Validation of simulated and GRACE based ocean bottom pressure time series against in situ observations

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Motivation

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GRACE
Gravity Recovery And Climate Experiment
Level-2 Products

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Gravity Recovery And Climate Experiment
JPL
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GRACE
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CSR
Level-2 Products

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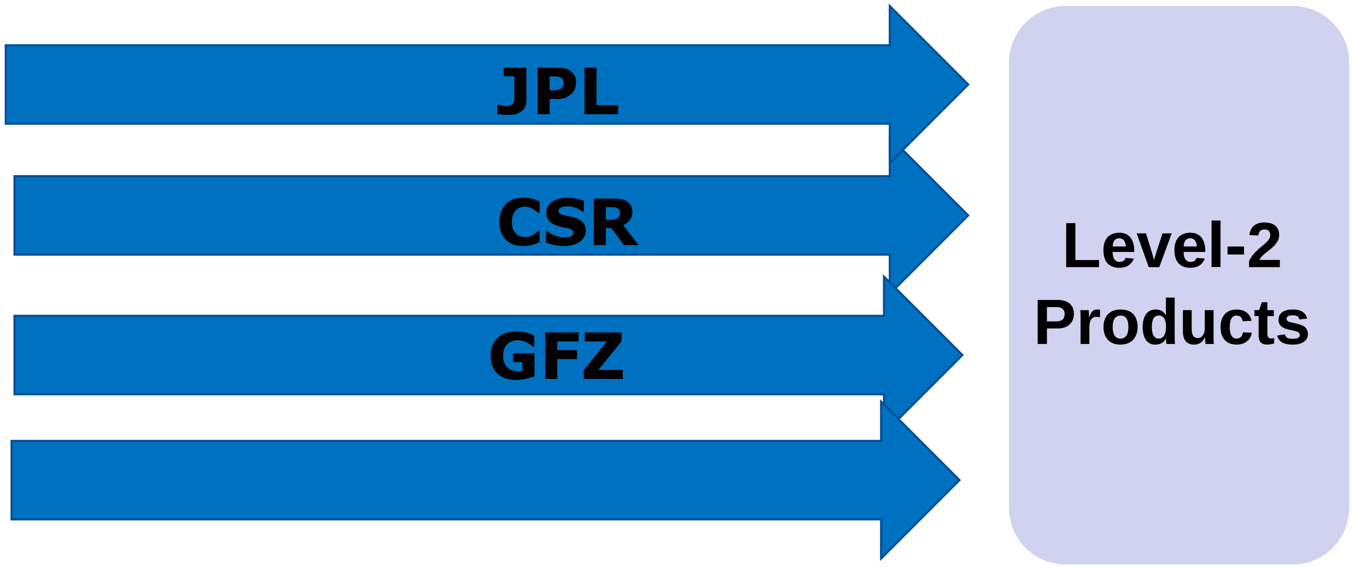
Gravity Recovery And Climate Experiment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GRACE
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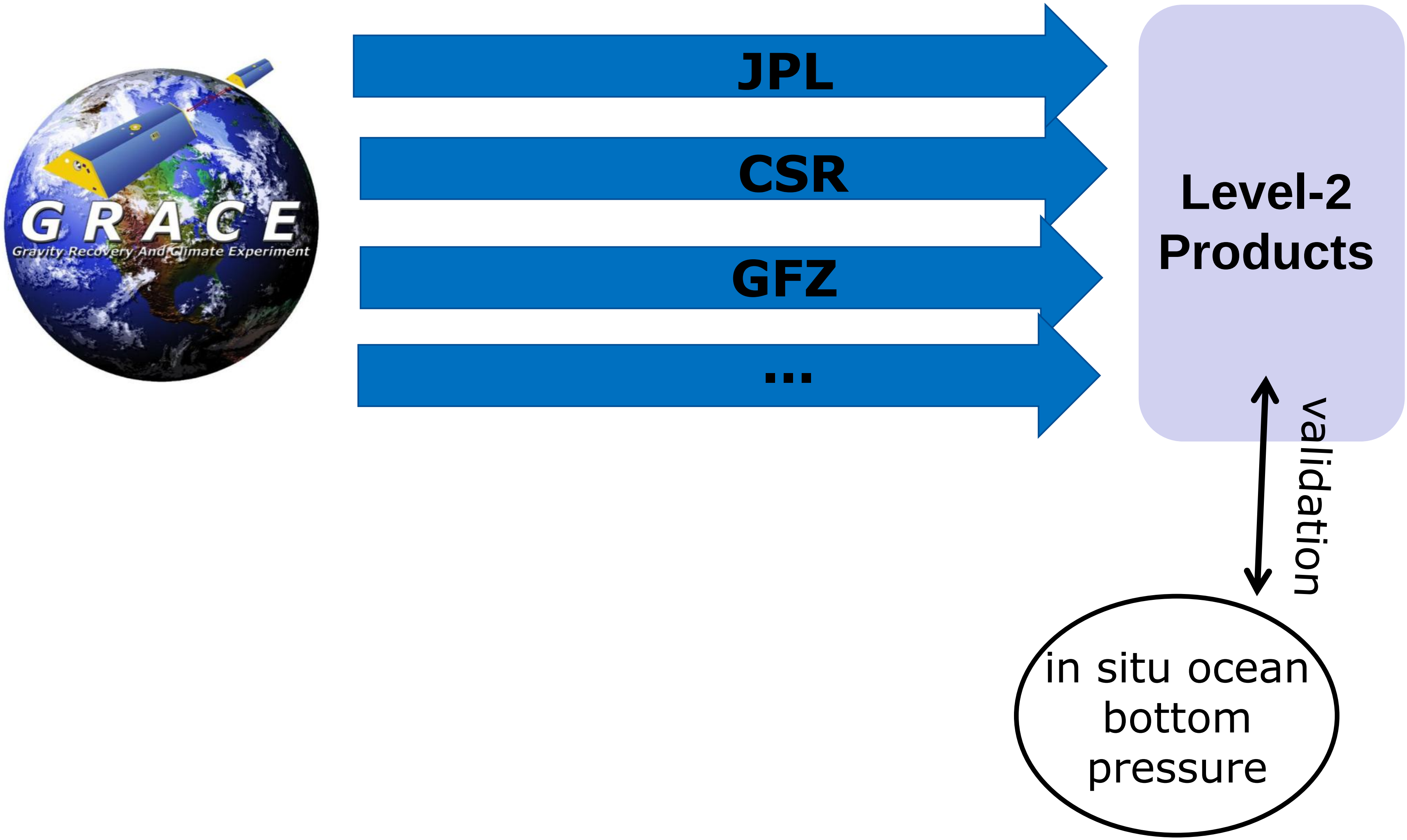

