Geophysical Research Abstracts
Vol. 13, EGU2011-11181, 2011
EGU General Assembly 2011

New mode splitting estimations from recent large earthquakes

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The observation of the splitting of normal modes was a very active research field in the 1990's but has seen little improvement since then. Paradoxically, in the last ten years the number of high-quality, digital broadband stations has grown by almost an order of magnitude, and the last decade has seen no shortage of strong earthquakes. The time is therefore ripe to revisit the topic.

Recent large earthquakes recorded by the global seismic network are studied to compute and determinate the splitting characteristics of normal mode multiplets. Our ultimate goal is to use these data together with multiple-frequency travel times to invert for structure of the Earth's mantle. In a first effort, we analyzed nearly 90 earthquakes in the period 2000-2010 using a mode stripping technique. This allowed us to do a rigorous quality control. From this analyze we conclude that we can strip multiplets of different spectra computed from more 15000 recordings from 50 events. The maximum angular order studied is 12 for a maximum frequency of 5 mHz.

In the second step - still in progress - we use the autoregressive estimation technique of Masters et al. (GJI, 2000), which allows for solving the splitting matrix system without knowledge of the earthquake source.

We present results from the first step that show how we use the technique to strip multiplets of different spectra computed from three components of multiple events in the period of study to select suitable data for subsequent autoregressive estimation. New estimations of splitting are also computed of a variety of multiplets. We also hope to present preliminary splitting estimates from the autoregressive technique and make a comparison with earlier data, as well as with recent efforts by other groups to re-determine mode splitting.