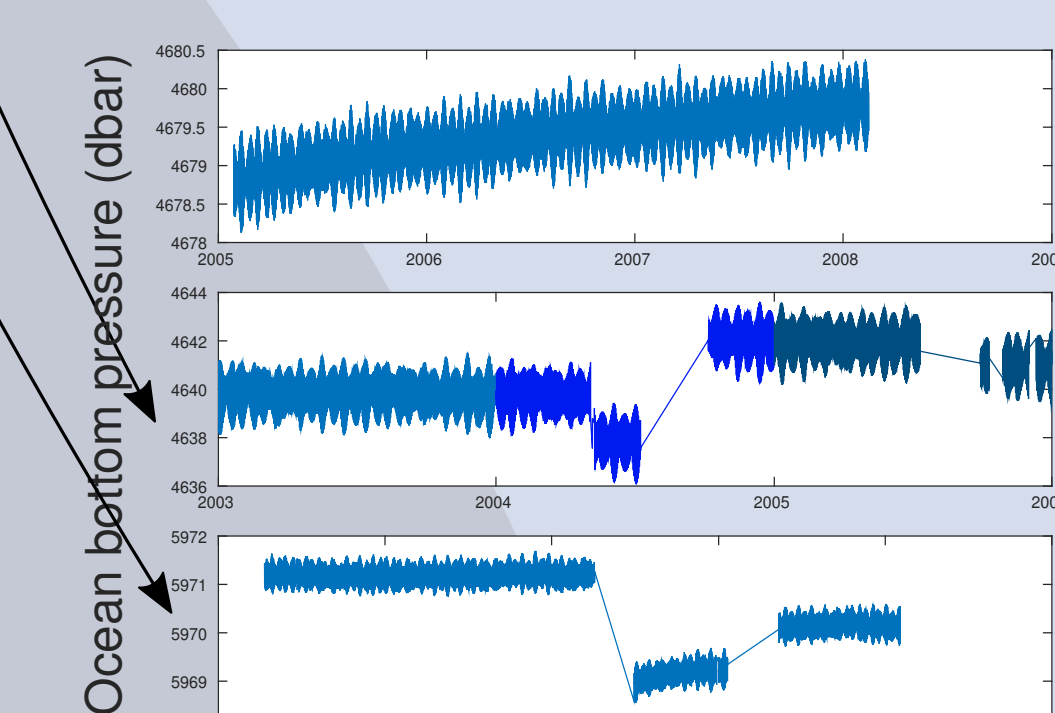
GRACE JPL RL05



Relative explained variances (%) for GRACE solutions from CSR, GFZ and JPL

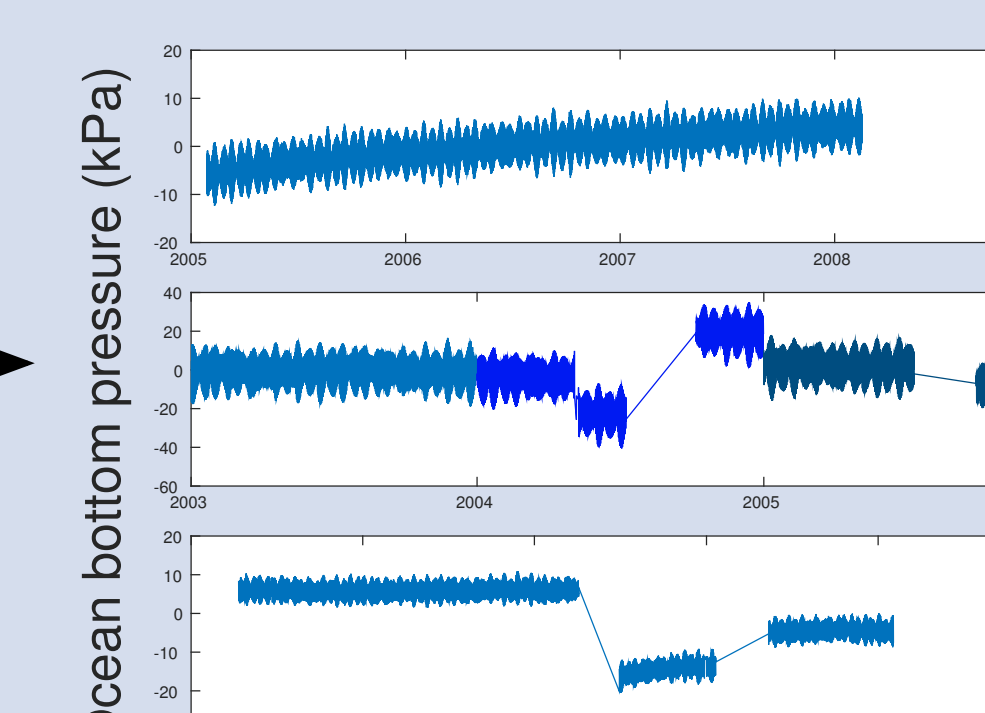


