Validation of EGSIEM combined solution with in situ ocean bottom pressure

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Relative explained variance

relative explained variance = variance of the in situ measurements explained by the GRACE solution / model / AOD1B product

$$REV = \frac{Var(obs) - Var(obs - GRACE)}{Var(obs)}$$

- positive values → good agreement between GRACE and in situ data
- negative values → bad agreement between GRACE and in situ data

Testing the validation procedure with Tellus solutions
(whole available time span: 2002 – 2016)

GRACE Tellus CSR

GRACE Tellus GFZ

GRACE Tellus JPL
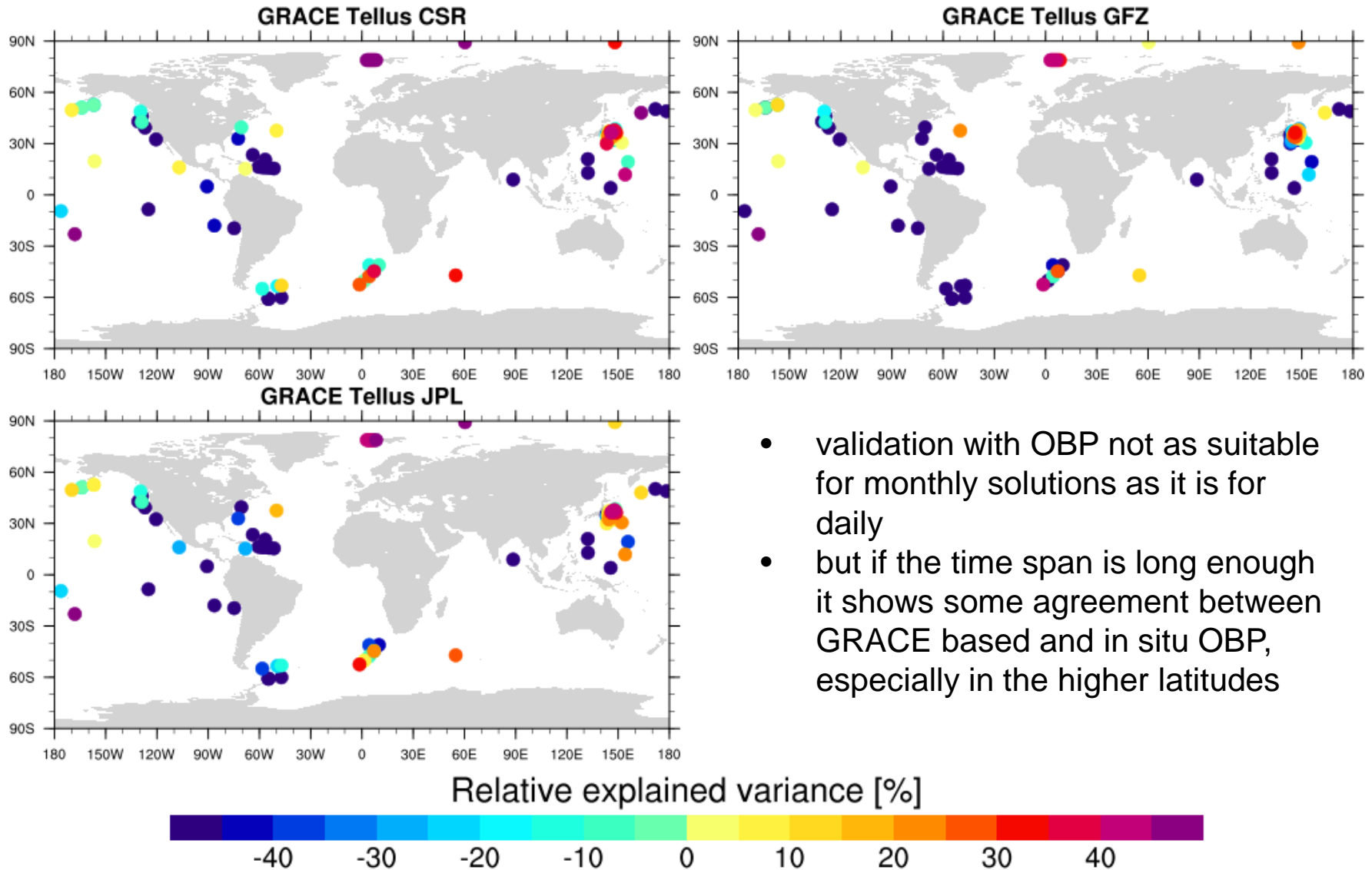
- validation with OBP not as suitable for monthly solutions as it is for daily
- but if the time span is long enough it shows some agreement between GRACE based and in situ OBP, especially in the higher latitudes

