ECCO Version 4, Release 4b; an errata for ECCO Version 4, Release 4

June 2021

An issue has been recently identified with the surface atmospheric pressure forcing fields used in the Version 4 Release 4 (V4r4) estimate that is available from NASA's Physical Oceanography Distributed Active Archive Center (PODAAC), https://podaac.jpl.nasa.gov/ECCO. Fields for April 2014 and December 2014 were inadvertently swapped and this resulted in wrong atmospheric pressure forcing for those months and also a shift of one day in the fields for the period May-November 2014. Effects on the estimate are largely confined to this period.

Given the quasi-static (inverted barometer) response to atmospheric pressure forcing expected at monthly and longer time scales, the faulty forcing should have a minimal impact on monthly fields, apart from differences in inverted barometer sea level estimates mainly for April and December 2014. The main effects on the solution are on sub-monthly time scales, for which a dynamical response to atmospheric pressure is expected. Solution fields most measurably impacted are sea level and bottom pressure.

We have re-run the solution with corrected atmospheric pressure forcing fields to create an errata for V4r4, called Version 4, Release 4b (V4r4b). Filtering used to remove atmospheric tides from these forcing fields is done over 3-year blocks. Thus, apart from the April-December 2014, the corrected forcing fields also include very minor adjustments over the rest of the 2013-2015 period. Given the expected impacts, and to minimize output volume, we have provided corrected daily and monthly fields for only native and lat-lon sea level and bottom pressure (SSH, SSHNOIBC, SSHIBC, OBP, and OBPGMAP), as well as hourly scalar time-series for ocean angular momentum output (SBO_CORE_PRODUCTS_snap_ECCO_V4r4b_1D.nc) and global mean atmospheric surface pressure over the ocean and sea-ice (GLOBAL_MEAN_ATM_SURFACE_PRES_snap_ECCO_V4r4b_1D.nc). These can be downloaded at https://ecco.jpl.nasa.gov/drive/files/Version4/Release4b. Output for other variables can be provided upon request from ecco-support@mit.edu (please subscribe via http://mailman.mit.edu/mailman/listinfo/ecco-support).

Comparison of ocean bottom pressure (OBP) between V4r4 and V4r4b shows that the difference on daily OBP anomaly is mainly in Hudson Bay and along Arctic coastal regions. At monthly or longer time-scales, the difference becomes negligible for most practical purposes. Map of the root-mean-square of the OBP anomaly difference is shown in Figure 1. Time-series of monthly and daily OBP time-series at 58N, 77W in Hudson Bay are shown in Figures 2 and 3, respectively.

