Regression analysis was performed using observed tsunami height at offshore and coastal tidal station pairs, which were within 20 km each other, for the 2010 Chile earthquake tsunami. We used 26 sets initial and 33 sets maximum tsunami height data obtained from the Real-Time Kinematic Global Positioning System (RTK-GPS) buoys, wave station and coastal tidal stations throughout Japan. We obtained two formulas for initial and maximum tsunami height; proportional parameters in these formulas are similar to those of derived in the previous study. Then, simulation of the 1896 Meiji Sanriku earthquake tsunami was performed as a case study of application of these equations to real-time tsunami forecast and tsunami database. Then, we conclude that the formula for initial tsunami height derived in this study is reliable and valuable enough to be applied in real-time tsunami forecast using detected initial tsunami wave at offshore RTK-GPS buoy, because of the potentially increased leading time to issue tsunami warning. In addition, preparing maximum tsunami height data by applying the formula for maximum tsunami height and using synthetic tsunami waveform at forecast points or RTK-GPS buoy should improve the accuracy of tsunami database.