Relative explained variance [%]

-40   -30   -20   -10   0   10   20   30   40

Testing the validation procedure with Tellus solutions
(same 2 years as EGSIEM solution: 2006 – 2007)

- only 24 out of originally 105 stations are left

Relative explained variance [%]
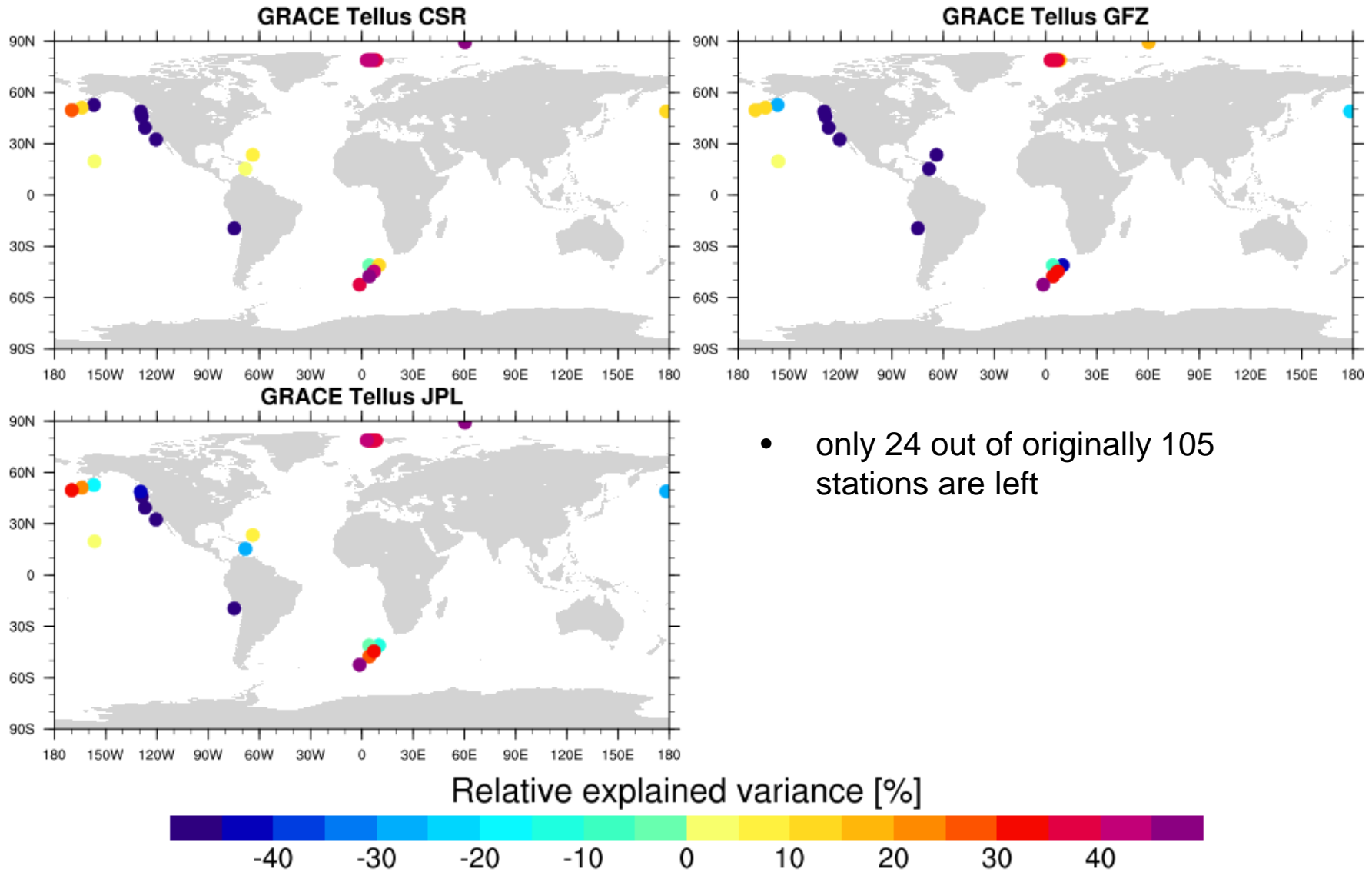
EGSIEM combined solution for ocean