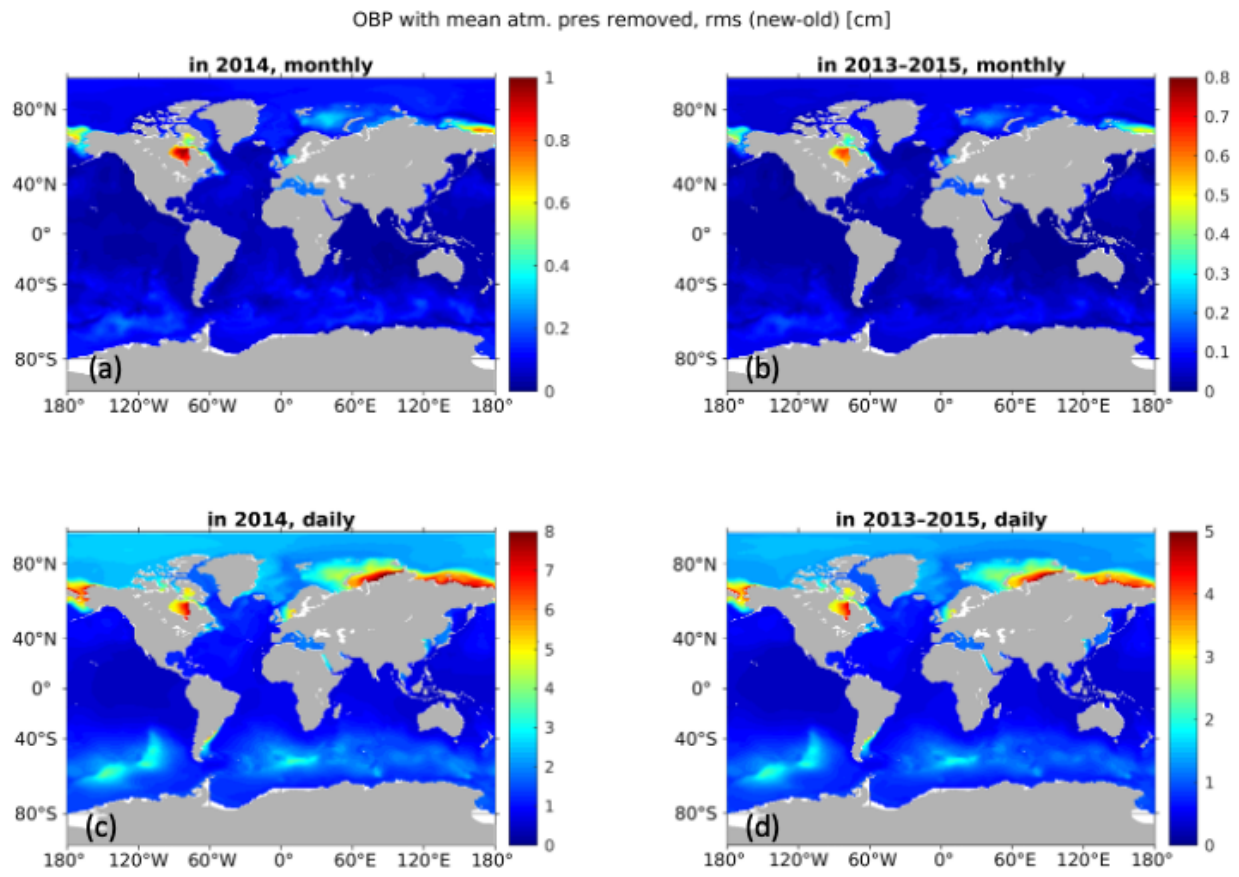

Figure 1. The root-mean-square of ocean bottom pressure (OBP, cm) anomaly difference between V4r4b (aka new) and V4r4 (aka old) for monthly (a and b) and daily (c and d) fields over 2014 (a and c) and 2013-2015 (b and d). Note that different color bars are used for different panels.

