



Estimating resolution and errors in travel time tomography: algorithms and applications

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Development of dense seismic networks in seismically active areas, especially around active volcanoes, makes tempting the idea of evidencing temporal variations of the medium seismic velocity model using travel time tomography. However the computed tomographic model is the result of the convolution between the true velocity model and the model resolution. Temporal variations evidenced may be that of velocity model, or that of model resolution as well. Estimating more and more correctly and easily the model resolution and the error on seismic velocity parameters is therefore an essential task for assessing the results of temporal comparisons. We developed an algorithm for the computation of the resolution kernel which allows the exact estimation of this kernel for a limited number of parameters, in the frame of the probabilistic tomographic inversion of Monteiller et al. (2005). It allows a thorough comparison of these kernels for some velocity parameters, when estimated from tomographic inversions using different sets of seismic events. Variations in the resolution kernel are used to estimate the relative error in the corresponding velocity parameters, which scale the interpretable velocity variation. We compare our resolution computation with many other resolution estimations.