- Data:
  - EGSIEM combined solution for ocean filtered by DDK2, DDK3 and DDK4 filters – coefficients:
    ftp://ftp.tugraz.at/outgoing/ITSG/EGSIEM/L3/DDK/
  - EGSIEM combined solution for ocean filtered by DDK5 filter – grid and coefficients:
    ftp://ftp.tugraz.at/outgoing/ITSG/EGSIEM/L3/ocean/

EGSIEM combined solution for ocean
(spherical harmonics coefficients)

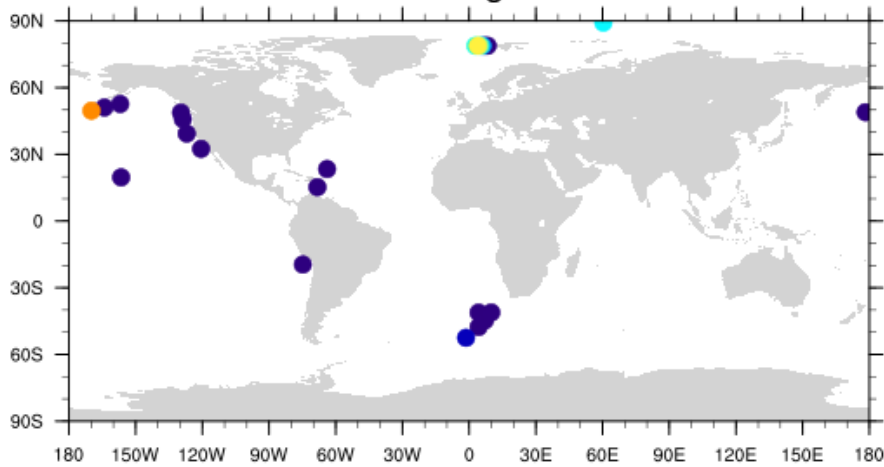Relative explained variance [%]

EGSIEM combined solution for ocean
(spherical harmonics coefficients)
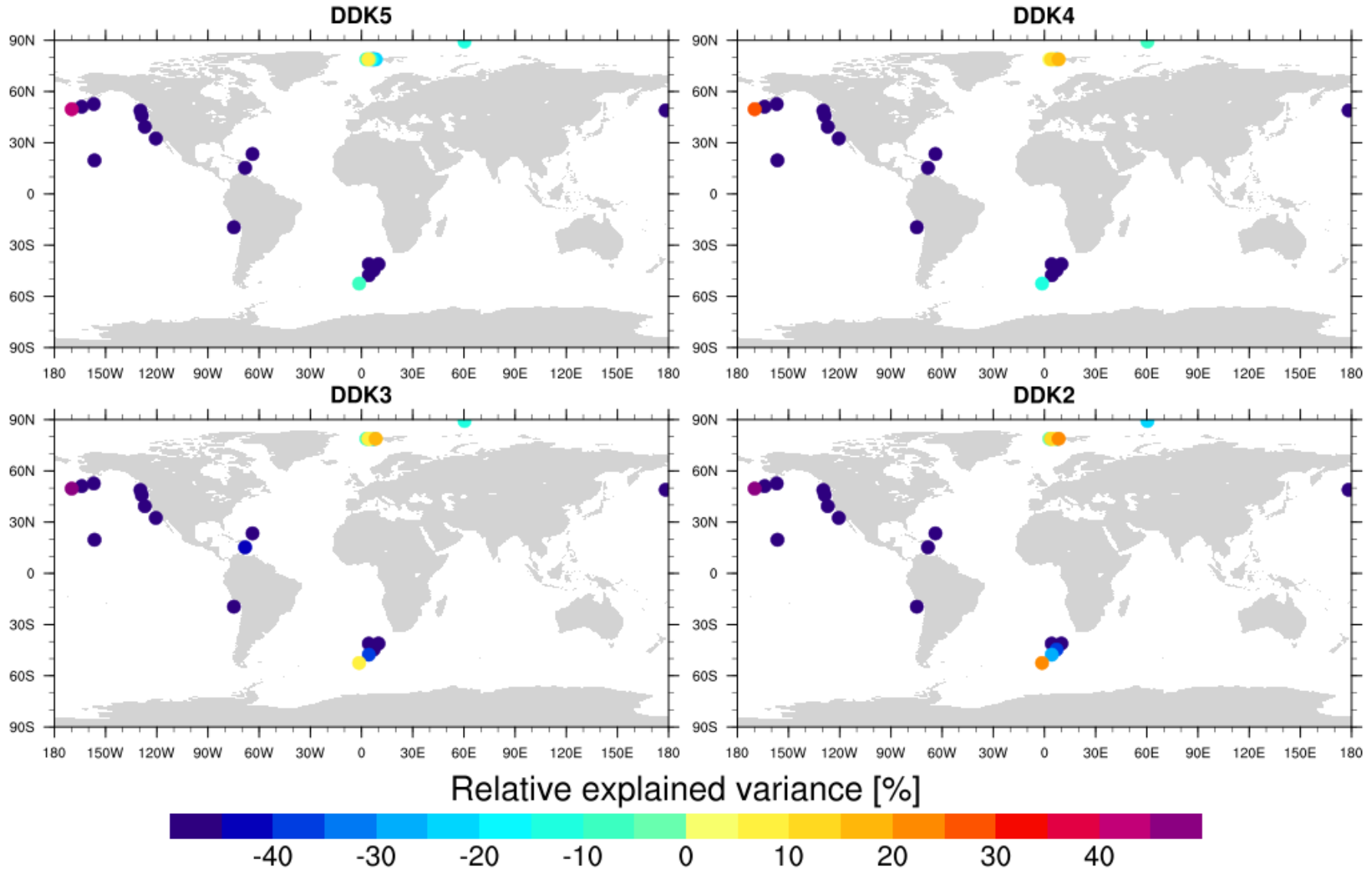
- Data:
  - EGSIEM combined solution for ocean filtered by DDK2, DDK3 and DDK4 filters – coefficients: ftp://ftp.tugraz.at/outgoing/ITSG/EGSIEM/L3/DDK/
  - EGSIEM combined solution for ocean filtered by DDK5 filter – grid and coefficients: ftp://ftp.tugraz.at/outgoing/ITSG/EGSIEM/L3/ocean/
- Results:
  - stronger filters provide better results in validation with in situ OBP → DDK2 is best (of provided filters)

