# Reply to Comment on "Errors in Hypocenter Location: Picking, Model, and Magnitude Dependence" by C. Lomnitz

by S. D. Billings, M. S. Sambridge, and B. L. N. Kennett

The comment by Lomnitz (1995) on our article Billings *et al.* (1994a) points out that there are a number of potential causes of earthquake mislocations that are not dealt with in our treatment. We entirely agree with him. Our article, as is suggested by the title, deals with just three potential sources of earthquake location error. It was never intended, nor did we claim, that it was an exhaustive analysis of hypocentral mislocations. In our view the sources of mislocation outlined by Lomnitz (1995) are all important. In response to the specific comments and suggestions made by Lomnitz (1995) we have only two points to add.

First, the dependence of earthquake location on the station distribution is dealt with in our paper under the heading "magnitude dependence." Billings *et al.* (1994b) pointed out that events with different magnitudes from the same source region will often be detected by a different number and distribution of seismic stations around the world. Each event is therefore located with a different configuration of stations, and so the dependence of the mislocation on the distribution of receivers will lead to a dependence on the magnitude of the event. In our article, we illustrated this with an example from the Flores sea, but it is equally applicable in other parts of the world. Therefore, the dependence of mislocation on magnitude and station distribution are essentially the same.

Second, Lomnitz (1995) suggests that earthquake location procedures might perform better if they decouple the estimation of the focal depth parameter from the epicentral parameters. We would like to point out that this is one of the features of the genetic algorithm hypocenter location procedure described by Billings *et al.* (1994a). They found it was possible to improve performance and stability of the location algorithm by exploiting two types of decoupling, the first between spatial and temporal parameters, and the second between depth and epicentral parameters.

We would like to thank Dr. Lomnitz for the opportunity to clarify these issues.

## References

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