Detecting slab structure beneath the Banda Arc from waveform analysis of deep focus earthquakes

Utilizing 30 recently installed broadband seismometers in the Banda Arc region of the Indonesia archipelago we investigate the structure of subducting Indo-Australian plate. This region is of particular tectonic interest as it is the archetypal example of a young arc-continent collision along with known varied lithospheric structure of the incoming plate. Previous tomographic images indicate a complicated subducted slab structure where gaps in fast velocity anomalies in the upper mantle are interpreted as slab tears and are linked to the variation in the incoming plate structures. The detailed shape and location of these tears are important for kinematic reconstructions and understanding the evolution of the entire subduction system. However, tomographic images are inherently smooth due to being produced with damped inversions and will then underestimate the sharpness of these structures. We investigate possible sharp-sided structures within and at the edges of the subducted plate from deep focus earthquakes occurring beneath the seismic stations. Preliminary results show that the energy associated with the P-wave first arrival indicates a large amount of variation between waveforms at different stations along the arc, both in terms of frequency content and maximum amplitudes. Three main features can be inferred from these initial results: (i) There is significant variation in frequency content along strike from deep events that are not related to station effects; (ii) There are two “regions” of low frequency signals that are not aligned with proposed location of the “slab gap”, but are possibly aligned with subducted continental lithosphere; (iii) The two “regions” of high frequency signals are possibly aligned with the subducted oceanic lithosphere. Therefore our initial results suggest that we may be able to image a change in subducted lithospheric structure or composition along strike.