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Far Field *P*-Waveform Analysis of 2004 Sumatra-Nicobar-Andaman Earthquakes Using Finite Difference Green's Functions

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The December 26 off west coast of northern Sumatra earthquake (M_W9.0) was the largest event after the 1964 Alaskan earthquake (M_W9.2). It is quite important to precisely examine the spatial and temporal stress state of the area for the study of the earthquake generation and the lithospheric dynamics as the area appeared to have relatively low seismic activity.

To infer the spatio-temporal stress state through spatial and temporal variations of focal mechanisms and source positions, we apply a non-linear inversion method1 to the far-field *P*-waveforms. Our method retrieves moment tensor and source time function of a point source simultaneously. Non-negative constraint imposed on the source time function prevents the trade-off between the source time function and the source depth. Furthermore, we can also constrain the horizontal source position relative to the trench axis because of the large, non-uniform effect of the lateral heterogeneity near the source (i.e., the trench) on the waveforms. Thus we numerically evaluate the effect by a very efficient 2.5D finite-difference method[2, 3] combined with the reciprocal algorithm[4] to obtain the far-filed *P*-wave Green's functions. We search the best source position by a grid-search method.

Our preliminary result for one of the aftershocks (2005/01/24 Nicobar M_W6.2) shows relatively well defined global minimum in the spatial residual distribution and favors a source position slightly shallower than, and more distant from the trench axis than the QED position. We will show results of our analysis and discuss the stress state of the area.

References

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