ISTerre
Institut des Sciences de la Terre

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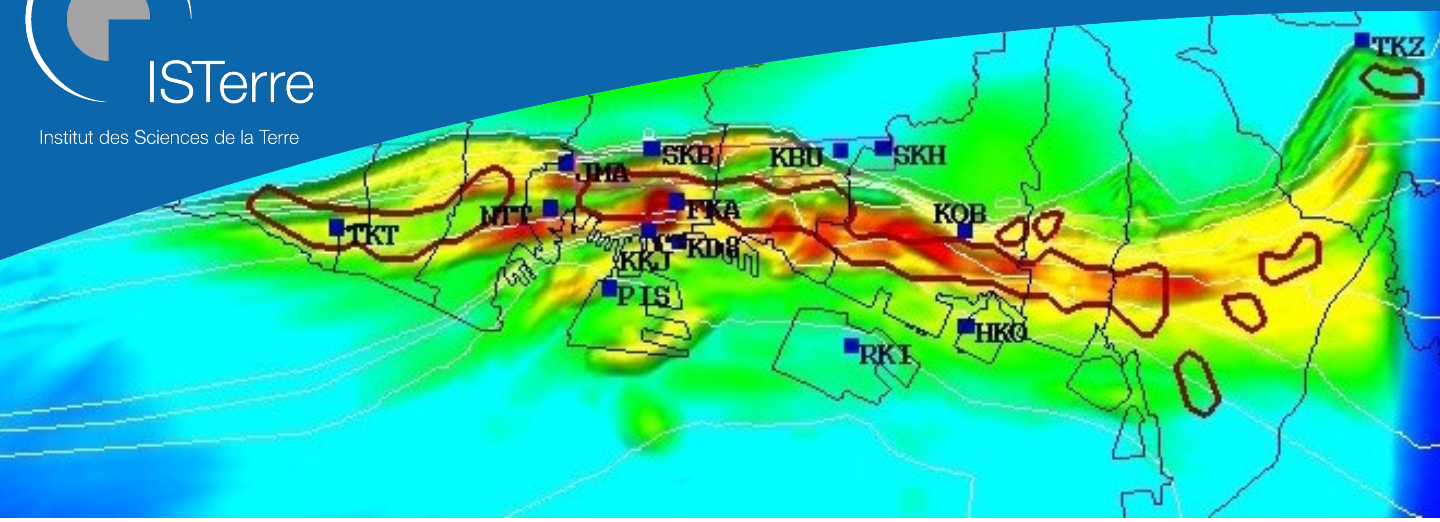

Progress of Strong Motion Prediction Research in Japan Since 1995 Kobe Earthquake

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It is important to predict quantitatively strong ground motions from the potentially dangerous earthquakes in the vicinity of the target sites for earthquake disaster mitigation. Before the Kobe earthquake of 1995 (M6.9) we did not have any concrete perception on the characteristics of near-fault ground motions from inland, shallow crustal earthquakes, although we had sufficient data from subduction zone earthquakes along the Pacific Plate in the northeastern side of Japan. This was because western Japan had been enjoying the quiescence era after the two large subduction zone earthquakes along the Nankai Trough in 1944 and 1946. The devastating damages to a lot of modern reinforced-concrete buildings and bridges were created during the Kobe earthquake, and so it was our urgent task to reveal the real cause of such heavy structural damage. After a couple of years of intensive studies it turns out that not only complex source effects but also complex site effects play a very important role to generate high amplitudes of velocity pulses, which should be the only cause of the observed devastating damage. Based on the reproduced strong motions, we successfully reproduced building damage to prove that. Since then we have been trying to build a common scheme (Recipe) for quantitative prediction of strong ground motions in the near field of dangerous inland earthquakes. One effort is focused on the description of the detailed yet complex nature of the fault process. The other effort is focused on the delineation of the detailed yet complex nature of the underground structure that would amplify strong motions. In this seminar I would like to present one of our recent achievements in each of these two main subjects. As a final note strong motions from subduction zone earthquakes were proved to be not an immediate threat during the 2011 Tohoku earthquake where we have very small numbers of collapsed buildings. This is because we would not have a coherent velocity pulse from the subduction zone earthquakes away from the site.

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