



Interactive comment on “The link between great earthquakes and the subduction of oceanic fracture zones” by R. D. Müller and T. C. W. Landgrebe

Anonymous Referee #2

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This paper examines the spatial correlation between fracture zone – trench intersections and giant subduction earthquakes. The purpose is to identify whether giant earthquakes are preferentially associated with such intersections. A positive correlation would allow the construction of better seismic hazard maps for such regions. I find the evidence of positive correlation presented in this paper convincing enough. Given the small amount of data available, the authors have developed an interesting way of testing for correlations. I think however that McCaffrey's (2007, 2008) idea that, given a long enough trench and enough time, giant earthquakes may well happen at any subduction zone, should be at least mentioned and discussed in this paper. It does not invalidate the conclusions that the majority of observed giant earthquakes

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seem to have occurred at trench – fracture zone intersections. However, it does have a bearing on the issue of hazard maps. If McCaffrey's statement is true, then finding these intersections would not be too relevant for the identification of potential hazard zones, because hazard would simply be determined by trench length (for max expected magnitude) and convergence rates (for frequency). After all, it does not matter for hazard purposes if an earthquake has nucleated 700 km away from a certain location: as long as the rupture spreads that far, this location has still high seismic hazard. Also, trench – fracture intersection in itself does not guarantee rupture propagation, if the subduction zone terminates laterally nearby. In such a setting, only uni-directional large ruptures are possible. Thus trench length and continuity may be more straightforward parameters to use for hazard assessment. On the topic of hazard maps, the authors should not confuse hazard with risk. I also agree with the other referee's comment that hazard maps are normally presented in probabilistic terms. If not, then the authors should explicitly state what they mean with "hazard map".

Please also note the supplement to this comment:

<http://www.solid-earth-discuss.net/4/C569/2012/sed-4-C569-2012-supplement.pdf>

Interactive comment on Solid Earth Discuss., 4, 1229, 2012.