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Far-field coseismic crustal deformation observed by a laser strainmeter

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Fault models have been inferred from seismic observation and geodetic observation such as GPS and SAR. Because of limited resolution of the GPS and the SAR, geodetical observation has mainly been utilized for land and shallow earthquakes, and so far there is no reliable geodetic method for ocean and deep earthquakes. Laser strainmeter with good performance may solve such problem.

A 100-m-long laser strainmeter installed in the Kamioka mine has detected strain steps associated with earthquakes. For seismic events with hypocentral distances of 100-530km and magnitudes of M5.8-7.4, corresponding strain steps of 1×10^{-10} to 3.5×10^{-8} are found to be in good agreement with calculation based on fault models and dislocation theories. The laser strainmeter, having better than 5% in accuracy, may constrain the fault models and the dislocation theories. In conclusion, the laser strainmeter provides a reliable geodetic method for far-field coseismic strain observation.

Reference

Araya, A, A. Takamori, W. Morii, H. Hayakawa, T. Uchiyama, M. Ohashi, S. Telada, and S. Takemoto (2010): Analyses of far-field coseismic crustal deformation observed by a new laser distance measurement system, *Geophys. J. Int.*, in press.

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