Geodetic inversion for spatial distribution of slow earthquakes under sparsity constraint (Fused Lasso)

*Ryoko Nakata[1], Hideitsu Hino[2], Tatsu Kuwatani[3], Masato Okada[4], Takane Hori[1]

1.R & D Center for Earthquake and Tsunami, Japan Agency for Marine-Earth Science and Technology, 2.University of Tsukuba, Japan, 3.Department of Solid Earth Geochemistry, Japan Agency for Marine-Earth Science and Technology, 4.Graduate School of Frontier Sciences, University of Tokyo

In geodetic data inversion, insufficient observational data and smoothness constraints for model parameters make it difficult to clearly resolve small-scale heterogeneous structures with discontinuous boundaries. Therefore, we have developed a novel regularization scheme for the inversion problem that uses smoothness, discontinuity, and sparsity constraints [Nakata et al., 2016]. We have applied the inversion method to synthetic displacements due to the simulated afterslip on the plate interface. The method accurately reproduces the slip distribution. However, the proposed method have some problems in terms of calculation cost and applicability. Then, we are now improving the method to treat more realistic and larger scale problem than our previous study. We are investigating other mathematical algorithms as the sparsity constraint, such as Fused Lasso, Adaptive Lasso, and Relaxed Lasso for evaluation function. And we prepare analyzing realistic displacement data observed at GEONET stations around the Bungo channel on 1997, 2003, and 2010. By using an improving method, we will show inversion results using sparsity constraint for the three slow slip events occurred beneath the Bungo channel.

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