Tsunami Hazards Along the Chinese Coast from Potential Earthquakes in Northwest Pacific Region

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There exist long records of past tsunamis along the Chinese coast, going back a couple of millennia. These historical vestiges clearly point to the potential danger from impending tsunami disasters with an eastern origin. Indeed the Chinese coastal area from Fujian to Shandong is exposed openly to earthquakes from both the Ryukyu and Japanese trenches. Using GPS, earthquake focal mechanisms and plate-tectonic history, we have outlined the dangerous zones in the Northwest Pacific plate boundaries, where major earthquakes may occur. The Ryukyu and Japanese trenches are identified as being most culpable for future major earthquakes. We have obtained the local Gutenberg-Richter relationship for several sections along the Ryukyu and Japanese trenches and employ this information for determining the probability distribution for tsunami waves with various heights to hit Chinese cities. We devise a novel method called the probabilistic forecast of tsunami hazard (PFTH), which determines this probability distribution by direct numerical integration of the non-linear shallow-water equations over the Yellow Sea to monitor the waves excited by the hypothetical earthquakes in these dangerous trench zones. We will give the results in terms of the probability of a wave with a height of over 2 meters to hit various Chinese cities in the next century.