Moment tensor analysis using the algorithm of Matching pursuit

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The method of moment tensor analysis (Fukuyama and Dreger, 2000) is one of the useful methods which calculate the earthquake mechanism from surface waveform data, on the assumption of point source. Therefore, it is not useful for analyzing the successive earthquakes whose sources are happened short time intervals or short distance intervals.

The Matching pursuit is the one of the wavelet transform method. First, the transform method matches the wavelet function with the best part of the waveform data. Next, the method subtracts the matched wavelet from the best part of the waveform data, after memorizing the position of the part and amplitude. The method repeats these operations (ex, Mallat and Zhang,1993).

We applied the method to the moment tensor analysis and made the new algorism. And, we applied the algorism to the successive earthquake. The new algorism matches the large amplitude part of waveform data with the calculated waveform. Then, the algorism subtracts the best matched calculated waveform from the part of waveform data, after the memorizing the time position of the part and correspondent moment tensor with the part. The algorism repeats these operations.

We can find easily the next analysis target part of the waveform data by subtracting the large amplitude analyzed part. Therefore, we can estimate the number of the sub-event. This is the advantage of the algorism.

We analyzed the successive earthquake which happened at Soya district of Hokkaido, October 4, 2008. We calculated the 2 inverse fault type moment tensors which are Mw3.5 and 3.6, respectively. But, there are differences of the strike angles and dip angles between 2 moment tensors. This is the problem for later that the differences are effect based on the tectonic in the region or effect of the calculation error.