A Mw 6.4 earthquake occurred on 11 August, 2009 in Suruga Bay, Japan, was accompanied by a tsunami which was recorded by various instruments including tide gauges at the coast, ocean-bottom pressure gauges of the seafloor network. The earthquake damaged a seafloor pipe of the deep-sea water plant. We used underwater vehicles to survey in the area around the seafloor pipe and identified bathymetric evidences that submarine mass movements occurred approximately 5 km off the coast. Submarine mass movements often generate unexpected tsunamis. In this paper, we perform numerical tsunami simulation by assuming simultaneous the fault motion and the submarine mass movement. Short-period tsunami is generated by the submarine mass movement because the dimension of which is not so large. The short-period tsunami waveforms can be identified in data recorded at the ocean-bottom pressure gauges, whereas it does not appear on the tide gauge data. This is due to that the tide gauge is not sensitive to the short-period tsunami component or it is hidden by the effect of harbor resonance. We conclude that the submarine mass movement due to the 2009 Suruga earthquake generated short-period tsunami, which was detectable by the ocean-bottom pressure gauge in the open ocean, not by the tide gauge at the coast.