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Oceanographic signatures and pressure monitoring of seafloor vertical deformation in near-coastal, shallow-water areas: a case study from Santorini Caldera.

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Bottom pressure, tilt and seawater physical-properties were monitored for a year using two instruments within the immerged Santorini caldera (Greece). Piggy-backed on the CALDERA2012 cruise, this geodetic experiment was designed to monitor evolution of the 2011-2012 Santorini unrest. Conducted during a quiescent period, it allowed us to study oceanographic and atmospheric signal in our data series. We observe periodic oceanographic signals associated with tides, and seiches that are likely linked to both the caldera and Cretan basin geometries. In winter, the caldera witnesses sudden cooling events that tilt an instrument towards the Southeast, indicating cold-water influx likely originating from the north-western passage between Thirasia and Oia. We do not obtain evidence of long-term vertical seafloor deformation from the pressure signal, although it may be masked by instrumental drift. However, tilt data suggests a local seafloor tilt event $\sim$1 year after the end of the unrest period which could be consistent with inflation under or near Nea Kameni. In addition, we illustrate that tilt sensor can roughly record seismic induced ground motion which in our case led to a shift in sensors attitude for one seismic event. Seafloor geodetic data recorded at the bottom of the Santorini caldera illustrates that the oceanographic signature is an important part of the signal, which needs to be considered for monitoring volcanic or geological seafloor deformation in shallow-water and/or nearshore areas.