

## ***Interactive comment on “An objective rationale for the choice of regularisation parameter with application to global multiple-frequency S-wave tomography” by C. Zaroli et al.***

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In this paper, the authors present an objective rationale for the choice of a priori damping parameter used in global multiple-frequency tomography. I understand the individual argument to get the optimal range of damping in sections 3.1 and 3.2. However it sounds complicated for me. I do not know why they did not adopt the simple cross validation rather than their criteria. I mean testing how well a dataset sampled randomly from all dataset is fitted by the model obtained from the remainder of the dataset. If there is any reason to avoid such simple method I would like to hear it.

And I suppose that the damping value close to their preferred one may be given by the

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misfit function of a single-band data subset with respect to multi-band model that obtained from all dataset except the single-band data subset. For instance, in case of 10 s data misfit, the model is constructed from the data except 10 s data and the damping value will be given by reversal point in the trade-off curve between  $\|MB_{15,22,34,51}^\lambda\|_2^2$  and  $\chi_{red}^2(MB_{15,22,34,51}^\lambda, d_{10})$ . If that is the case, I think they do not need the criterion in section 3.3 that I feel subjective as the authors also mention. And if the damping values obtained above strongly depend on what period data are used for misfit calculation, it may reflect the noise level of each period.

I do not have a problem with their statement about their tomographic result, because this paper does not address to interpretation of the obtained detail structure.

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Interactive comment on Solid Earth Discuss., 5, 841, 2013.