Seismic wavefield imaging based on dense seismic networks using replica exchange Monte Carlo method

*Masayuki Kano[1], Hiromichi Nagao[2,3], Kenji Nagata[4,5], Shin-ichi Ito[2,3], Kei Hasegawa[2], Shin'ichi Sakai[2], Shigeki Nakagawa[2], Muneo Hori[2], Naoshi Hirata[2]

1. Graduate school of science, Tohoku University, 2. Earthquake Research Institute, The University of Tokyo, 3. Graduate School of Information Science and Technology, The University of Tokyo, 4. AIST, 5. Japan Science and Technology Agency

In recent years, dense seismic observation networks have been constructed. For example, the Metropolitan Seismic Observation network called MeSO-net has been observing ground motions since 2011 with the average intervals of ˜5 km in the Tokyo metropolitan located on the Kanto sedimentary basin, Japan. Utilizing seismograms of MeSO-net, we have developed a wavefield reconstruction method by simultaneously estimating subsurface velocity structures and source locations using replica exchange Monte Carlo (REMC) method [Kano et al. 2017, GJI, JGR]. The reconstructed wavefield can be used as input ground motions to simulate seismic response of infrastructure for the purpose of rapid evaluation of seismic hazards. In this presentation, we will summarize the REMC-based wavefield estimation method and discuss future developments and applications of the method.

Keywords: MeSO-net, Replica exchange Monte Carlo, Seismic wavefield imaging