Most of earthquake early warning systems are conceived as either ‘regional’ or ‘on-site’ systems. A new concept is the integration of these approaches for the definition of alert levels and the estimation of the earthquake Potential Damage Zone (PDZ). The key element of the method is the real-time, simultaneous measurement of initial peak displacement ($P_d$) and period parameter ($TAU_c$) for a 3-second window after the first P-arrival time at accelerometer stations located at increasing distances from the epicenter. As for the on-site approach the recorded values of $P_d$ and $TAU_c$ are compared to threshold values, which are set for a minimum magnitude $M_w$ 6 and instrumental intensity Imm VII, according to empirical regression analysis of strong motion data from different seismic regions. At each recording site the alert level is assigned based on a decisional table with four entries defined by critical values of the parameters $P_d$ and $TAU_c$. A regional network of stations provides the event location and transmits the information about the alert levels recorded at near-source stations to more distant sites, before the arrival of the most destructive phase.

We present the results of performance tests of this method using ten, $M_w > 6$ Japanese earthquakes, and propose a very robust methodology for mapping the PDZ in the first seconds after a moderate-to-large earthquake. The studied cases displayed a very good matching between the rapidly predicted and observed damage zone, the latter being mapped a few days after the event from detailed macro-seismic surveys.