EGSIEM combined solution for ocean
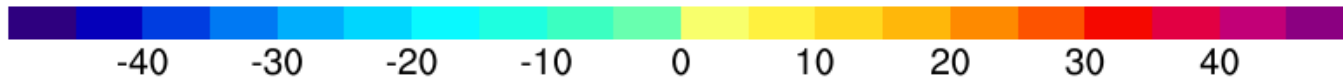# (grid and coefficients for DDK5 filter)

DDK5 grid

DDK5 coefficients
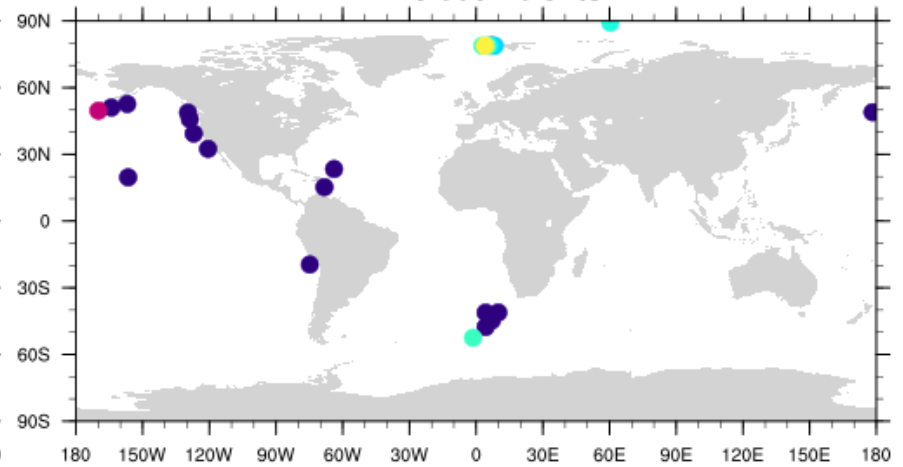
Relative explained variance [%]

-40   -30   -20   -10   0   10   20   30   40

EGSIEM combined solution for ocean
(grid and coefficients)