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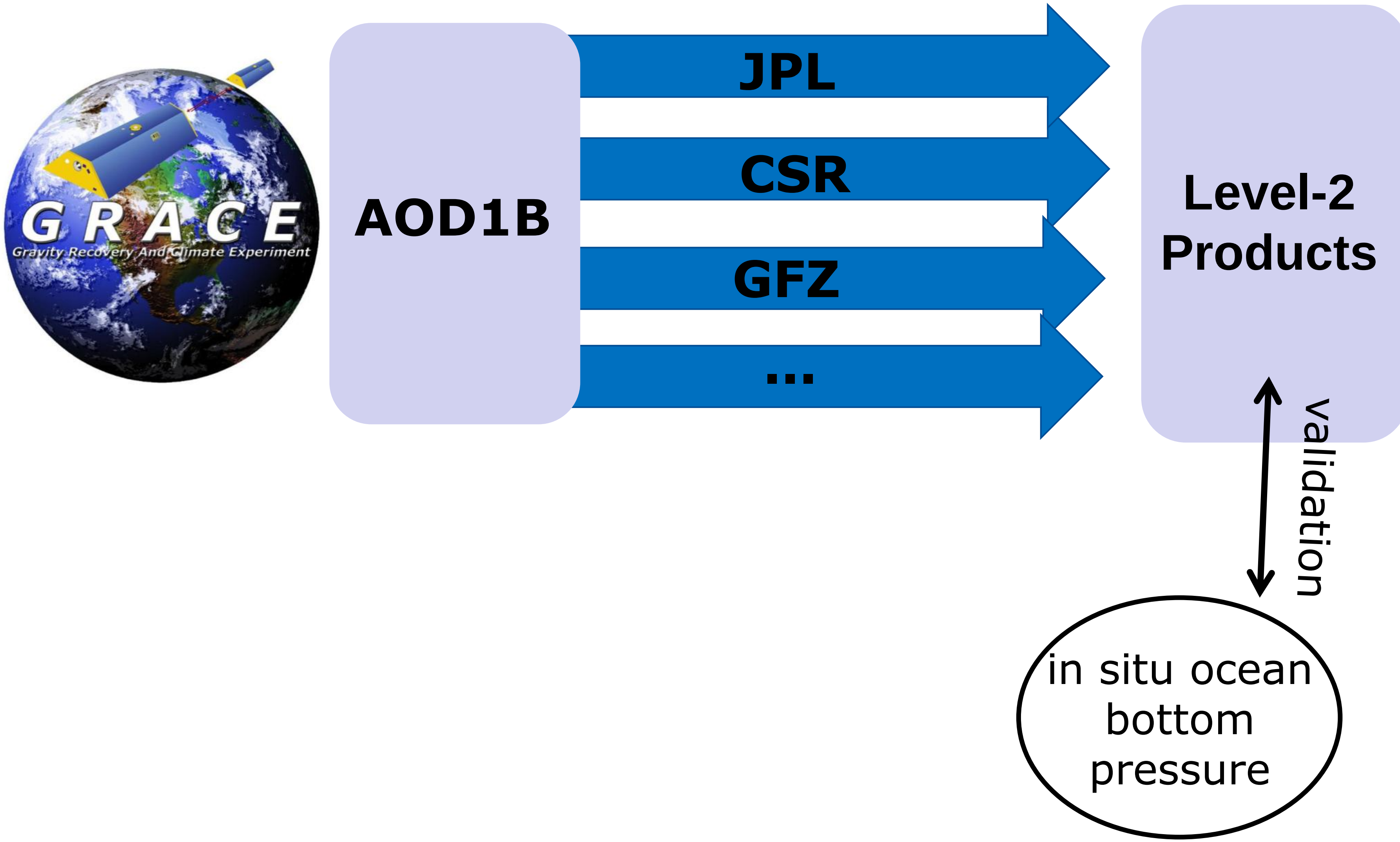
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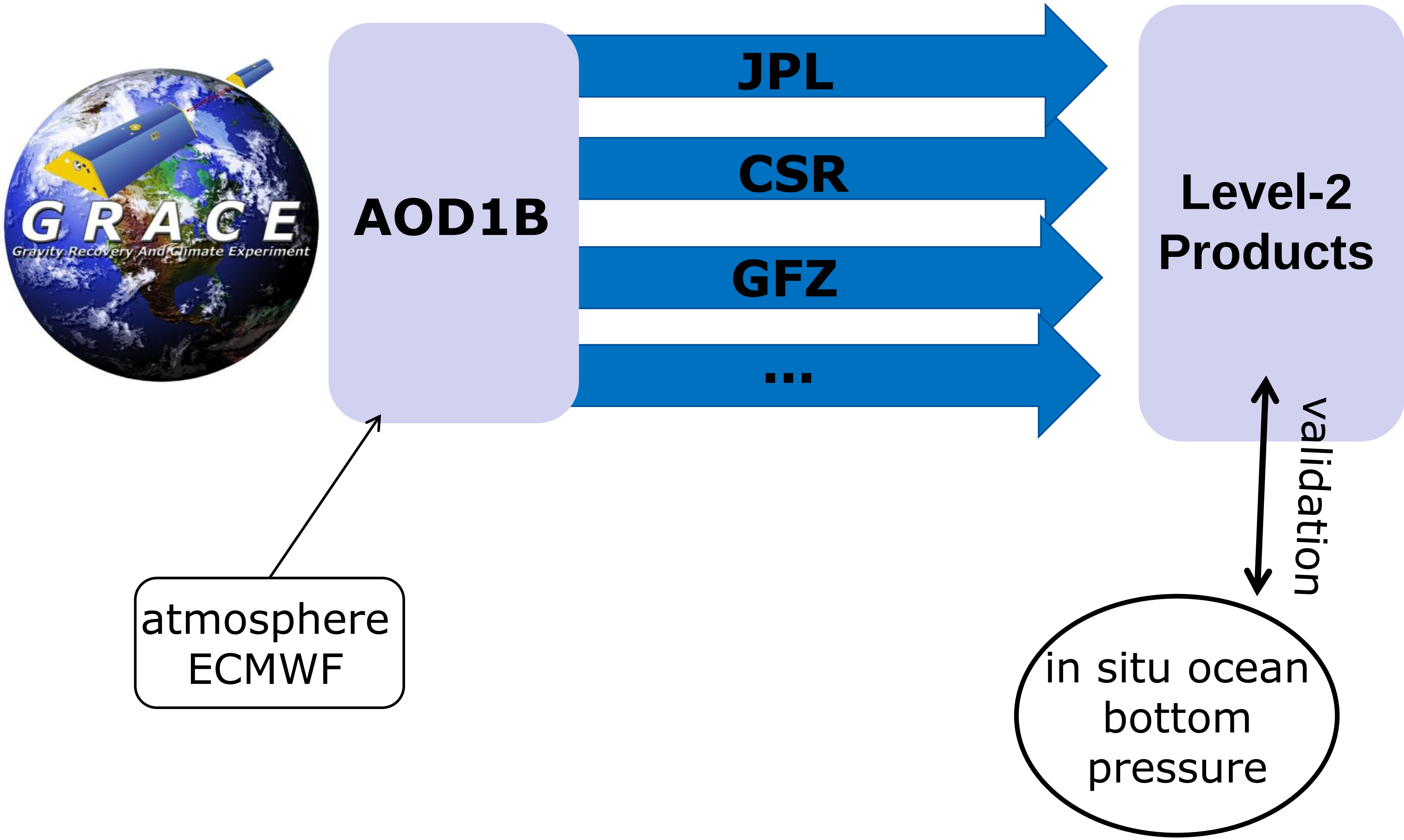
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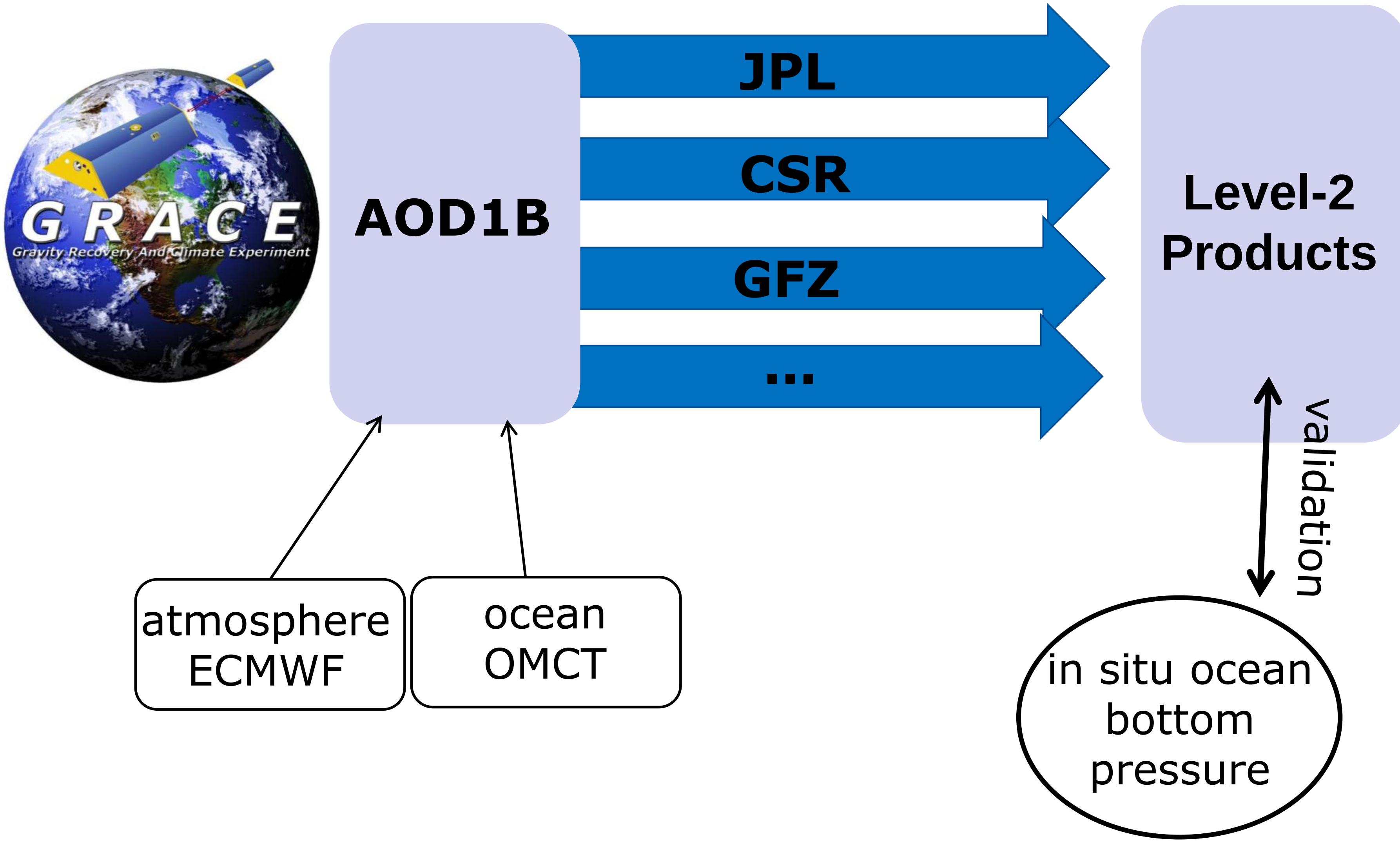
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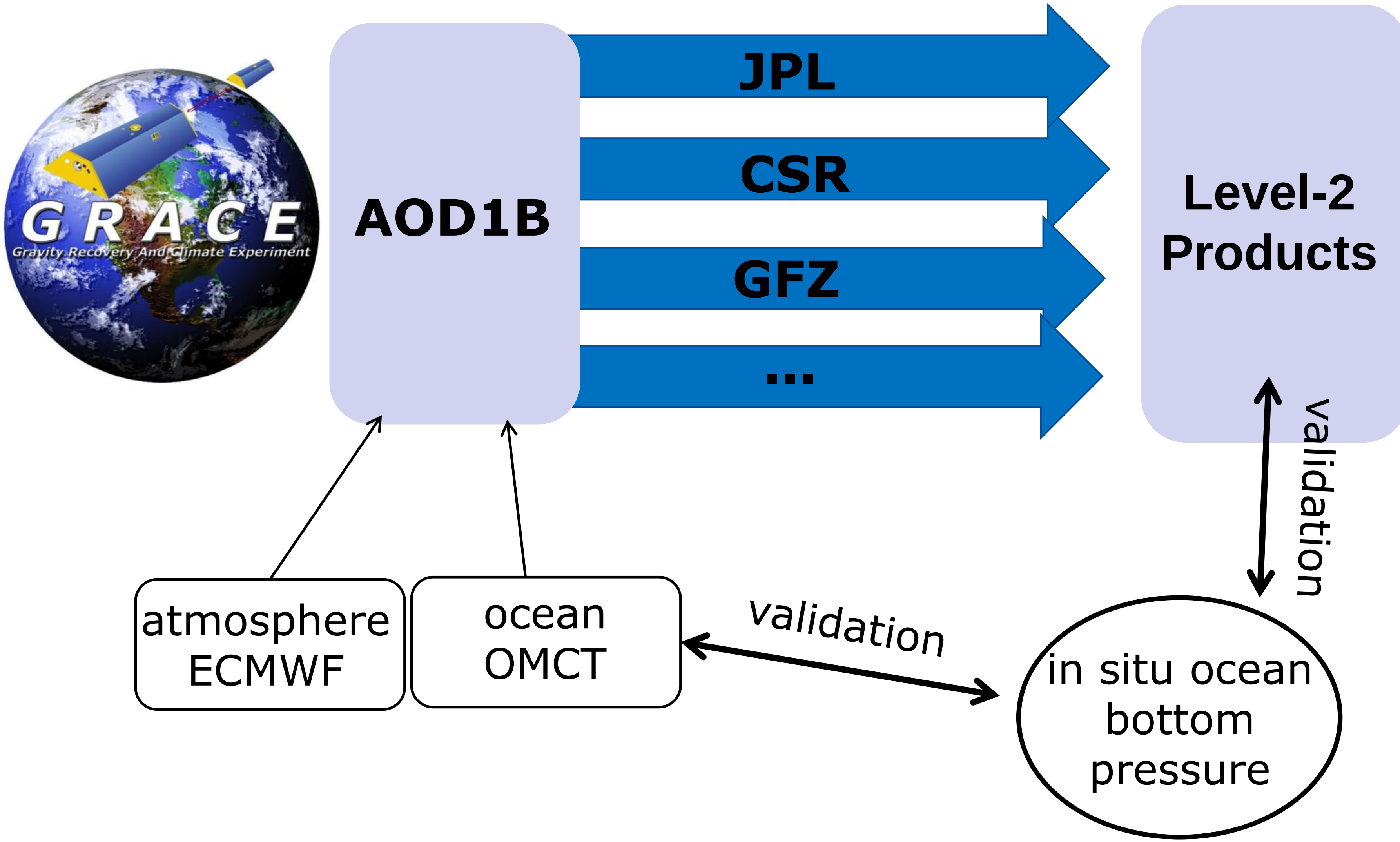
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- removing outliers, drifts, jumps and trends
- changing time step to 1 hour

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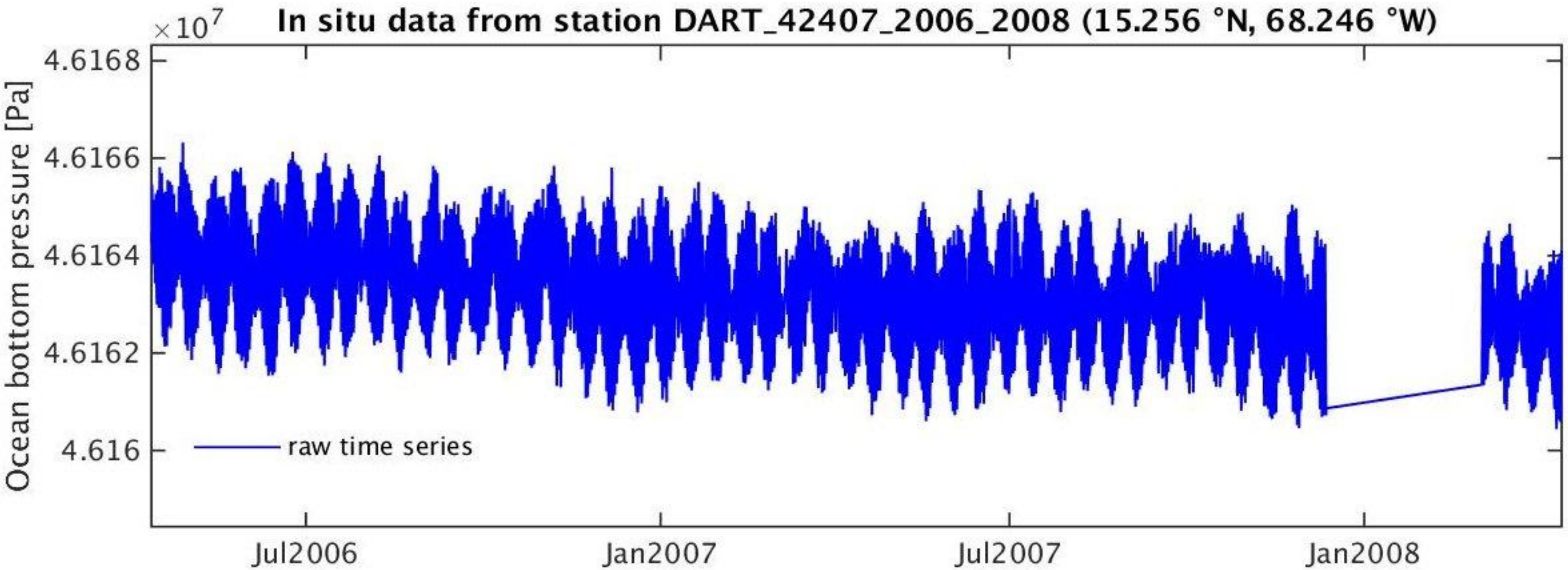

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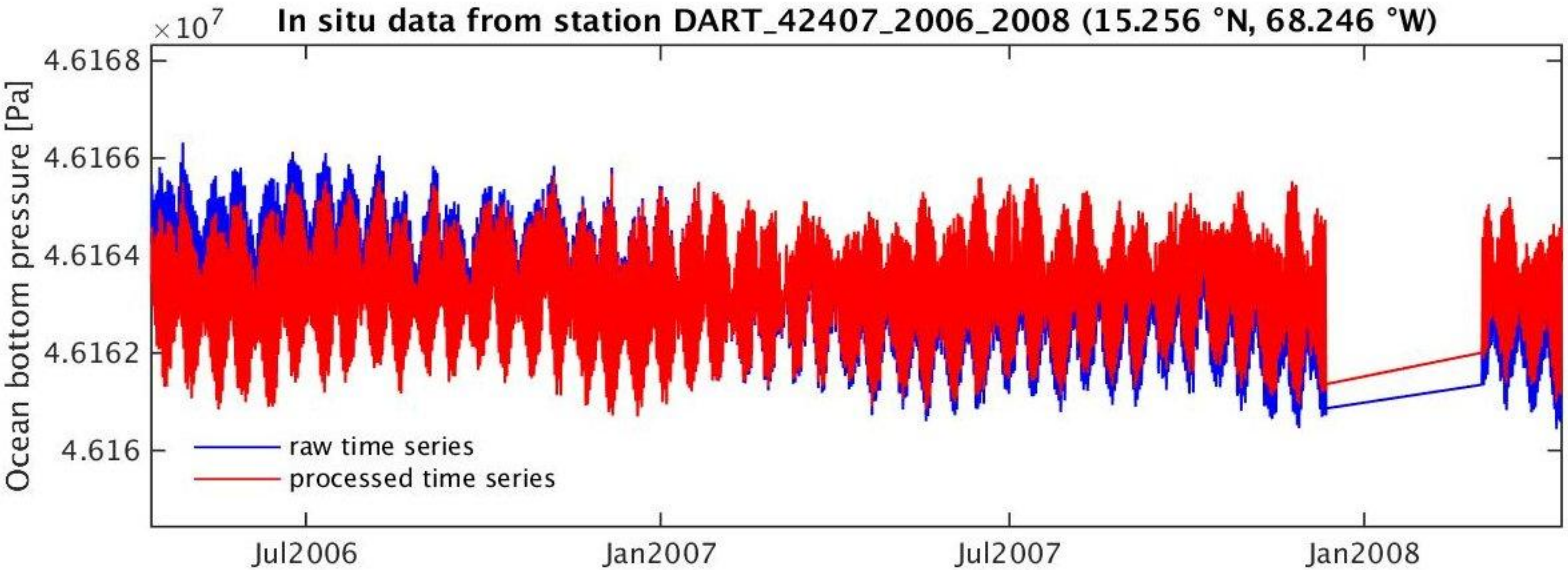

