

Interactive comment on “Investigating rural community behaviour after the 2004 Chuetsu earthquake: a case study of Kawaguchi town, Japan” by M. Gismondi

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Received and published: 5 January 2012

General Comments A very interesting case study of different community responses to an earthquake event, detailing how the underlying social structures can influence vulnerability to an earthquake hazard and the resulting coping mechanisms employed. Further clarity differentiating terms such as “rural”, “urban” and “town” would be beneficial and the methodologies used would benefit from further discussion.

Specific Comments Introduction 1. There is an issue with the term “natural disaster” which is used throughout this paper – many authors have suggested this term is a misnomer, a natural hazard can exist/occur but it is humans who through their various

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actions, e.g. building in inappropriate locations, thus increase their vulnerability, they are then exposed to the hazardous event and a disaster results. Perhaps the term “environmental disaster” is more appropriate. 2. Perhaps some more discussion about the comment that an earthquake is an event that can be prepared for in advance - in terms of how is this different to, for example, a flood. At least with a flood you may actually get some warning beforehand, in terms of monitoring precipitation or snowmelt amounts, for example, but you don’t often get warnings before an earthquake, perhaps some foreshocks but this is not always the case. 3. You say there’s been a considerable amount of discussion on the definition and characteristics of disasters but then only cite 2 references – perhaps this should be expanded. 4. You refer to the earthquake magnitude – perhaps be clear as to whether you are referring to the Richter magnitude or the Moment magnitude. 5. You say the Japanese population has subsequently (to 1997-2006) learned to survive in a high risk environment but then reference a 1979 paper. 6. You could also reference Cutter’s work in terms of vulnerability definitions. E.g. Cutter (1993) - Vulnerability is the likelihood that an individual or group will be exposed to and adversely affected by a hazard. It is the interaction of the hazards of place (risk and mitigation) and the social profile of the communities. 7. Perhaps it would be more accurate to talk about “distance to epicentre” rather than “location of the epicentre on p.42, line 22. Also in terms of “temporal characteristics” I think this could be made clearer – characteristics of what exactly?, presumably the earthquake itself. 8. On page 42, line 25, the sentence beginning with “The temporal characteristics...” – I think this needs to be clearer because by saying “The temporal characteristics of an earthquake” – this implies you are discussing a single event, whereas the following part of the sentence would imply you are referring to the historical frequency of numerous earthquakes in a region. You can’t infer anything about historical frequency by looking at one event. 9. The sentence beginning “The epicentre and damage caused by past...” – perhaps should say “The location of the epicentre...” Also here you are only referring to historic/recorded events, what about geological evidence of past earthquakes? 10. Regarding the issue of higher number of casualties at home at night, perhaps it would

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be useful to have some discussion of why you think a residential dwelling would be less safe than an office / place of work. Also, some discussion on the fact that it would all depend on the quality of the build of homes, compared to say the impact an earthquake would have in rush hour with many people in the middle of their commute on roads, railways, etc 11. Perhaps some discussion needed of what exactly you mean by non-structural regulations and other preventative policies – p.43, line 5. 12. Within the discussion of relief measures being critical factors in reducing vulnerability, you mention the availability of provisions but also getting those provisions to those who need them is critical. Also the accessibility of search and rescue teams in terms of the “golden hours” within which to save lives. 13. When you discuss the global programs developed in the last decade do you have any FEMA references you could add in here? 14. Through some of the discussion of policy systems it isn’t always clear whether you are referring to Japan specifically or much more generally. Also perhaps there needs to be more explanation of why exactly rural areas are not prepared and in contrast, therefore, explain how urban areas are deemed to be prepared. 15. It is confusing to use the term “town” on the one hand and then to say you are studying rural community behaviour. This confusion runs through the paper. Perhaps the title of the paper should be “Investigating urban and rural community...” especially when on p.45 you say the town includes rural, remote and urban locations. 16. The Suganuma 2006 reference seems rather vague – are you referring to a specific earthquake here?

Kawaguchi town and the Chuetsu earthquake 17. The terms central, peripheral and isolated presumably relate to the town centre rather than earthquake epicentre – this perhaps could be made clearer. 18. When discussing the economic cost of the 2004 earthquake, how about a discussion/comparison with the more recent 2011 earthquake costs.