- Data:
  - EGSIEM combined solution for ocean filtered by DDK2, DDK3 and DDK4 filters – coefficients: ftp://ftp.tugraz.at/outgoing/ITSG/EGSIEM/L3/DDK/
  - EGSIEM combined solution for ocean filtered by DDK5 filter – grid and coefficients: ftp://ftp.tugraz.at/outgoing/ITSG/EGSIEM/L3/ocean/
- Results:
  - stronger filters provide better results in validation with in situ OBP → DDK2 is best (of provided filters)
  - small difference between provided gridded solution and the coefficients (coefficients give slightly better results for the DDK5 filtered solution) → probable reason: coefficients re-synthesised to different grids
  - only 24 stations for validation → sample is too small to draw any strong conclusions
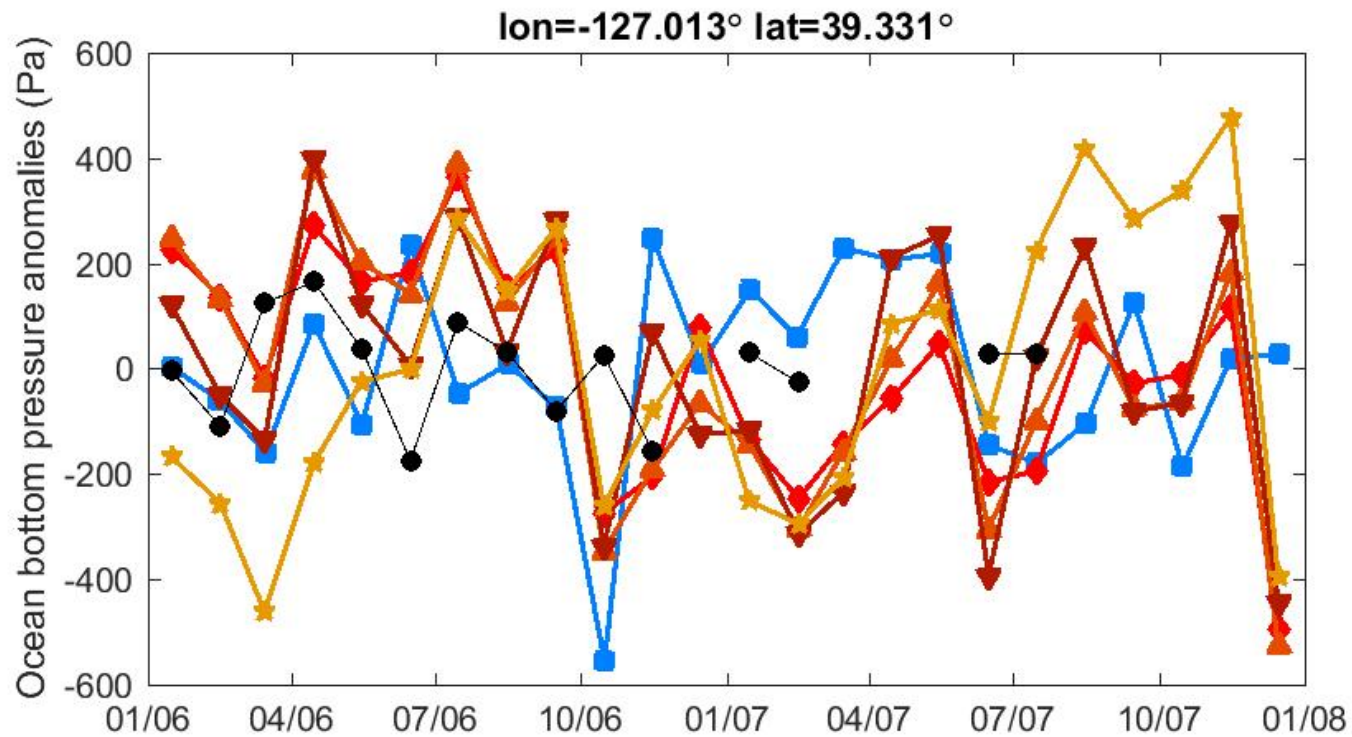
Comparison of time series
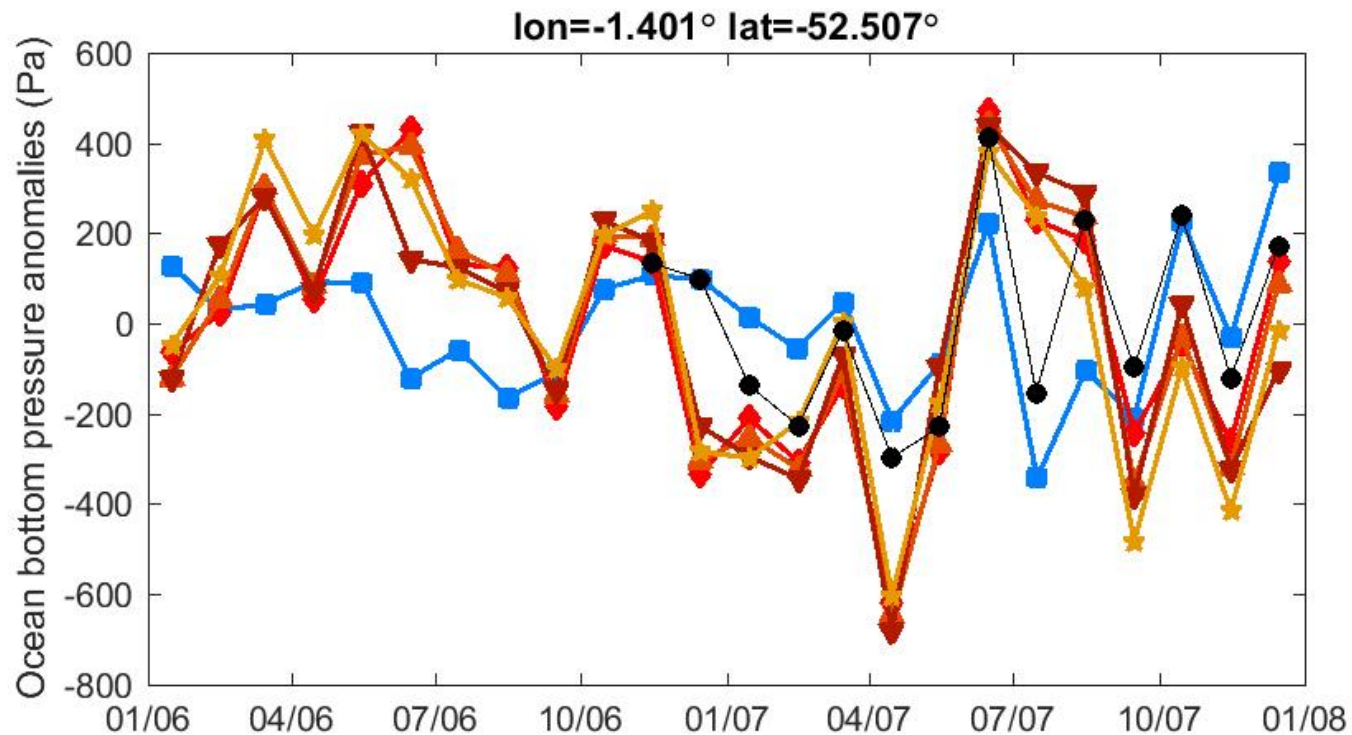
both Tellus and EGSIEM solution are positive, Tellus has higher explained variance
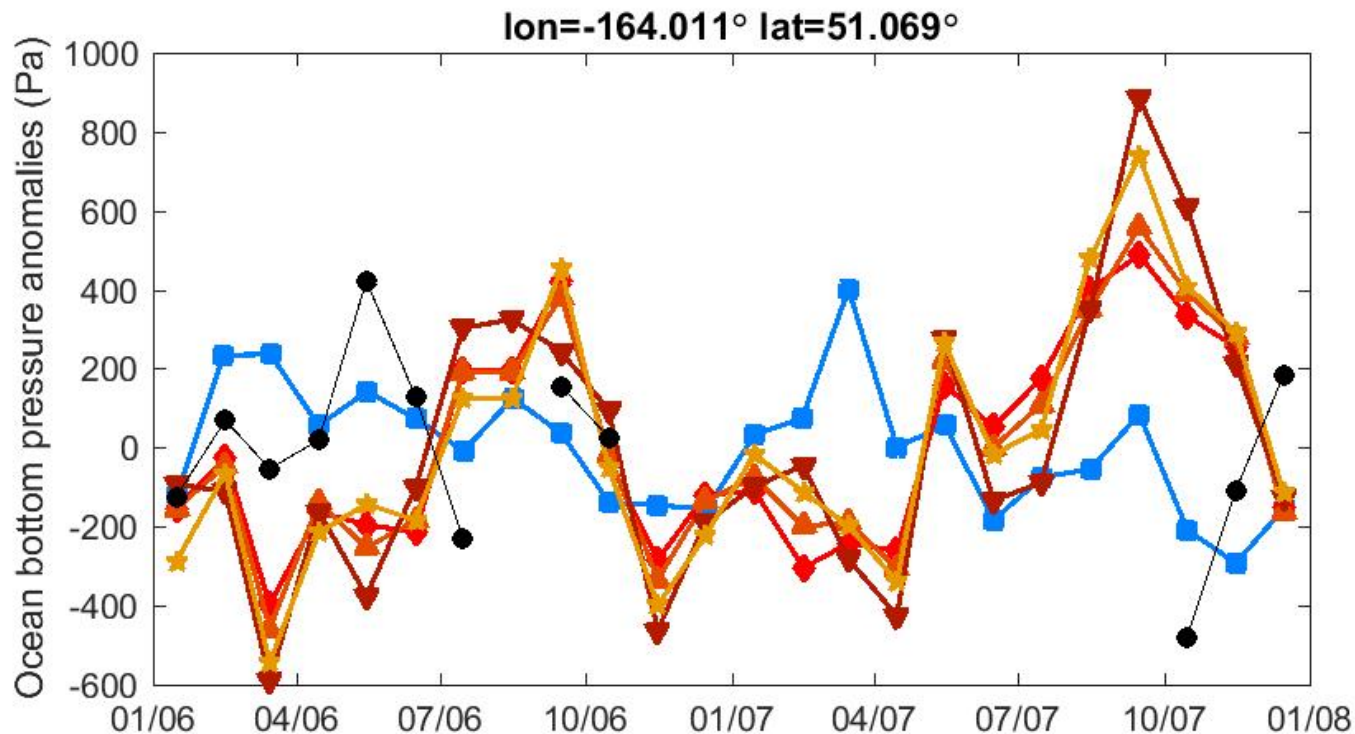
Comparison of time series
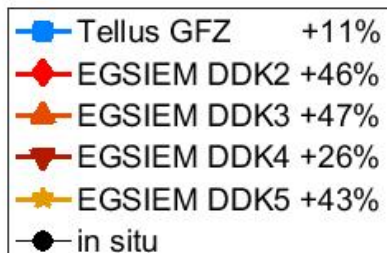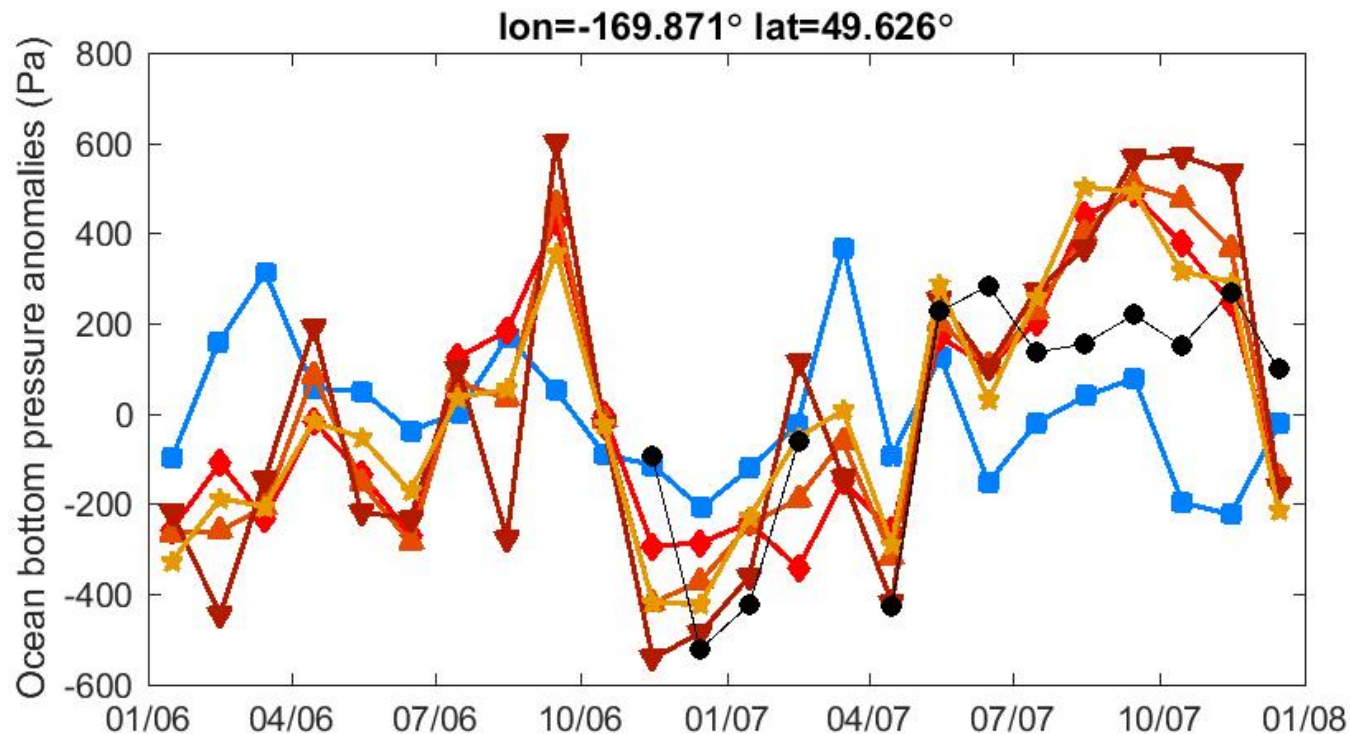
both Tellus and EGSIEM