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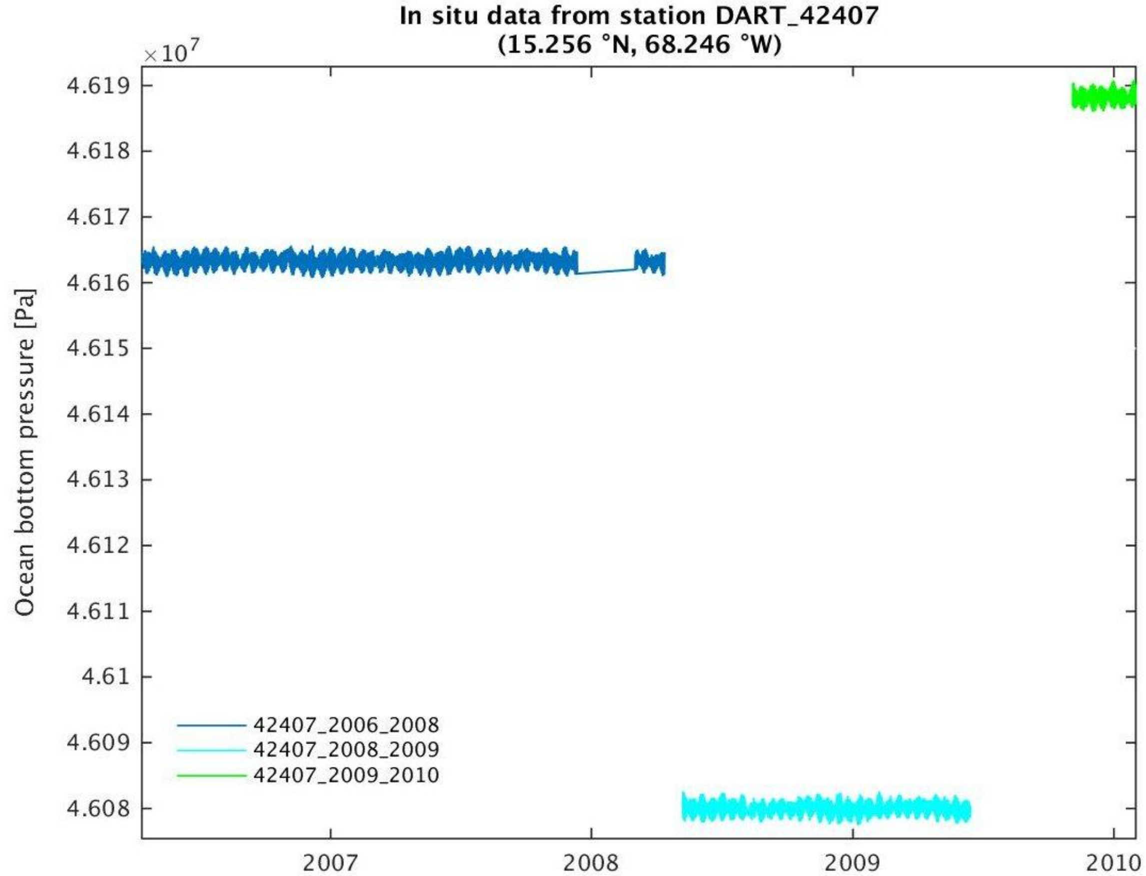

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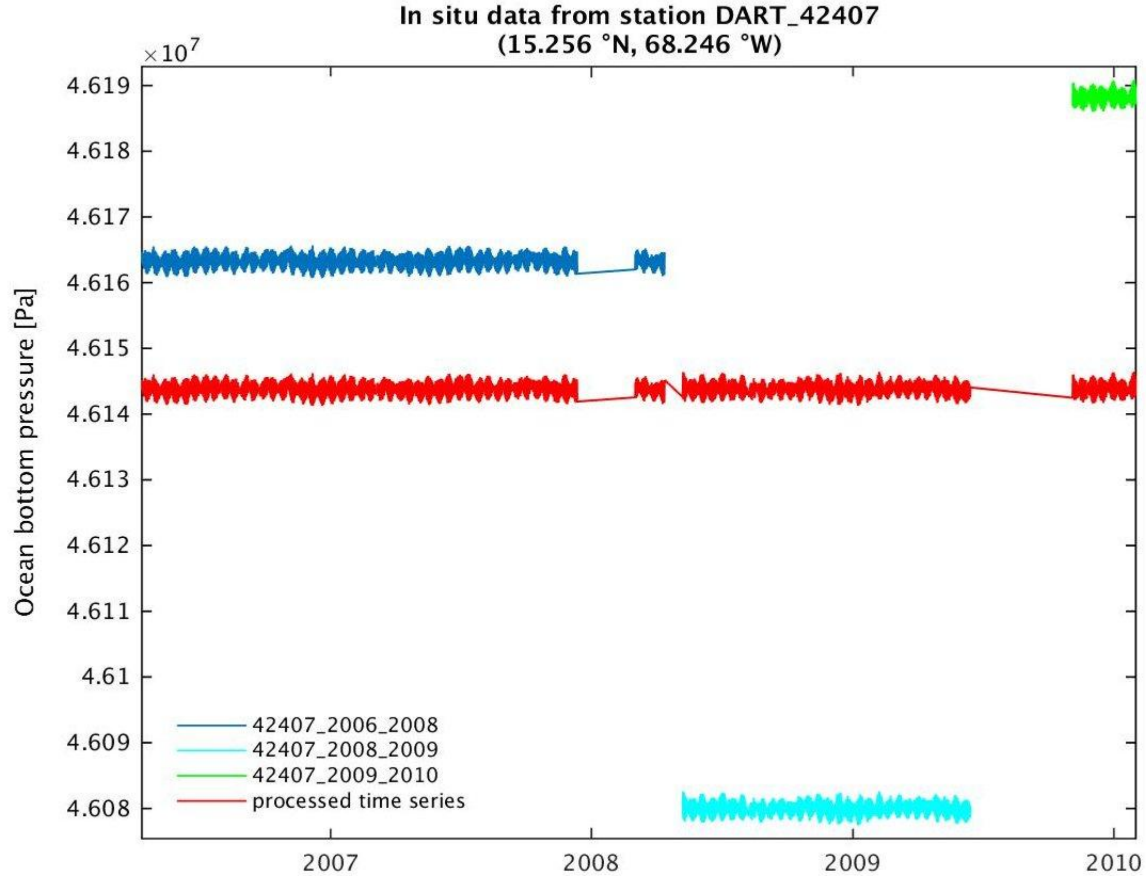

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T_TIDE MATLAB package for classical harmonic analysis [Pawlowicz et al., 2002]

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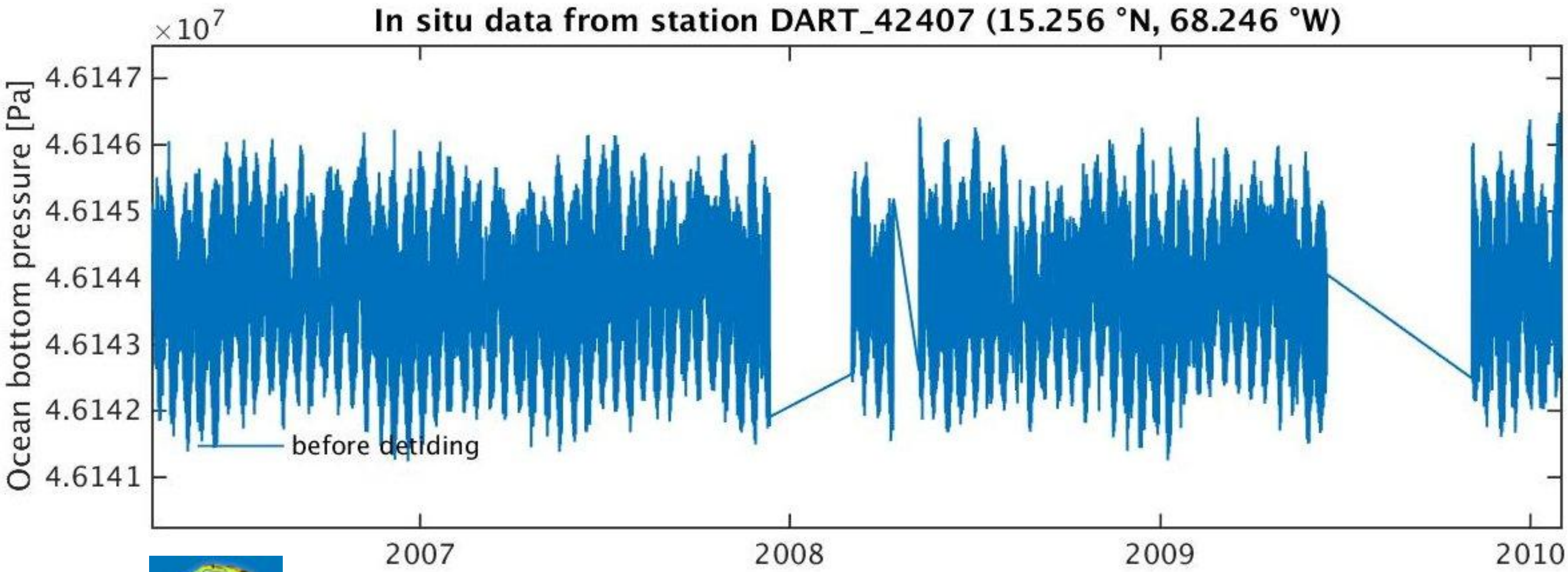

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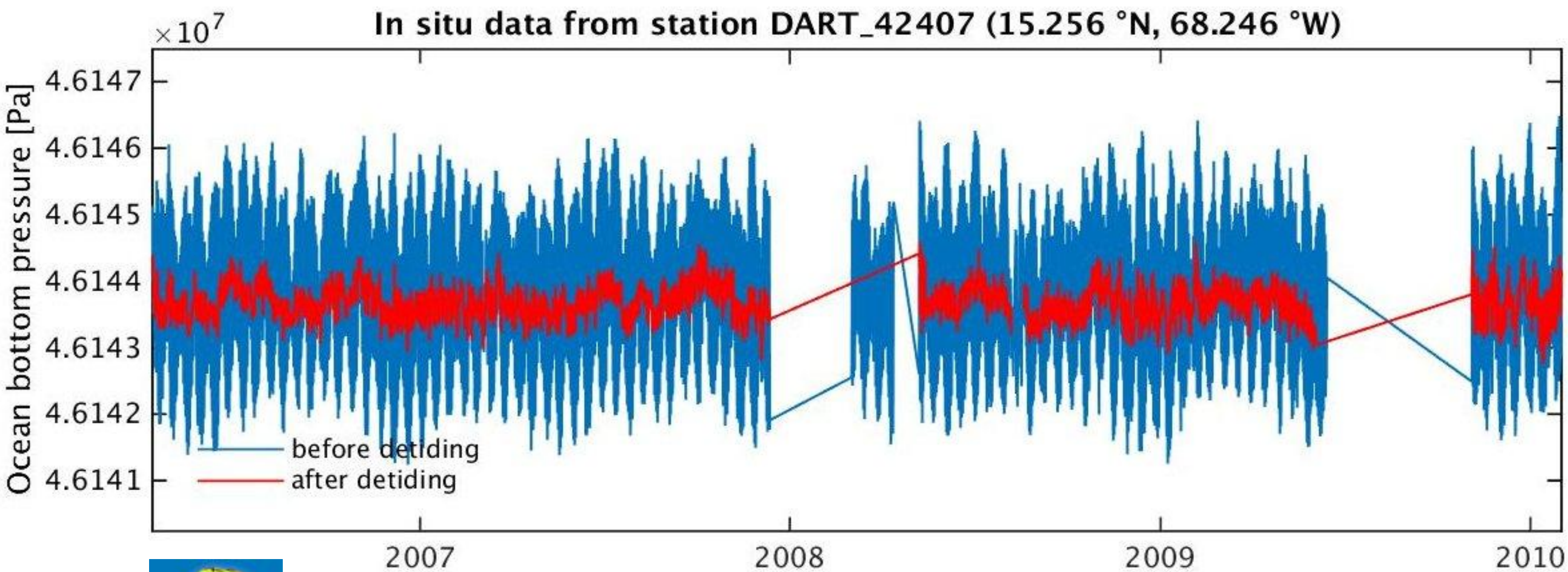

