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New approach to analysis of strongest earthquakes with upper-value magnitude in subduction zones and induced by them catastrophic tsunamis on examples of catastrophic events in 21 century

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The study of generation of strongest earthquakes with upper-value magnitude (near above 9) and induced by them catastrophic tsunamis, is performed by authors on the basis of new approach to the generation process, occurring in subduction zones under earthquake. The necessity of performing of such studies is connected with recent 11 March 2011 catastrophic underwater earthquake close to north-east Japan coastline and following it catastrophic tsunami which had led to vast victims and colossal damage for Japan. The essential importance in this study is determined by unexpected for all specialists the strength of earthquake occurred (determined by magnitude M = 9), inducing strongest tsunami with wave height runup on the beach up to 10 meters. The elaborated by us model of interaction of ocean lithosphere with island-arc blocks in subduction zones, with taking into account of incomplete stress discharge at realization of seismic process and further accumulation of elastic energy, permits to explain arising of strongest mega-earthquakes, such as catastrophic earthquake with source in Japan deep-sea trench in March, 2011. In our model, the wide possibility for numerical simulation of dynamical behaviour of underwater seismic source is provided by kinematical model of seismic source as well as by elaborated by authors numerical program for calculation of tsunami wave generation by dynamical and kinematical seismic sources. The method obtained permits take into account the contribution of residual tectonic stress in lithosphere plates, leading to increase of earthquake energy, which is usually not taken into account up to date.