Source Process of the 2003 Tokachi-oki Earthquake, Mw=8.0, Deduced from Strain Seismograms

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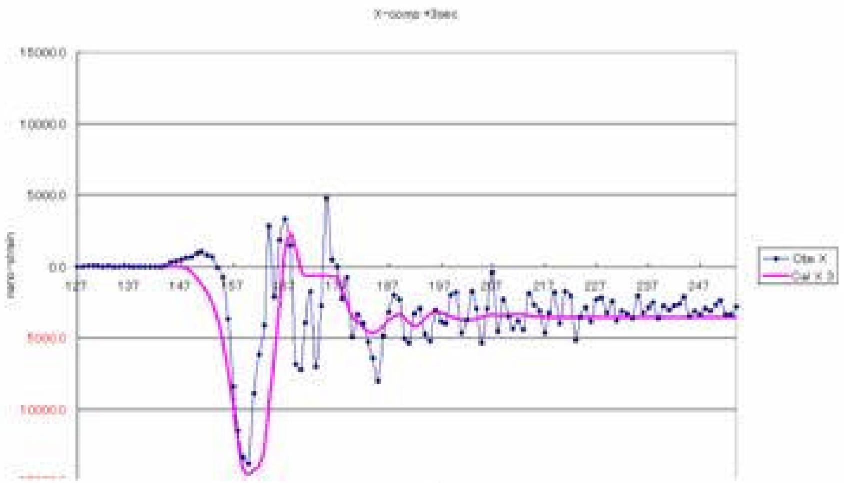
An extensor-meter (strain meter) which is used for continuous observation of crustal deformation has a flat dynamic response from DC to a few Hz. This means it can be used as an ultra-long period seismometer when we employ high rate sampling with wide dynamic rage quantification. Especially this is an unique seismometer which can record DC component (i.e., near-field term) generated by faulting at the source. We succeeded to record full strain seismogram by the 2003 Tokachi-oki earthquake (Mw=8.0) at Hiroo station just on the tip of fault. The data were recorded by 1 Hz sampling with 24 bit ADC. It has dynamic range from 10-10 to 2x10-5. The observed strain seismograms are compared with the calculated one by using Honda at al(2004) model of this event deduced by strong motion seismograms as shown in Fig.1. We can see good agreement between both strain seismograms from the beginning of deformation and total amplitude of deformation (which is proportional to the seismic moment of the event) in general sense. However, there is discrepancy between both strain seismograms at the latter half of rupture process continuing about 50 seconds. It will be required for reconstruction of source model.

Strain seismogram can directly represent the growing process of the great earthquake. By comparison between strain seismograms of main shock (Mw8.0) and the largest aftershock (Mw7.1) we can obtain a judgment whether the event will grow up by Mw8 or not during a few seconds after beginning of the deformation. At the case of the largest aftershock it can be recognized that the growth of faulting stopped at a few second after beginning of deformation. This means we can estimate the seismic moment (i.e. magnitude of the earthquake) in real time. This is fundamentally important information for quantitative estimation of tsunami height.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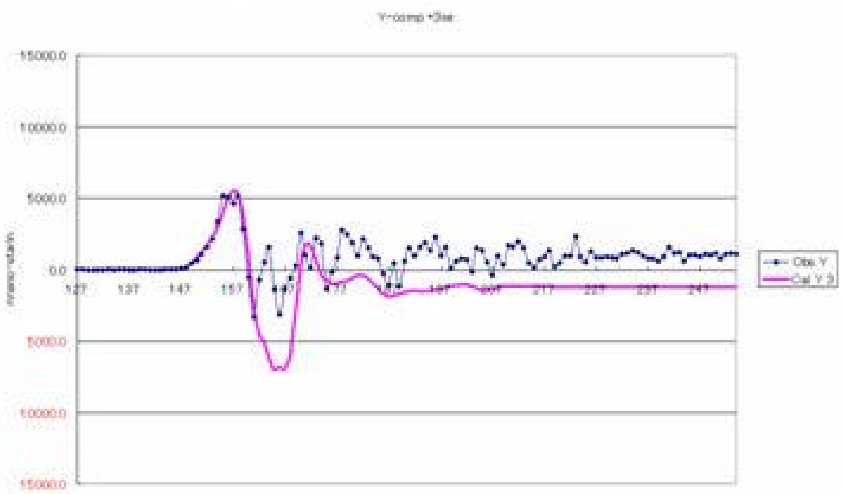
nano-strain
Obs X
Cal X 3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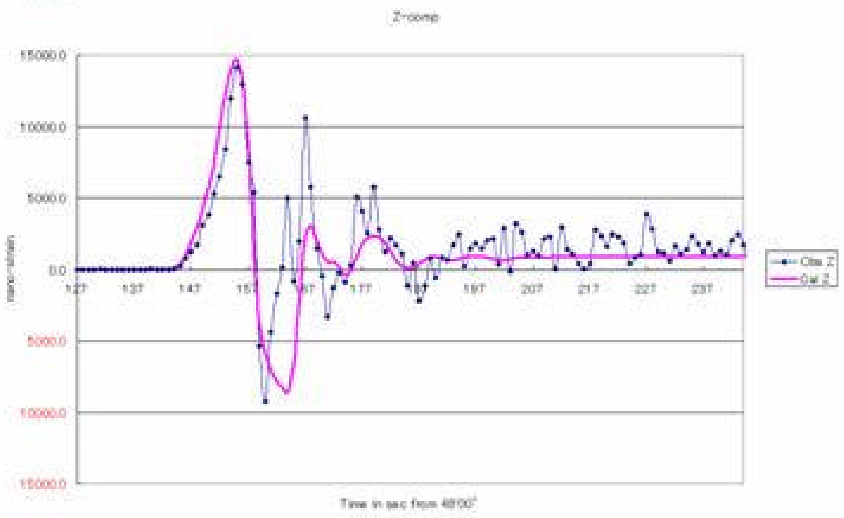
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nano-strain
Obs Z
Cal Z
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