Crustal Structure of Southeast Asia and Northern Australia from Bayesian Inversion of Seismic Ambient Noise

Erdinc Saygin (1), Phil Cummins (1), Suhardjono Suhardjono (2), and Prih Harjadi (2)

(1) Research School of Earth Sciences, The Australian National University, Canberra, Australia (erdinc.saygin@anu.edu.au),
(2) Badan Meteorologi, Klimatologi, dan Geofisika, Jakarta, Indonesia

We image Southeast Asia and the northern part of Australia by cross-correlating ambient seismic noise recorded at over 500 stations. The group velocities are measured through applying narrow band filters on the retrieved Rayleigh wave Green's functions and used in a probabilistic tomographic approach to map the velocity structure of the region. The inverted images from 8 seconds to 40 seconds show details of the seismic structure of the region beneath the Indonesian archipelago, South China Sea, and northern shelf of Australia, including the boundaries of the oceanic lithosphere.

Transdimensional Bayesian tomography is used to invert the traveltimes of Green's functions for periods between 8 and 40 seconds. Transdimensional Bayesian tomography does not require an explicit choice of smoothing, damping or grid parameterization; the resolution if the solution instead varies spatially and is determined by the data. By sampling the resulting tomographic images at different spatial points, we construct the group velocity dispersion curves. These curves are later inverted, again with a transdimensional Bayesian approach, to create the 2D shear wave velocity distribution of the region. Various features are imaged, including low-velocity sedimentary basins at shallow depth and high velocities associated with the ongoing subduction of the Australian lithosphere beneath the Sunda Plate.