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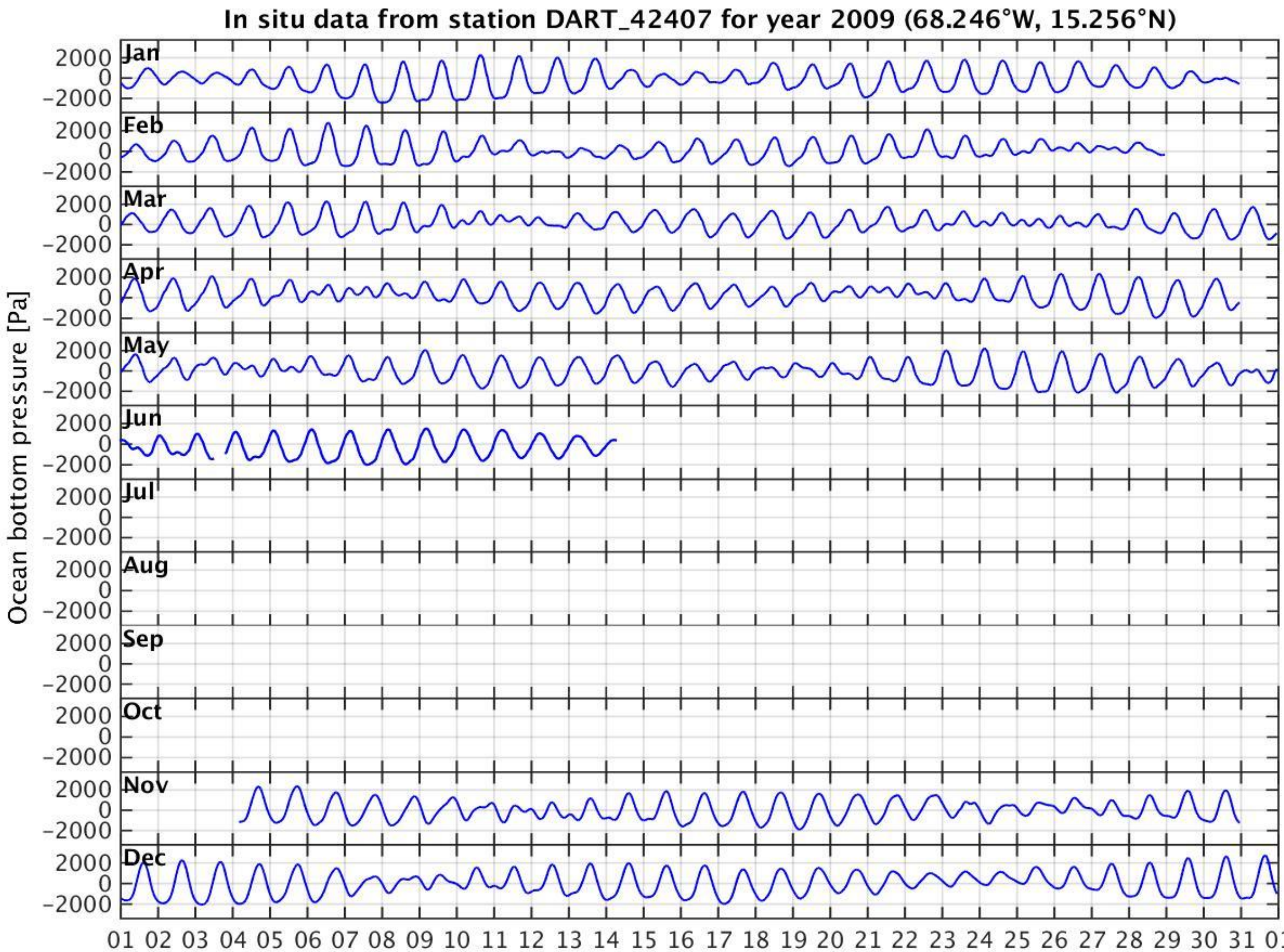

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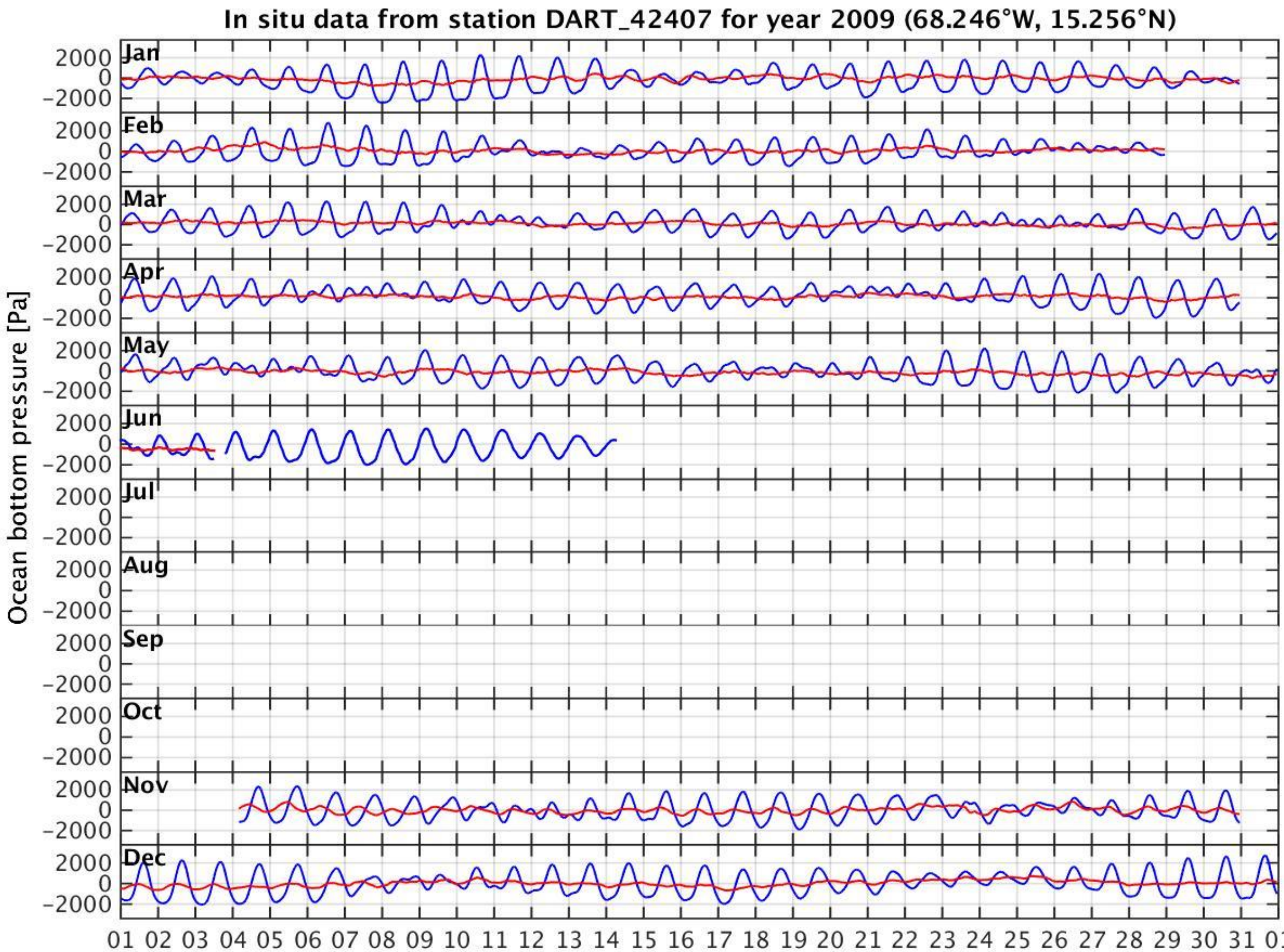

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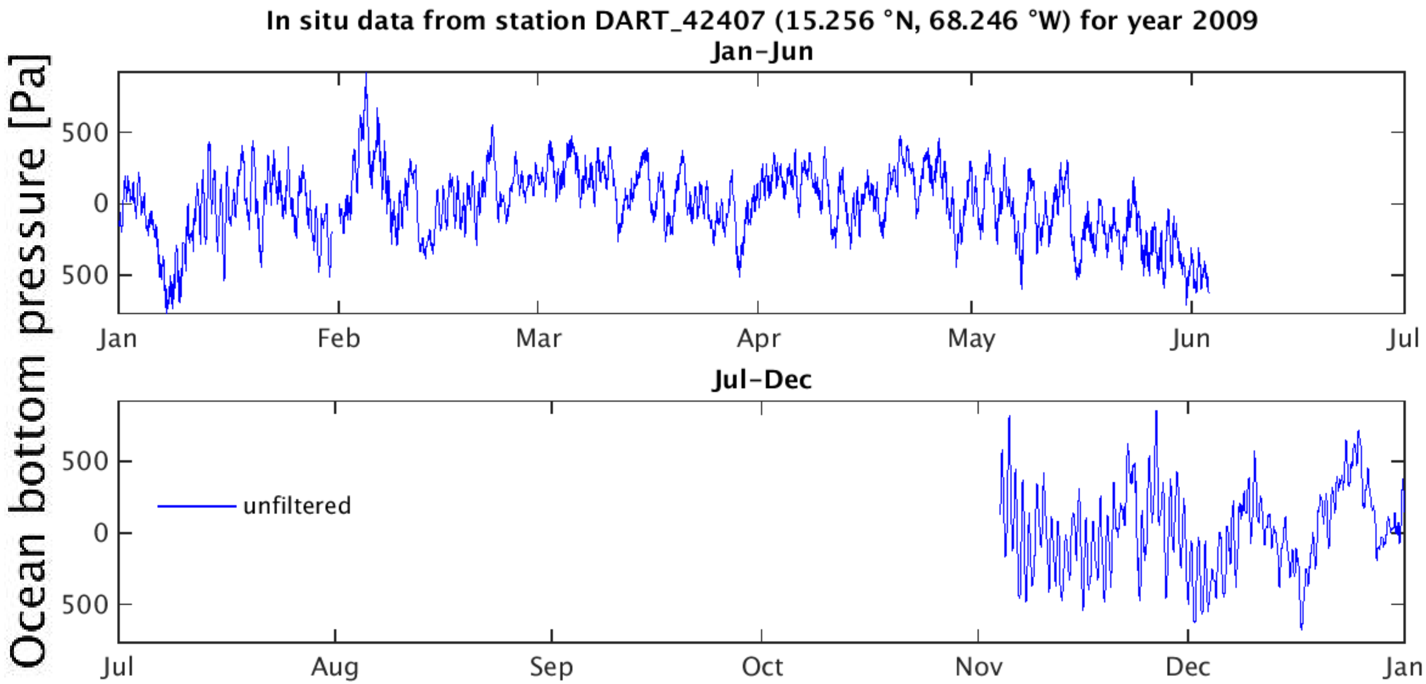

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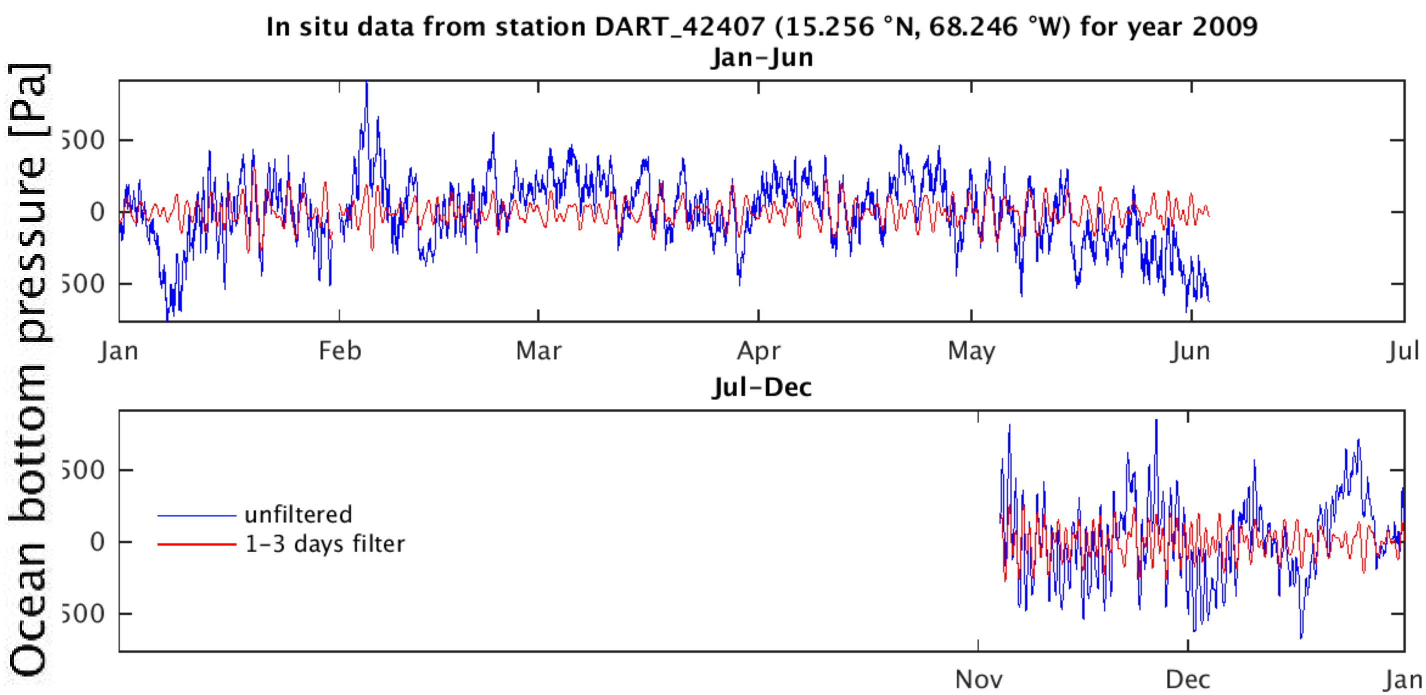