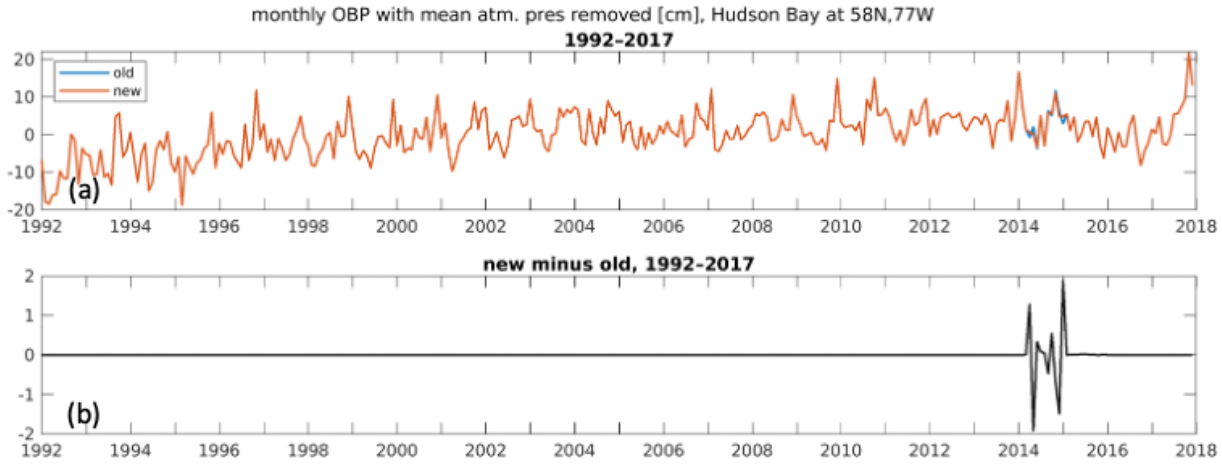

Figure 2. (a) Monthly time-series of OBP anomaly (cm) for a grid point (58N, 77W) in Hudson Bay for V4r4 (old; cyan) and V4r4b (new; orange). (b) Difference of monthly OBP anomaly, V4r4b minus V4r4.

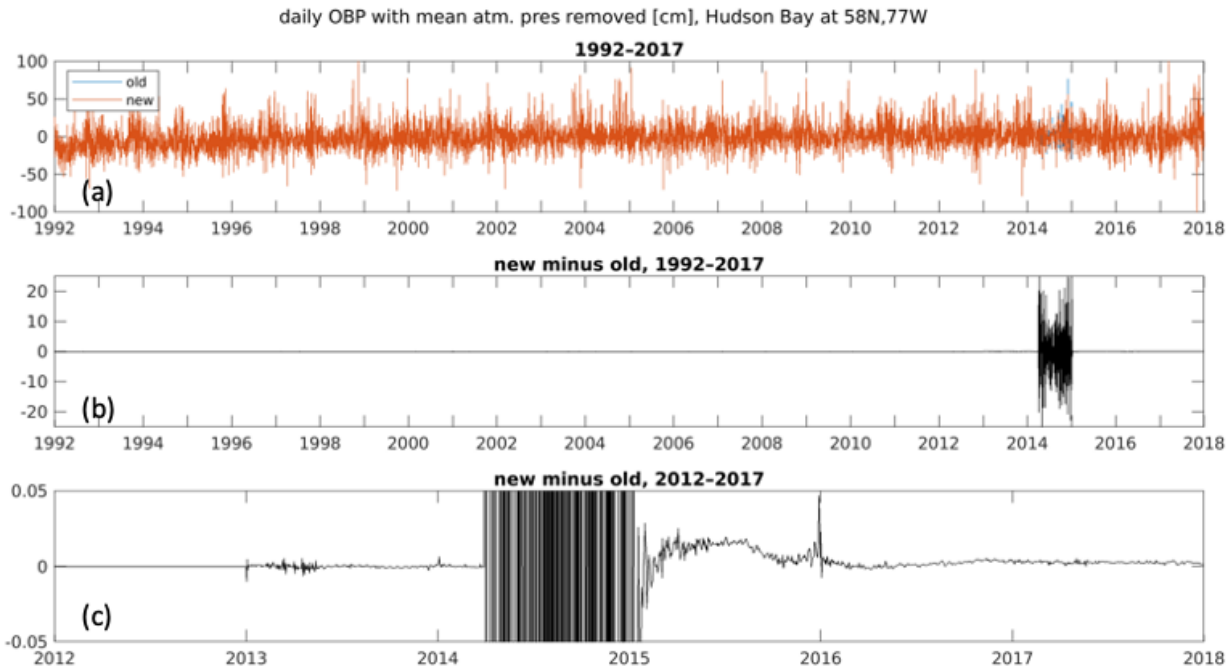

Figure 3. Same as Figure 2, but for daily time-series. (a) Daily time-series of OBP anomaly (cm) for V4r4 (cyan) and V4r4b (orange). (b) Difference of daily OBP anomaly, V4r4b minus V4r4. (c) Detail of (b) over 2012-2018 with reduced y-axis ranges.