



## Supplement of

## Estimating ocean tide loading displacements with GPS and GLONASS

Bogdan Matviichuk et al.

Correspondence to: Bogdan Matviichuk (bogdan.matviichuk@utas.edu.au)

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Figure S1. The effect of varying coordinate process noise (left) and ZWD process noise (right) at test site CAMO for the up component (2010.0 - 2014.0). This test was performed for all three constellation modes: GPS, GLONASS, GPS+GLONASS using CODE REPRO\_2015 products (up) and GPS-only AR JPL (bottom).



Figure S2.  $||Z_{res}||$  per tidal constituent for east, north and up components (left, middle and right, respectively) relative to FES2014b\_STW105d OTL values with CMC correction for JPL solutions. Grey crosses as per Figure 3. Top to bottom: ESA (GPS, GLONASS, GPS+GLONASS), CODE (GPS, GLONASS, GPS+GLONASS), JPL (GPS), JPL AR (GPS). Elevation cutoff of 7° was used for all solutions.



Figure S3. Magnitude of vector distance between estimated  $Z_{res}$  values computed with 7° and 20° elevation cutoff angles,  $||\Delta Z_{res}||$ , within the same set of orbits and clocks (from top to bottom: ESA, CODE, JPL, JPL AR) for east, north and up *coordinate* components (*left, middle and right, respectively*). Grey crosses are as per Figure 3.





Figure S4. Dependency of estimated  $||Z_{res}||$  and timeseries' length in years: GPS, GLONASS and GPS+GLONASS PPP solutions in blue, orange and green, respectively using ESA products. Note that 1 to 4 years of timespan use ESA repro2 while the rest uses a combination of ESA repro2 and ESA operational products. Grey crosses are as per Figure 3.



Figure S5. S<sub>2</sub> constituent as a function of elevation cutoff angle, computed with (top to bottom): ESA, CODE, JPL, JPL AR products. Grey crosses are as per Figure 3.



Figure S7. OTL vector differences between: ESA repro2 (2010.0-2014.0) and ESA operational (2014.0-2019.0) OTL estimates (top); CODE REPRO\_2015 (2010.0-2014.0) and CODE MGEX (2014.0-2019.0) OTL estimates (bottom). GPS (blue), GLONASS (orange), GPS+GLONASS (green) constellation modes present. Grey crosses are as per Figure 3.