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The implosive component of the 2013 Okhotsk Sea deep earthquake: Evidence from radial modes and constraints from geodetic data

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Ever since Bridgman's (1945) original suggestion, the presence of an implosive component in the source of deep earthquakes has long been a passionately debated subject, which is re-openened by the occurrence of the 2013 Sea of Okhotsk earthquake, the largest ever recorded deep event.
The analysis of the fundamental and first overtone radial modes, 0s0 and 1s0, allows the resolution of such a component without trade-off with the relevant deviatoric component. We document the presence of an implosive component valued at 2 percent of the scalar moment tensor (but 9 percent of the deviatoric component exciting radial modes). The implosive component is also resolved by CMT inversion when the zero-trace constraint is relaxed, but with a significantly larger amplitude (8 percent of the scalar moment.
The near field of three-dimensional static deformation by the earthquake is reconstructed from data at permanent GPS stations in the epicentral area, with maximum observed deformations on the order of 1 cm (horizontal) to 2 cm (vertical). Preliminary modeling indicates that the influence of the proposed imnplosive components (especially as derived from CMT inversion) may be resolvable from this dataset at critically located GPS stations, of which a full investigation will be presented.