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Bottom pressure record of resonant oscillations in the Sea of Marmara

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Resonant oscillations (also known as seiches) in closed basins may be triggered by earthquakes and landslides and result in larger tsunamis amplitudes that in the open ocean. Moreover, seiches cause oscillatory currents at the seafloor that can influence sediment resuspension and deposition after earthquakes. In particular, processes generally invoked for turbidite-homogenite formation involve episodes of tractive transport under oscillatory currents (forming a laminated turbidite layer) followed by the settling of a cloud of suspended particulate matter (forming the homogenite). In the Sea of Marmara, numerical modeling had been performed in order to determine the periods of free oscillations modes (Yalciner and Pelinovsky, 2007) and the periods of the resonant oscillations typically fall in the range of infra-gravity waves, which suggests smaller amplitude ones may be triggered my meteorological events. In order to better constrain those models, an attempt to detect resonant oscillations and measure their frequencies and amplitudes was planned as part of MAREGAMI ANR-TUBITAK collaborative project and EMSO-France activities. A bottom pressure recorder and a doppler current meter are being deployed at successive locations in the Sea of Marmara for periods of about 6 months. We here present results of our first deployment session (February to August 2018) and re-examine data from an older record. Tidal oscillations with ≈12 hours and ≈24 hours dominant periods are observed with maximum amplitudes of 10 cm (10 hPa) crest to crest as well as 1-to-5-days intervals with higher frequency oscillations of centimeter amplitude. The frequency spectra of these oscillations display peaks at periods ca. 107, 78, 48.5, 41, 34.8, 24 and 22.4 minutes, only approximately matching results of numerical simulations. As in the numerical simulations, the spectra obtained vary with station location, which may be explained by local resonances, or if stations are located near the nodal lines of the missing modes.