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Abstract content:

Vertical crustal motions from tide gauge observations and satellite altimetry in southern Italy

The Italian peninsula with its islands is tectonically active to the effect that the entire territory is exposed to high natural hazard due to earthquakes and volcanoes. The tectonic activity leads to vertical motions that affect the coastlines. Tide gauges measure the relative motion between the coastline and the sea surface. A measured increase in sea level is therefore the sum of sea level rise and crustal subsidence. If the goal of the observations is measuring the vertical crustal motions, the sea level rate must be subtracted. Satellite altimetry gives an independent measurement of the sea surface rise. Due to interannual variability of sea level change, the time series of tide gauges and satellite altimetry must be at least 10 years long and contemporaneous. The observations of the satellite missions ERS, Topex/Poseidon and Jason and the tide gauges of the Italian tide gauge network meet this criterion (Fenoglio Marc et al., 2012). For southern Italy the tide gauges are analyzed statistically among each other to obtain the relative sea level rise variations along the coast (Braitenberg et al., 2010). The correlation coefficient between tide gauges is very high, over 0.9, between tide gauges and altimeter lower, but still relatively high up to 0.7. Statistically significant vertical movements have been found in southern Calabria and eastern Sicily. The results are validated with geomorphologic results, vertical rates from GPS, and from repeated leveling (Spampinato et al., 2013).

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vertical crustal movement, satellite altimetry, tide gauges, Italy, Mediterranean, climate change