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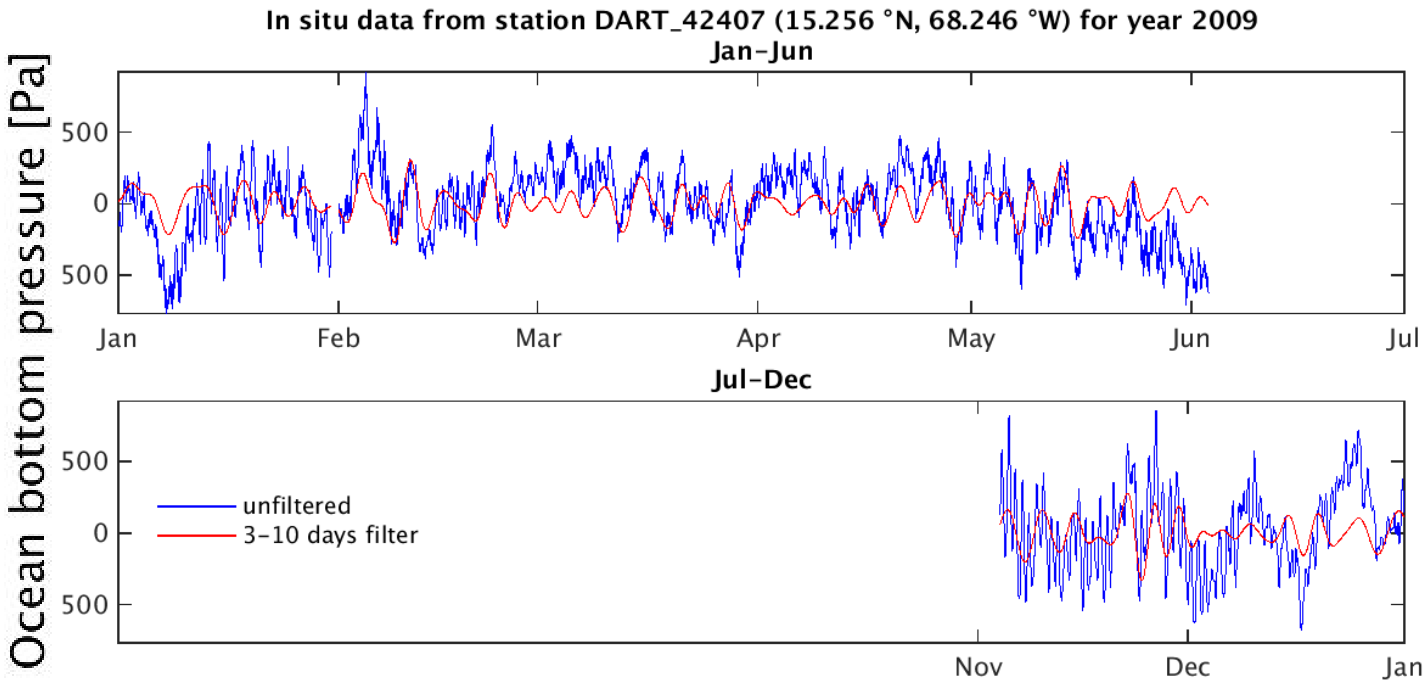

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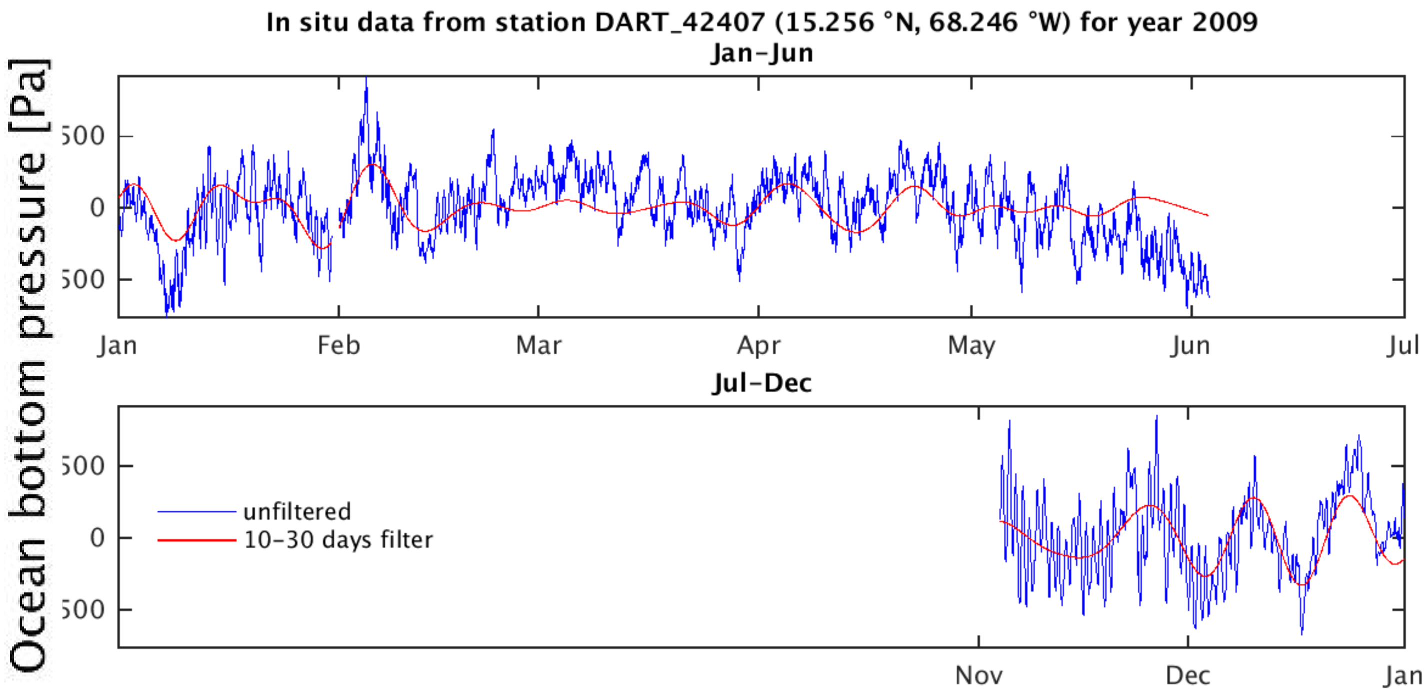

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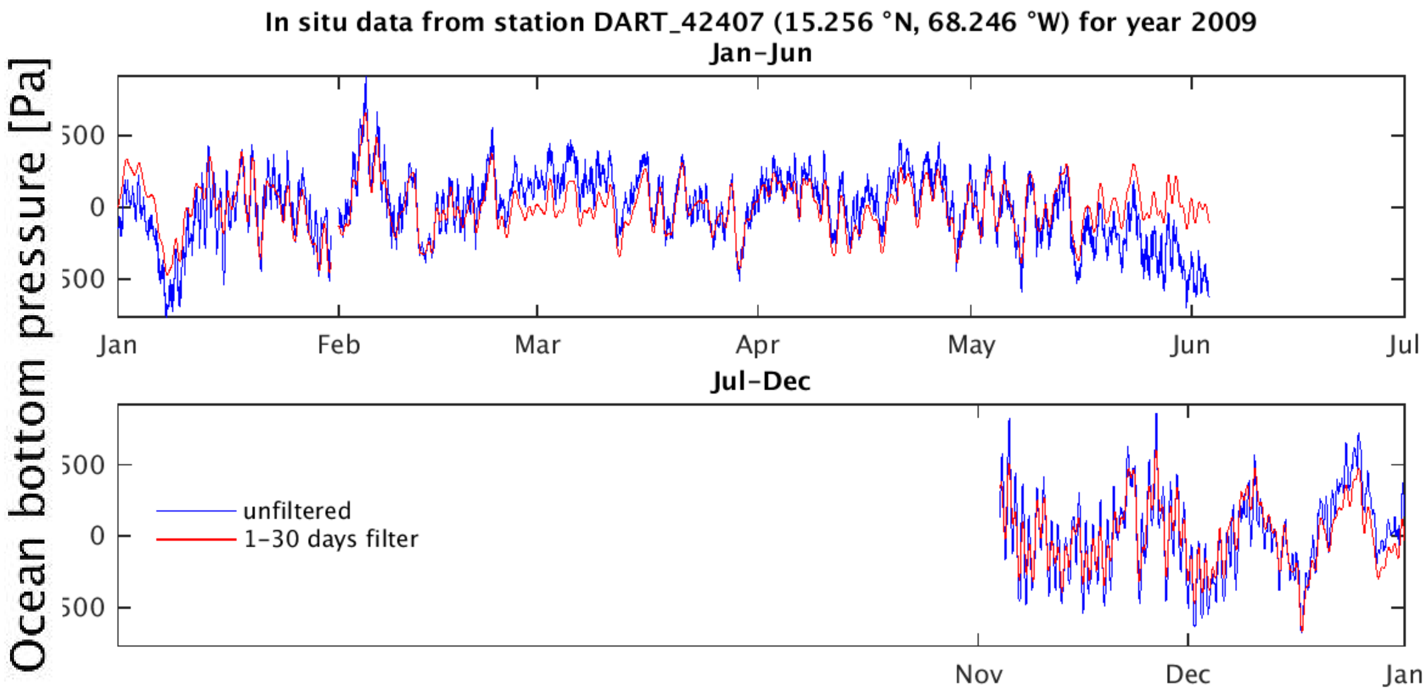

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or

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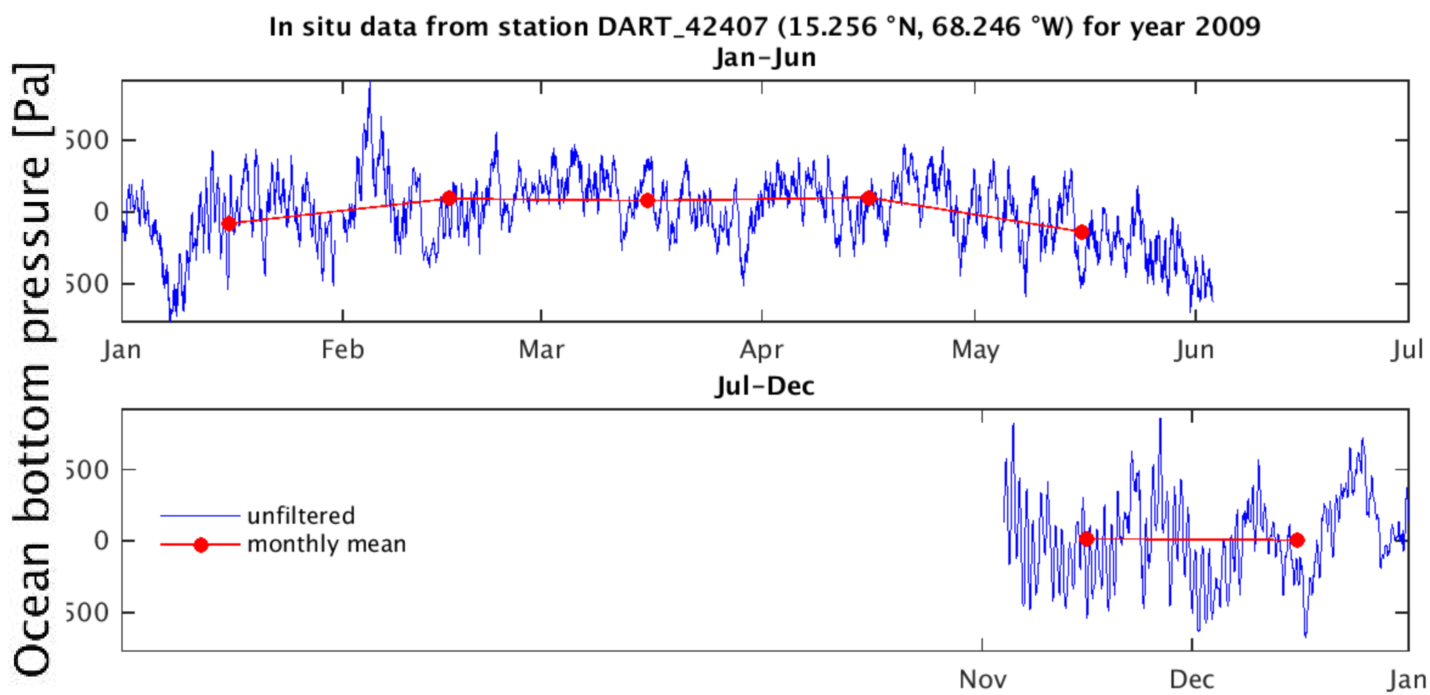

