Since 1995 we have been conducting detailed field studies of the Holocene evolution and seismotectonic regime of selected areas on the eastern coast of the Kamchatka Peninsula (Fig. 1).

Specific methods of these investigations include: 1) application of tephrochronology and tephrostratigraphy [1] for dating and correlation of various types of coastal deposits and landforms; 2) study of paleotsunami deposits [4,5,6] in order to determine their ages and recurrence rate and to estimate the magnitude of large tsunami and tsunamigenic earthquakes along the Kurile-Kamchatka subduction zone and north of the latter during Holocene time (last 10,000 years); 3) analysis of the geologic structure, age, and modern and paleo-topography of marine terraces and beach ridges in order to determine the direction and scale of seismotectonic movements over different time intervals [2,3].

As a result of these studies we have reconstructed key events in coastal evolution during the Holocene and determined the ages of marine accumulative landforms on various segments of the coast. We managed to estimate coseismic, afterslip and post-seismic vertical deformations for some Kamchatkan historical and pre-historical earthquakes. Such estimates are feasible in cases where the study area hosts closely timed volcanic ashes bracketing a strong earthquake.

The shorter the time interval we are able to specify (decades to hundreds of years), the higher the rate of vertical movements (centimeters to tens of centimeters) we tend to obtain. Estimates of summary deformation for longer periods (hundreds and thousands of years) allow us to obtain average rates, which are significantly smaller (of the order of 0.1-1.0 millimetres per year). A reason for this discrepancy is that a long time interval (thousands of years) normally includes more than one seismic cycle, and averaging the deformations for such long time intervals ignores the influence of large-scale individual cycles of vertical movements, each of which is related to a certain seismic event. Intervals of hundreds of years give intermediate rates since they include the interseismic phase of relatively slow movements.

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References