Stations with in situ measurements of ocean bottom pressure



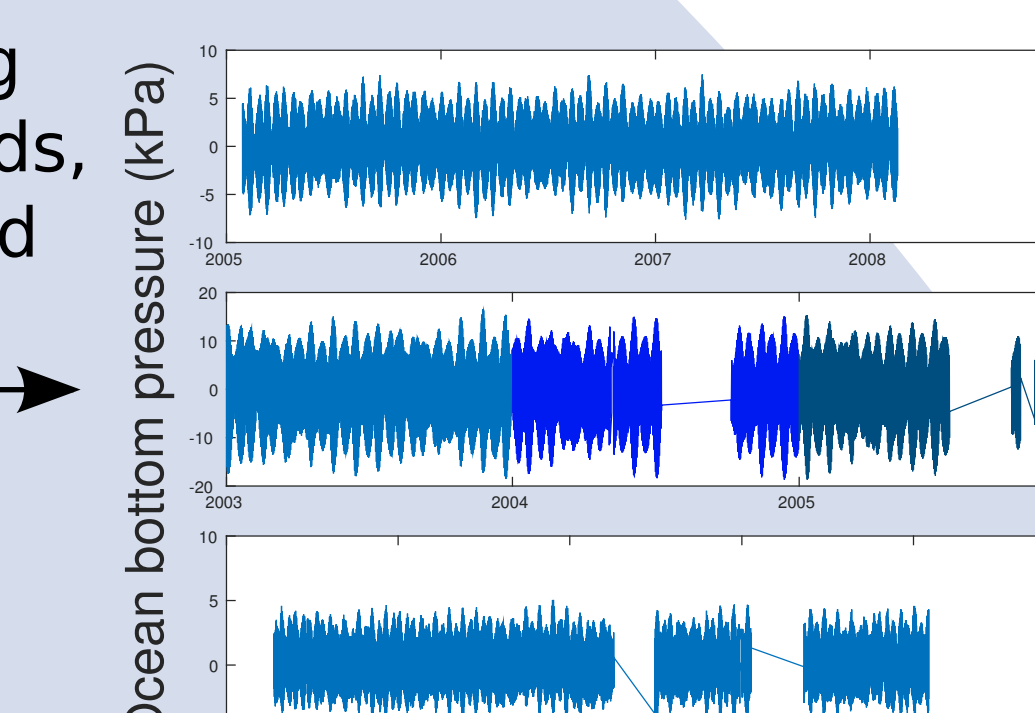
Examples of in situ OBP original time series