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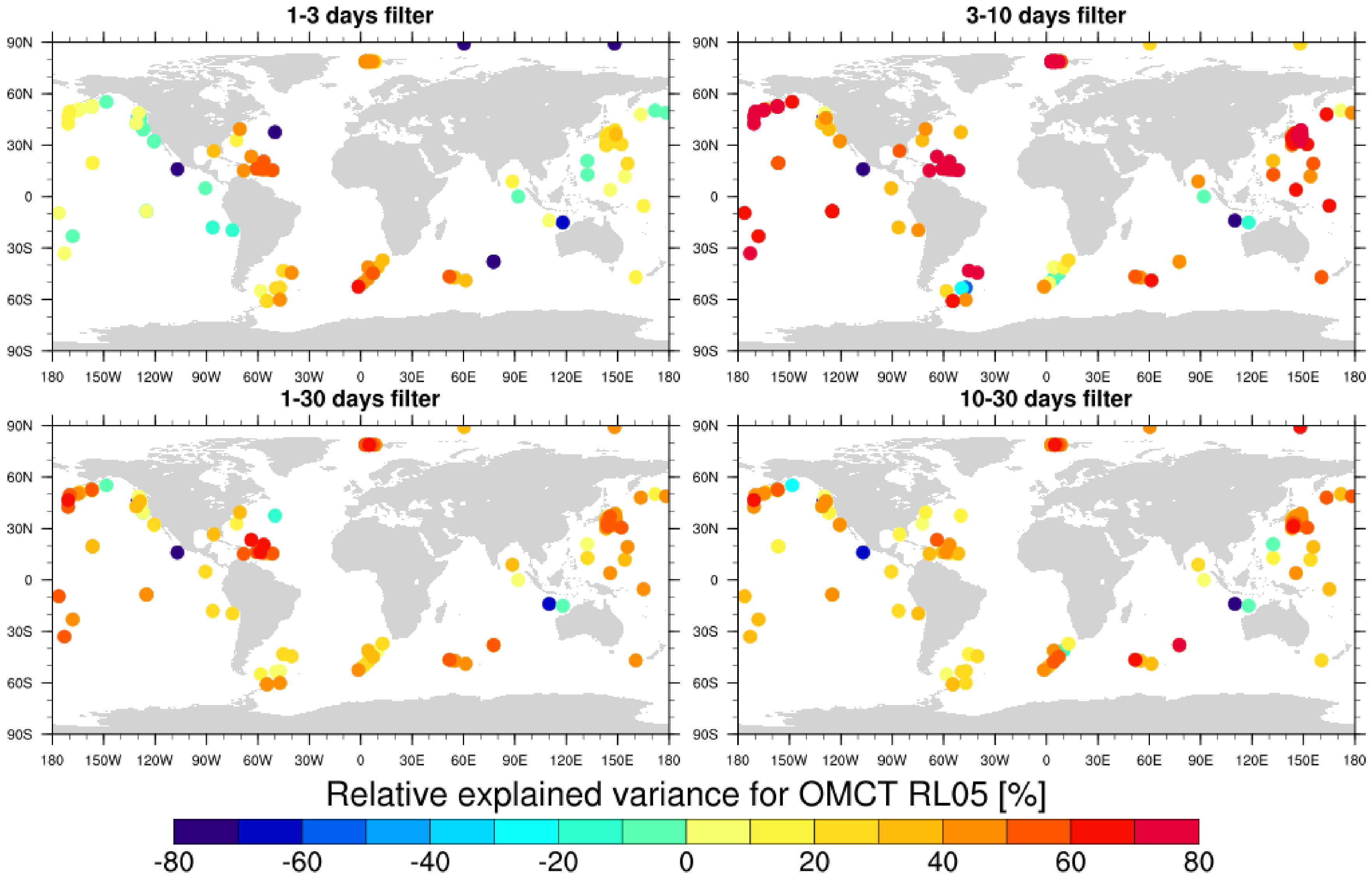
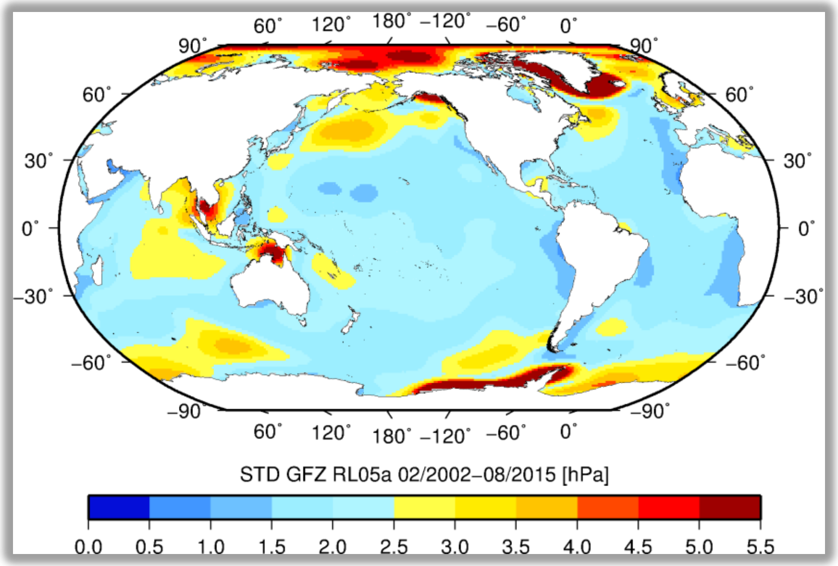
Relative explained variance for OMCT RL05



OBP fields from GRACE GFZ RL05a



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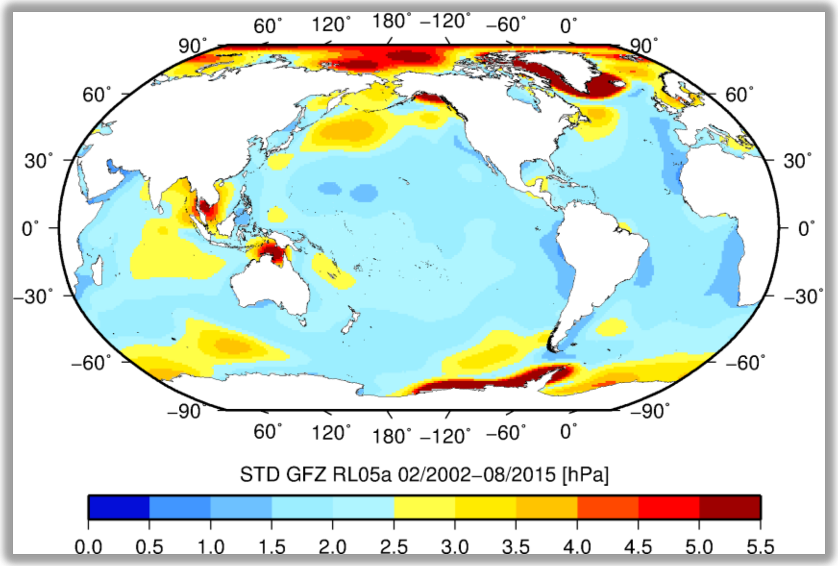

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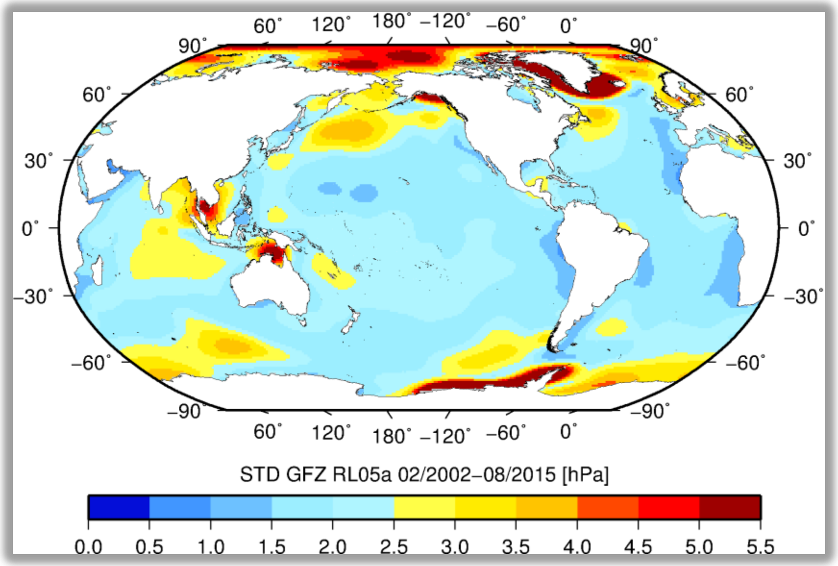

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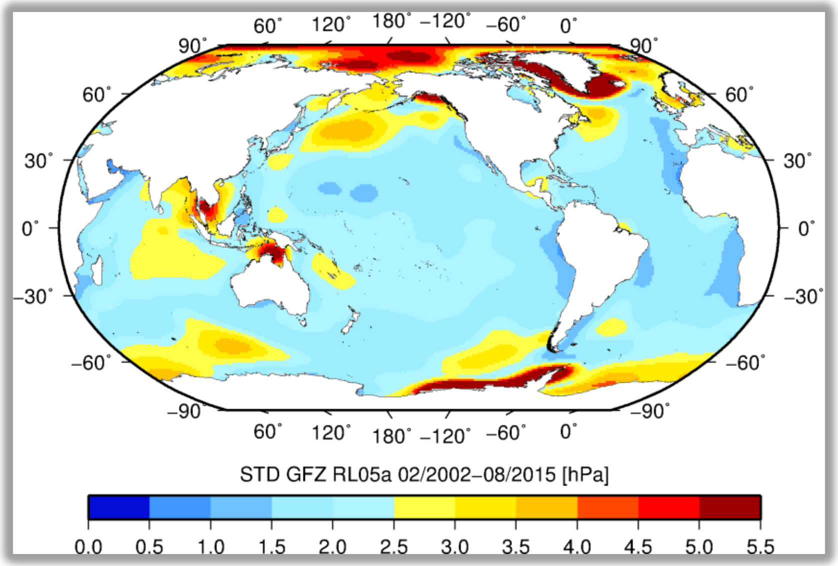

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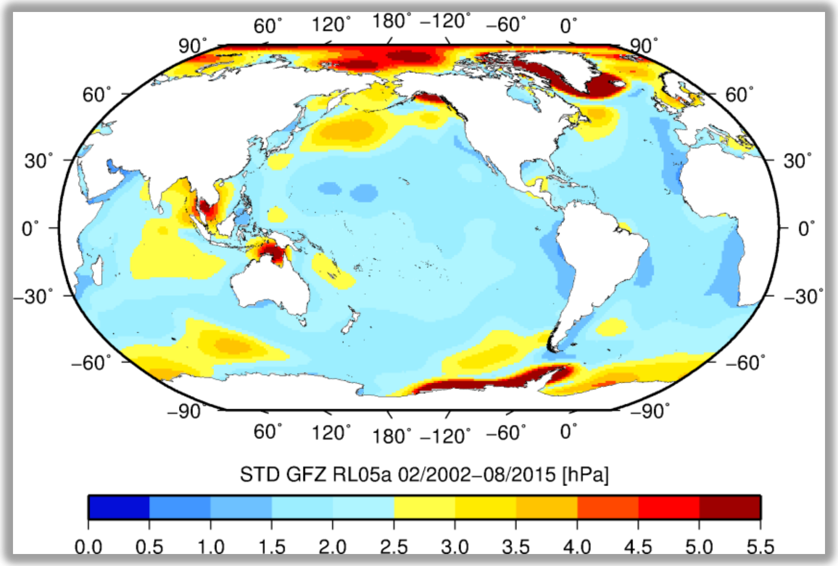

