Geophysical Research Abstracts, Vol. 7, 03261, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03261

First comparison of direct and array-derived earthquake-induced rotational ground motions:the M6.4 Morocco event of February 24, 2004

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Recently, ring laser technology has provided the first consistent observations of rotational motions induced by distant large earthquakes. Consistent in this context implies that the observed waveforms and amplitudes are in large part compatible with the theoretical prediction that transverse acceleration and rotation rate should be in phase and their ratio identical to twice the horizontal phase velocity. The ring laser installed at the Fundamentalstation Wettzell in the Bavarian Forest close to the Czech boarder is recording the vertical component of rotation rate, theoretically a linear combination of the space derivatives of the horizontal components of translations. This suggests, that - at least in principle - rotation could be determined from seismic array measurements using "finite differencing". For this propose, we installed a cross-shaped array of nine (LE3D/5s-Mars Lite) seismometers around the ring laser instrument in Wettzell. The experiment was running for four months, from December 2003 to March 2004, recording several large earthquakes. The data set is complemented by the GRSN broadband instrument installed at Wettzell. Spece derivatives are calculated by applying three different methods. This procedures were applied to the M6.4 Morocco earthquake of February 24, 2004. We note that this is the first experiment where - in addition to seismic array data - direct measurements of a collocated rotational sensor are available.