removing mean



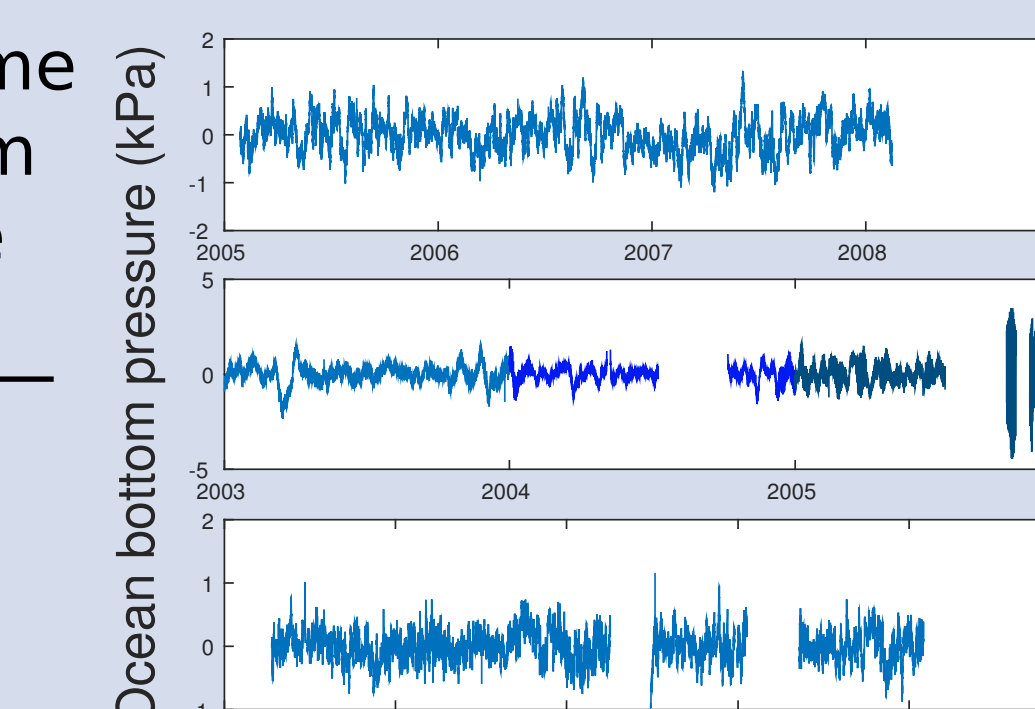
In situ time series after removing mean

removing drifts, trends, jumps and outliers



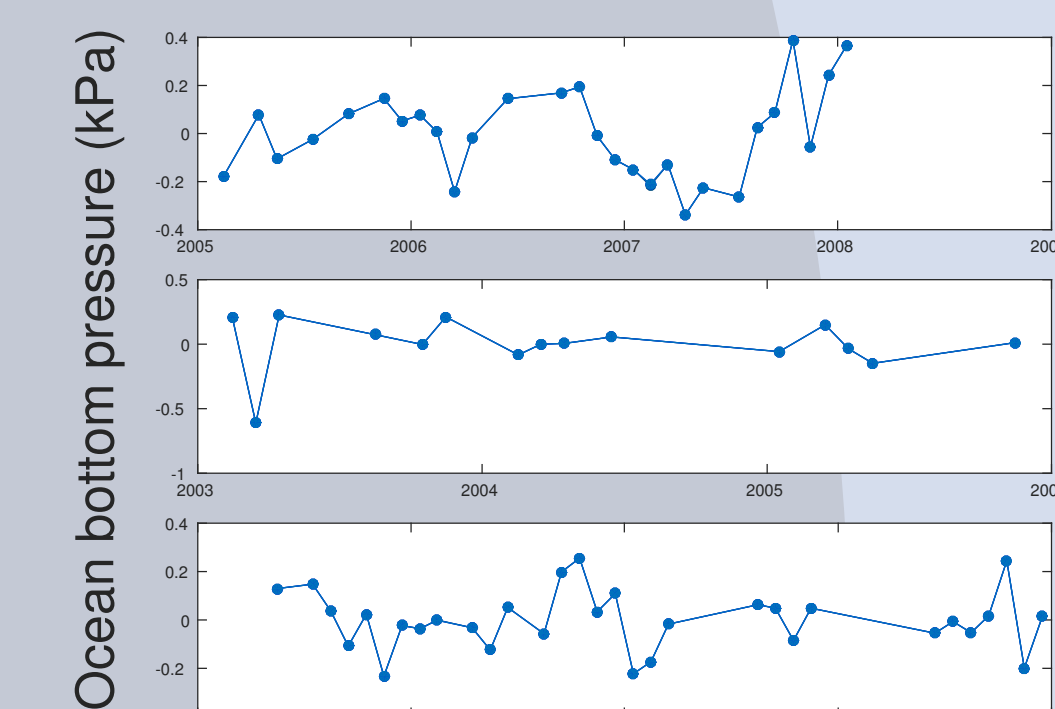
In situ time series after removing drifts, trends, jumps and outliers

removing tidal signals



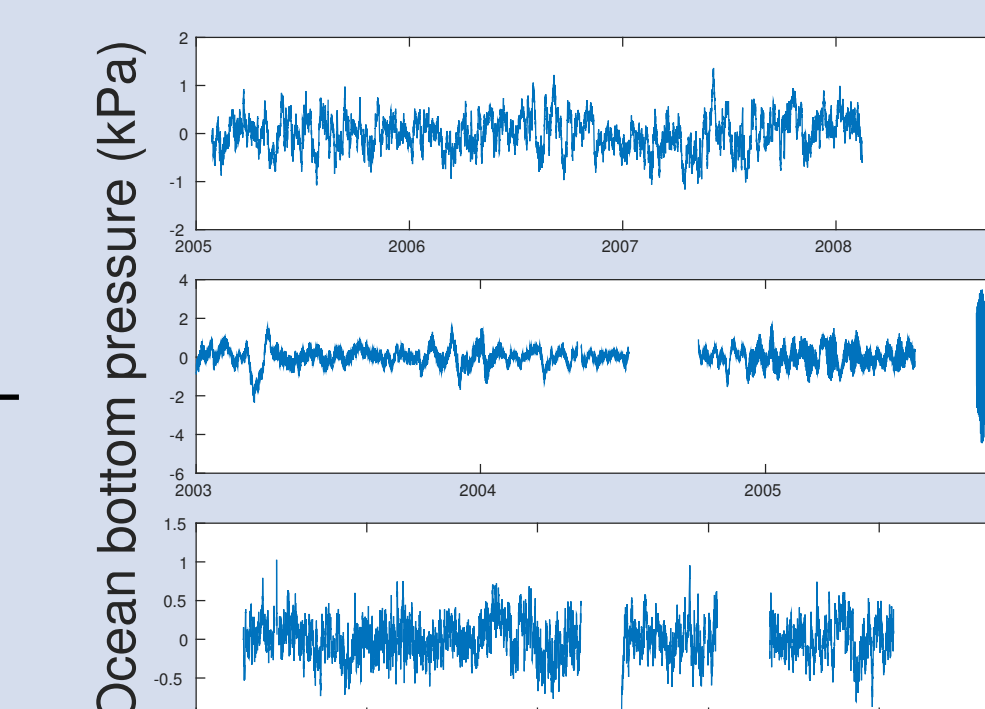
In situ time series after removing tidal signal