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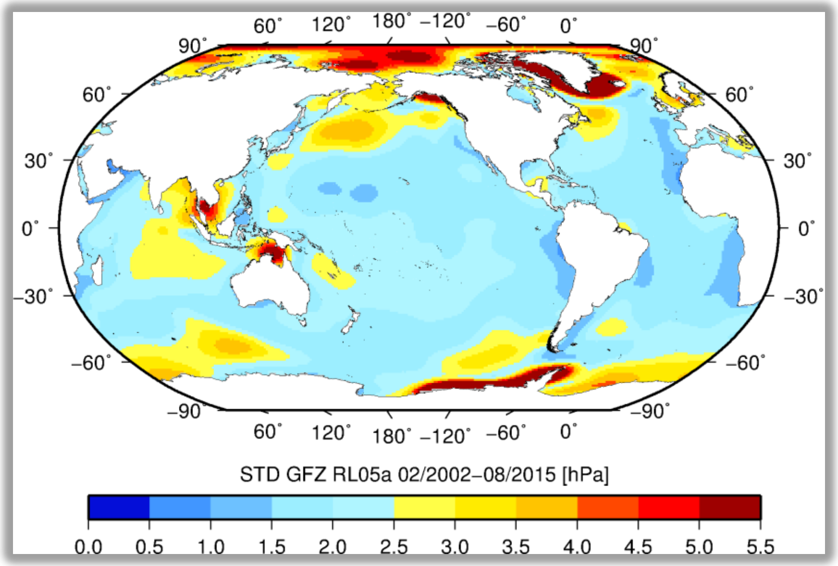

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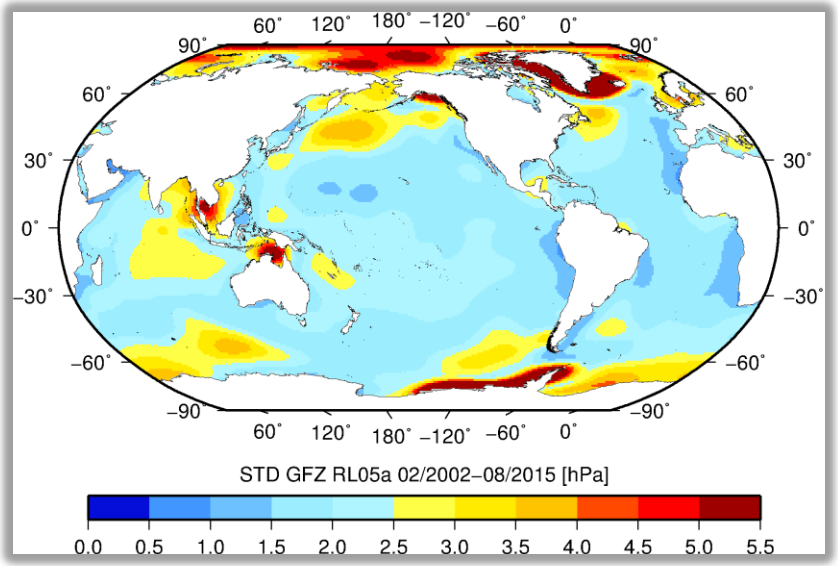

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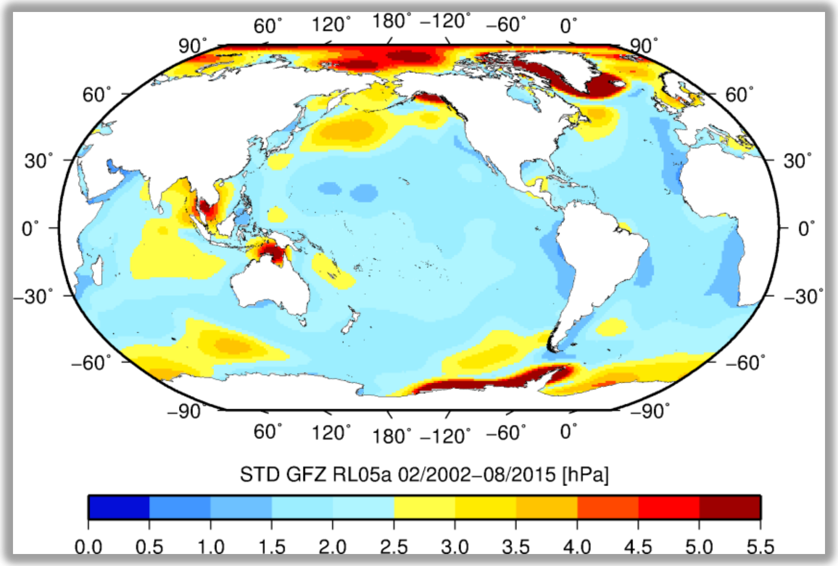

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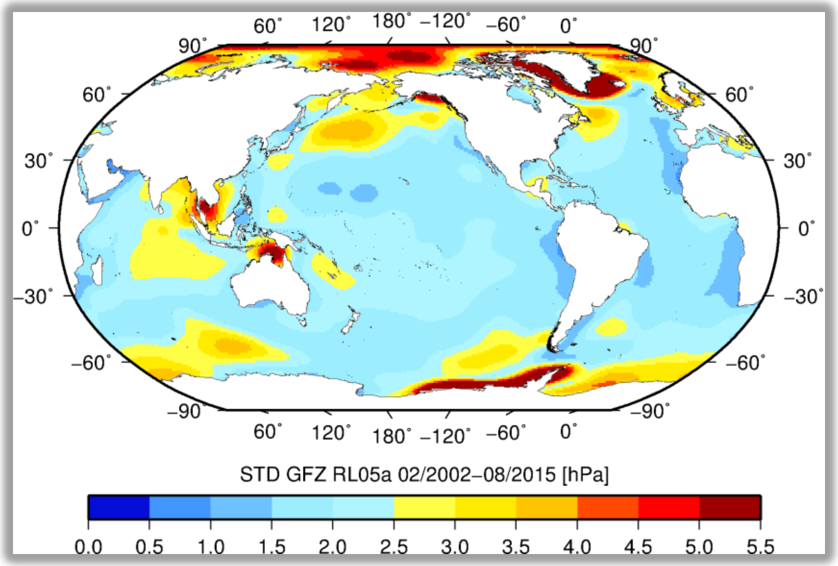

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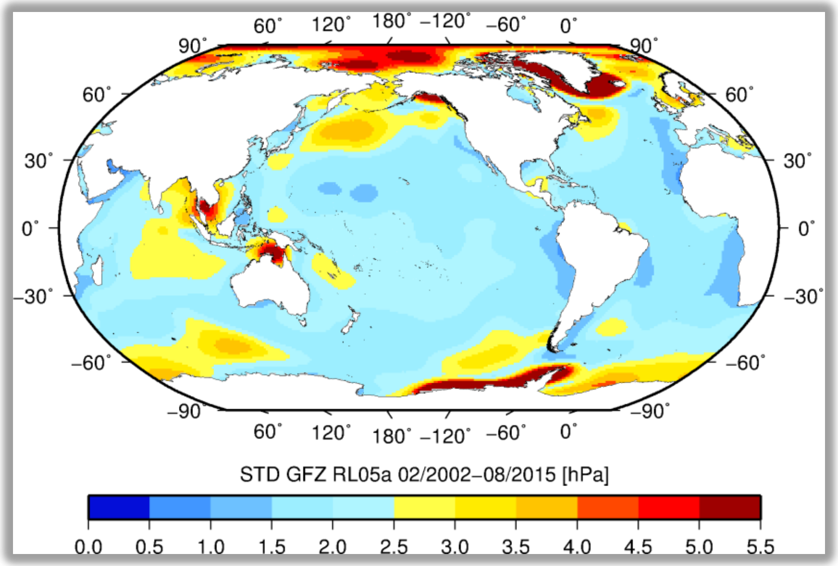

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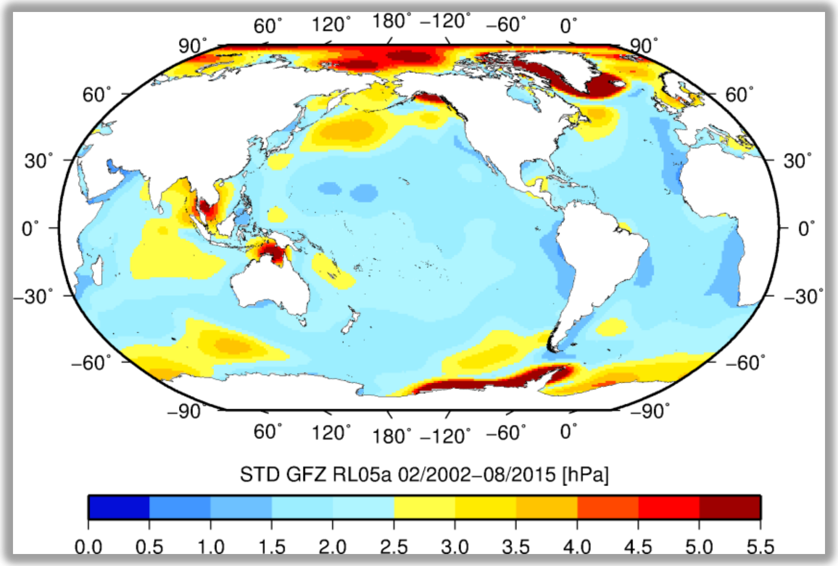

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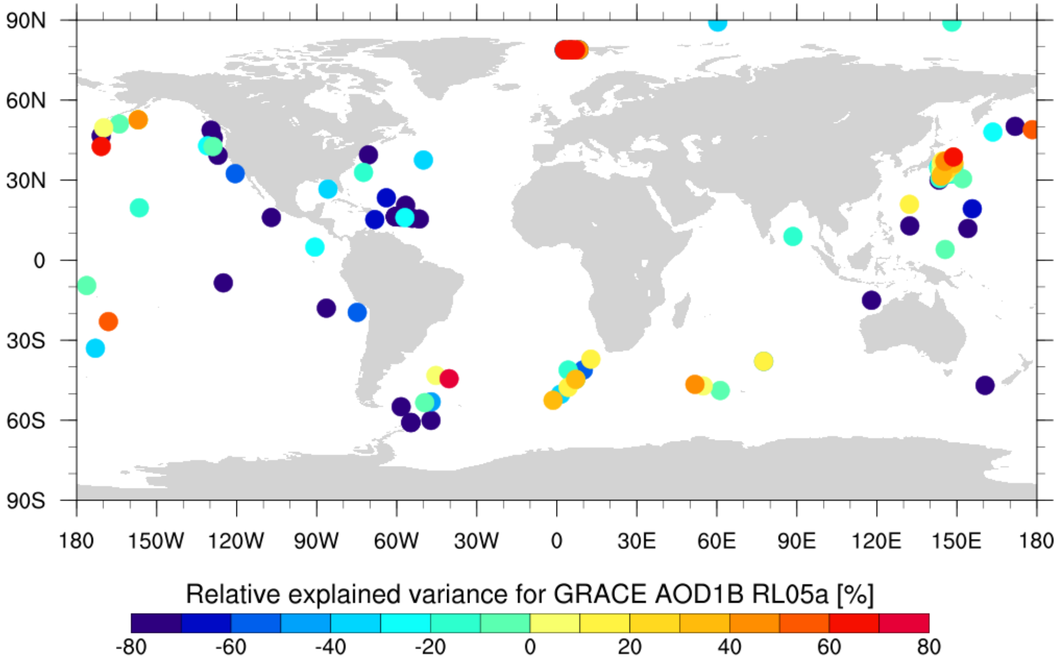

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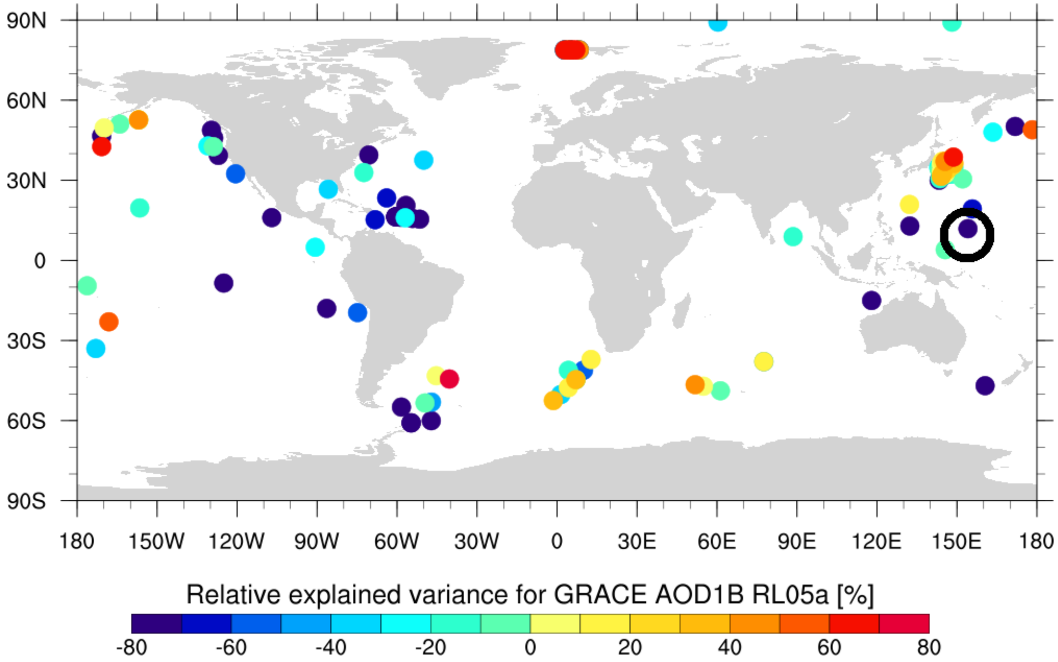