solution are positive,
EGSIEM has higher
explained variance
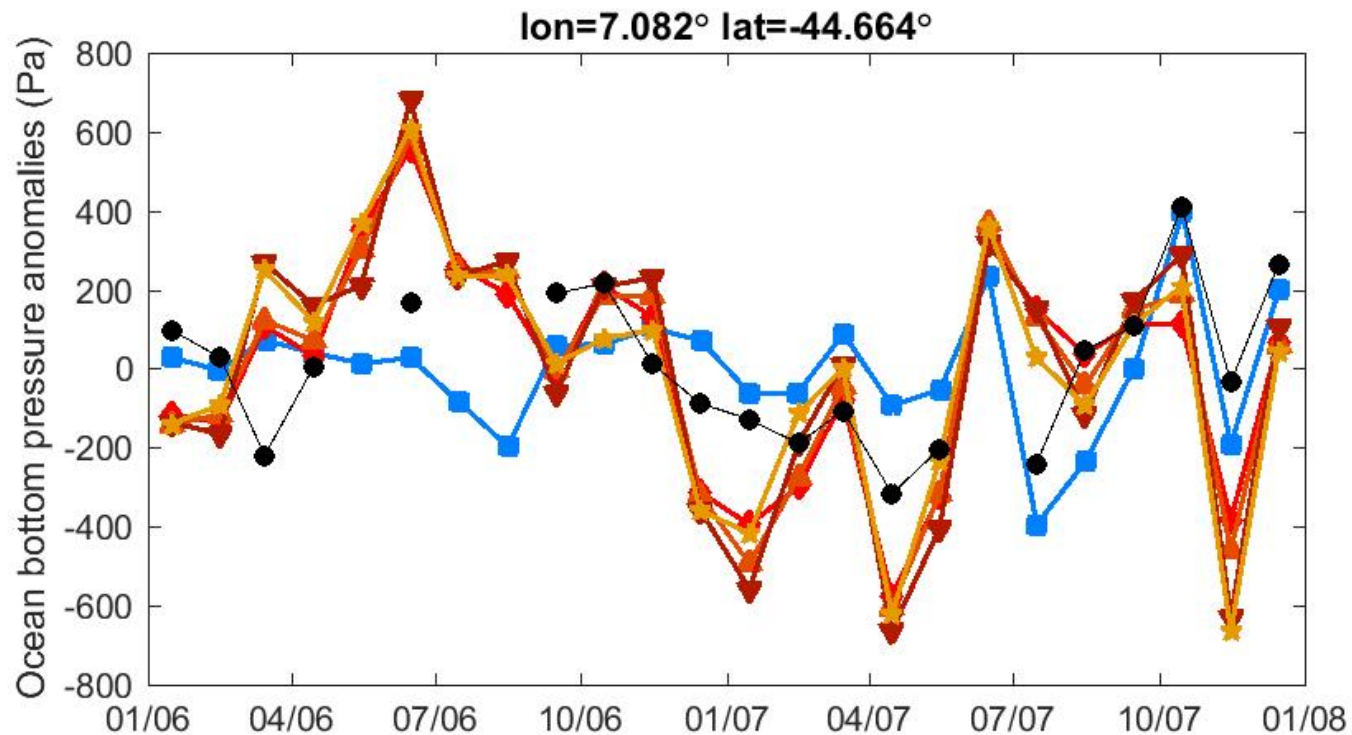
Comparison of time series

all solutions bad for this station

Comparison of time series

all solutions bad for this station, in situ time series too short and has a lot of gaps

Comparison of time series

Tellus solution relatively good, EGSIEM is not