The Great Tohoku Earthquake ($M_w=9.0$) occurred on March 11, 2011 and the following devastating tsunami are of higher importance to identify the relationship between earthquakes sources parameters and fault dimensions with tsunamis. Kandilli Observatory and Earthquake Research Institute (KOERI) which is leading the national initiative for the establishment of a National Tsunami Warning Center in Turkey as a part of Tsunami Warning System in the North-eastern Atlantic, the Mediterranean and connected seas region used Nami Dance Tsunami Simulation Visualization Code v5.x in the aim of comparing scenarios produced by applying three different focal mecanisms solutions derived respectively by CMT (203/10/88 with depth: 20km), ERI W phase (202.3/10.1/94 with depth: 24km) and USGS W Phase (193/14/81 with depth: 24km). Numerous parameters are tested such as the length (L) and width (W) of the fault (L: 300km-W: 150km and L: 450km-W: 200km) and the displacement on the fault (20 m and 30 m). In the end of one hour simulation, each scenario has their own wave trends at specific time slices and maximum wave amplitude obtained under the control of a 450km-200 km fault system is about 20 meters while a height of 13 meters is reached in the presence of a more smaller fault system. Therefore, this analysis giving the opportunity to test Nami Dance sensitivity towards different parameters highlights the closer correlation between earthquake source parameters and fault dimensions with resulting tsunamis, and also call attention to the importance of accuracy of these parameters for an effective tsunami early warning.