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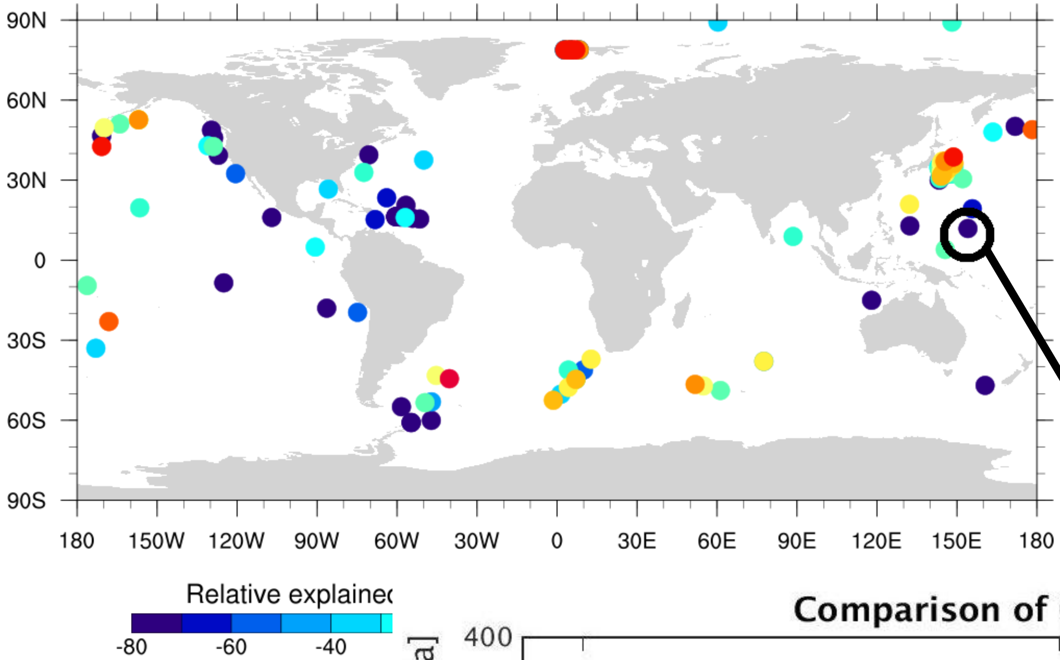

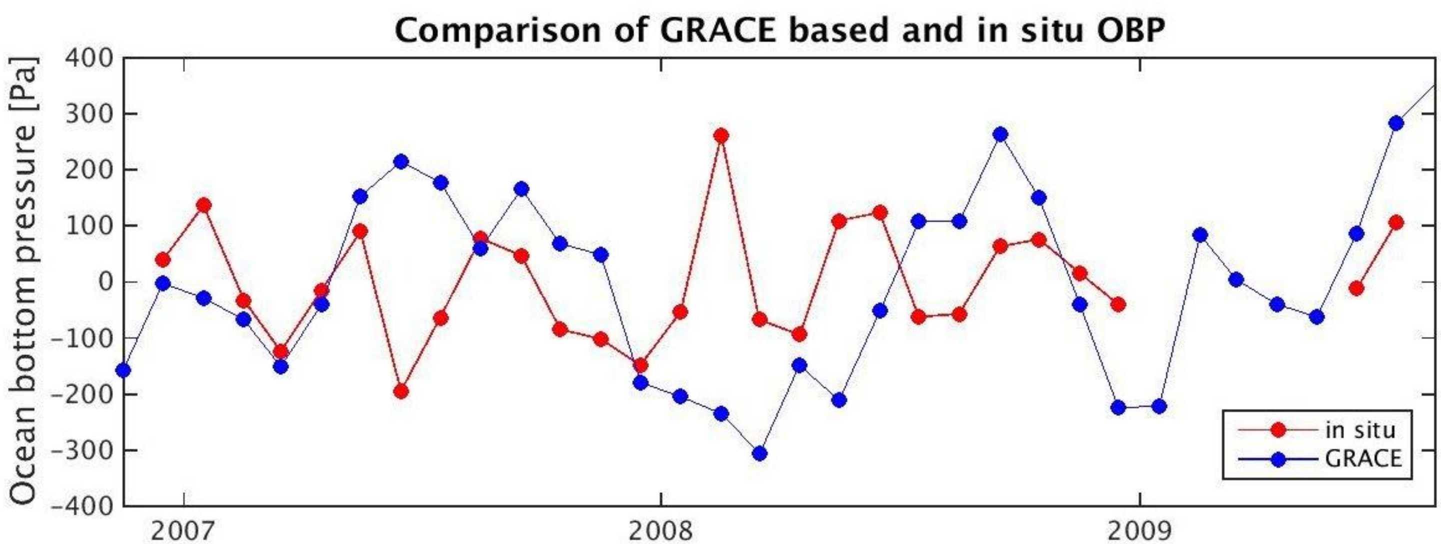

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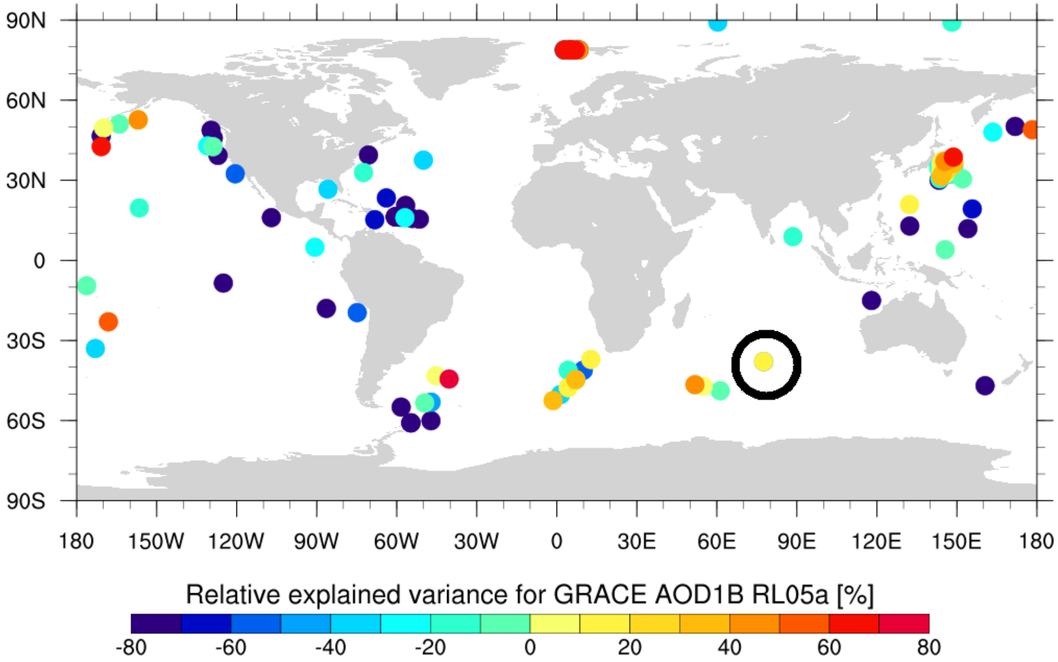

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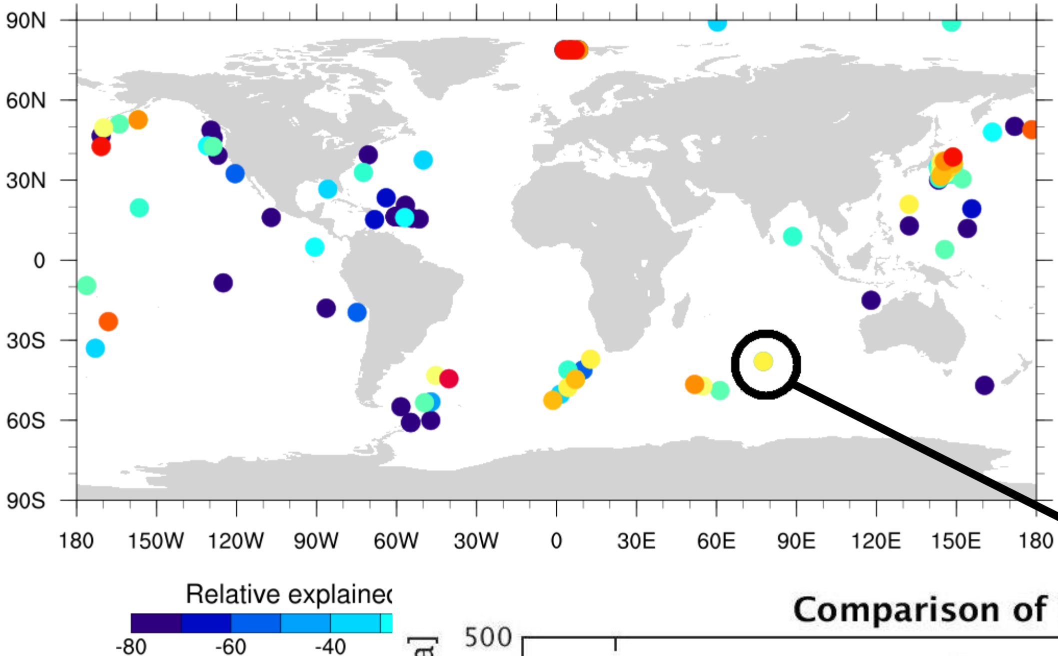

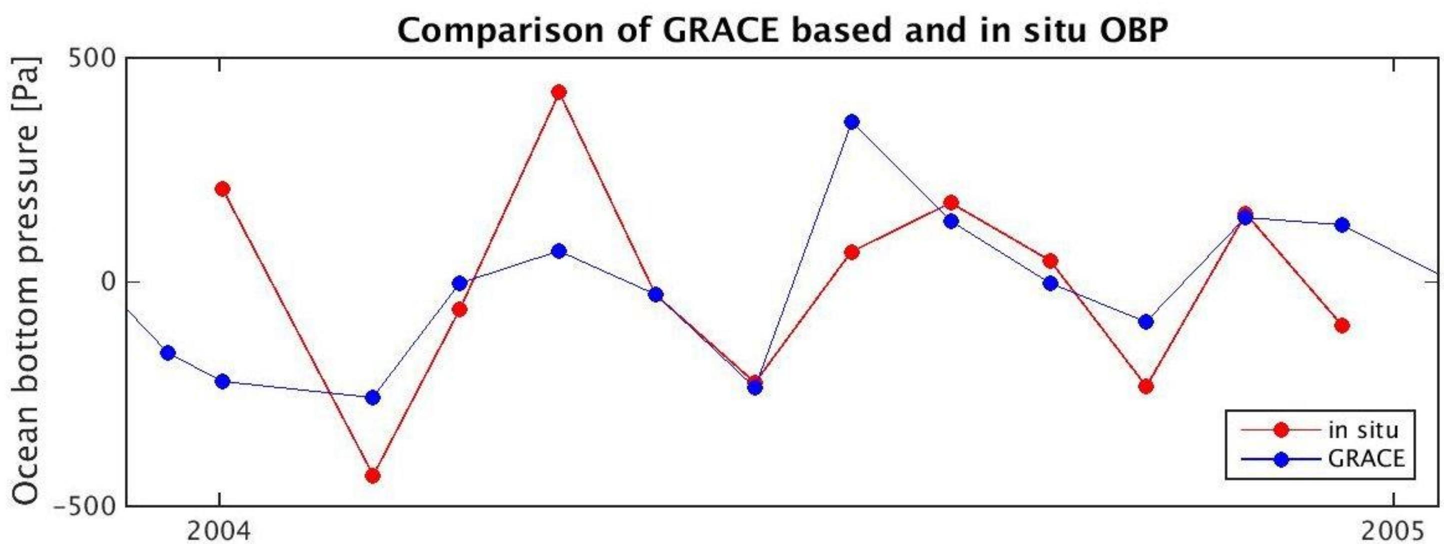

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Summary

- available data:
  - ocean model validation - ~150 re-processed in situ ocean bottom pressure time series
  - GRACE monthly mean solutions - ~130 stations
- OMCT RL05 validation:
  - generally good performance of the current OMCT RL05 over all considered frequency bands
- GRACE GFZ RL05a validation:
  - too much noise in the lower latitudes
  - good agreement between GRACE and in situ data in the higher latitudes

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  - rapid evaluation of new model experiments during the development of the model
  - comparison of GRACE solutions obtained in different institutions
  - evaluation of changes in data processing in preparation of a new data release
- validation results are considered during the ongoing development of AOD1B RL06 (planned for release in summer 2016)

GFZ Helmholtz Centre Potsdam

HELMHOLTZ ASSOCIATION

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Thank you!

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Relative explained variance

Explained variance – variance of in situ measurements explained by the model

$$V = \frac{\langle obs \rangle - \langle obs - \mathrm{mod} \rangle}{\langle obs \rangle}$$

OBP fields from GRACE GFZ RL05a

Work in progress

- improve leakage correction
- remove Sumatra-Andaman earthquake signature
- reconsider GIA model
- residual tidal signal assessment: Gulf of Carpentaria
- reconsider level of smoothing (DDK2, DDK3)