calculating "monthly" means

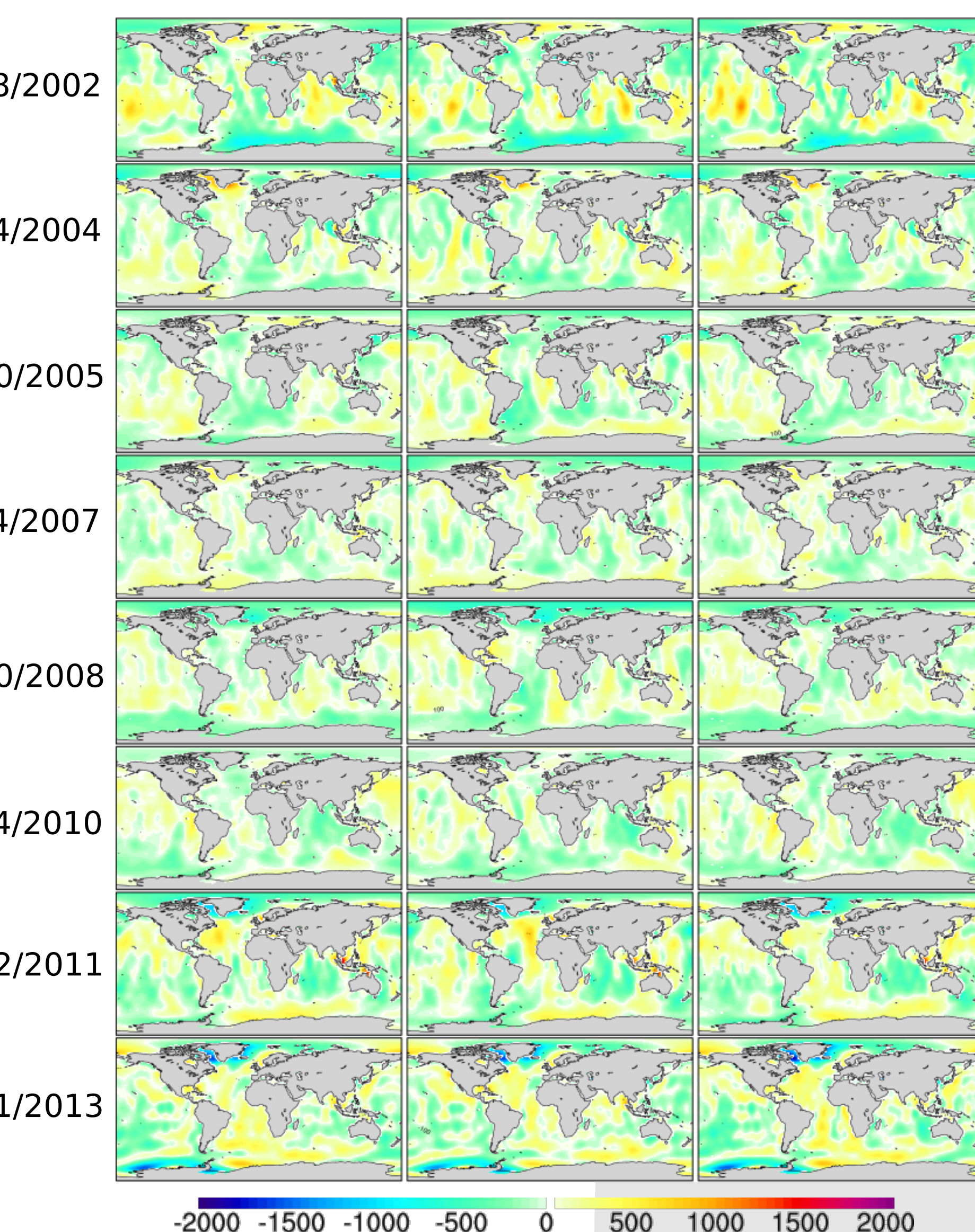


"Monthly" means of in situ data

stacking time series from the same station



In situ time series after stacking series from re-deployments of sensors



GRACE based monthly mean solutions from CSR, GFZ and JPL processing centers expressed as ocean bottom pressure anomalies (Pa)