



Sea level variations in the Black Sea for 1993-2007 period from GRACE, altimetry and tide gauge data

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Basin average GRACE seawater mass anomalies in the Black Sea obtained from satellite-only geopotential solutions to degree and order 50 computed by International Gravimetric Bureau (BGI) at 10-day intervals are corrected for the leakage of Lad-WORLD continental hydrology model and compared with the basin average steric corrected Jason-1 altimeter sea level anomalies (SLA). The basin average mass signal corrected for land hydrology has an annual amplitude of 33 ± 5 mm peaking in July and a semi-annual amplitude of 12 ± 4 mm peaking in June and December. Annual means obtained from combined T/P and Jason-1 SLA where no inverse barometer correction was applied are used to estimate the temporal variations in the mean sea level (MSL) during 1993-2007 period. The results shows that basin average MSL over the Black Sea has a rise rate of 2.8 ± 0.4 cm/year during 1993-1999 which is consistent with former studies and a fall rate of of -1.0 ± 0.5 cm/year during 1999-2007. It is observed that annual sea level of 2007 is getting closer to the annual sea level in 1993. This result is confirmed by using merged T/P, Jason-1 and ERS-1/2 or Envisat SLA distributed by CLS Space Oceanography Division where inverse barometer correction applied. Jason-1 SLA and GRACE seawater mass anomalies corrected for land hydrology at nearest grid points to the tide gauges are compared with the mean sea level values of Igneada, Amasra, Sinop and Trabzon-II tide gauges located along the Turkish coasts.