The Interview Process 19. In general I think there could be more detail and discussion on the methodology. More detail about sampling strategy of questionnaires and interviews, the response rate – so how many sent out in each area and how many

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were returned?, why couldn't information about the respondent be incorporated into the questionnaire? Who in the household responded? i.e. male or female, young or old – as this would undoubtedly influence the responses, so how is this accounted for? 20. There seems to be an inconsistency if you calculate the number of households targeted in each area as a % of total number of households – 4.9% in central, 20% in peripheral and 25% in isolated. 21. The extra 8 households which moved inside the study area – it's unclear as to which category they fall under 22. You say it is assumed the centre of town retains aspects of an urban/modern lifestyle and isolated areas a traditional lifestyle – was this verified in any way and what traits in particular are you using to define “modern” or “traditional” besides number of residents in farming? 23. The questionnaire you refer to on p.47. do these differ from the postal questionnaires? If so, how? This isn't clear. 24. You say the comparison focussed on structural damage so perhaps it would be useful to have some discussion of the factors that could influence this and show how you've accounted for them, such as distance to epicentre, building standards of house, geological conditions of ground house is built on, etc.

Results 25. I think it may be useful to have more clarity regarding the research areas and sampling. Fig 1 does not show this clearly in black and white. Where exactly within these central, periphery and isolated areas did the sampling occur? Where are the extra 8 households previously mentioned located? Were each of the 6 communities in the central area sampled? What are areas involved for each area in km² for example? 26. You mention interactions between households in the peripheral area, it would be interesting to give examples. 27. How do the statistics presented in section 4.2 relate to the 3 different research areas? 28. Figure 3 would suggest to me that the isolated areas suffered more structural damage than central areas, which would be the opposite of what you suggest. 29. It would be useful to offer some kind of explanation as to why the peripheral area suffered reduced damage. 30. You mention that houses in the centre and isolated areas were constructed of wood, which is why they sustained so much damage, so what were the houses in the peripheral area constructed out of? 31. The paragraph beginning “Local government officers...” doesn't seem to follow

on well from the previous one. Also what interview are you referring to here? So far you have only discussed interviewing residents. Also the quote – which of the 3 areas does it refer to , or is it more general? 32. You specifically state “...forced individuals from different communities to mix...” – it would be interesting to have some discussion of the implications of this. This statement suggests that within each of the 6 different communities there is cohesion, however later in the discussion this doesn't seem to be the case. 33. The quote “we lived in our car...” – i can see the link clearly with “severity of damage” but there's nothing in this quote to suggest “fear of profiteering.” 34. In section 4.3 you say that local government support was essential for organising shelters but that there was an observed lack of knowledge about town shelters, so perhaps more discussion of the inadequacies of this support. 35. You say the arrival of rescuers provided more defined organisation – it would be interesting to expand on this. 36. There's some confusion of behaviour in the peripheral area, here you say the residents grouped into small units, previously you say they tended to prioritise protection of their own families. Also you say they did not benefit from immediate support, but from Table 2 the number of days isolated is the same for the central and peripheral areas (3 days). 37. Perhaps some further explanation of the term household sheltering would be beneficial. 38. Also some further explanation of the terms scattered evacuation compared to concentrated evacuation would be useful. 39. Again I don't think the quote on p.50, line 15 reflects a “fear of robbery.” Perhaps it reflects more a lack of awareness of shelters. I guess it is logical that in the isolated area there's likely to be just 1 dedicated shelter compared to more in urban areas and therefore more uncertainty about which shelter to go to.

Discussion 40. There could be some discussion of the issue that if information is distributed to schools, what happens in the isolated area that has no schools? 41. There could be more discussion around the issue of underestimating the occurrence of an earthquake due to forecasting problems (bottom of p.53) – it would also surely be due to the irregularity of an event such as an earthquake compared to perhaps yearly more regular events such as heavy snowfalls. You've stated the previous earthquake

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to the 2004 one was in 1964 – this is 40 years previously so perhaps before many people in the area were born so they haven't experienced it before, and generally the more experience you have of something, the more knowledge or awareness you have. 42. You say the "community played an important role in guaranteeing the safety of its residents" and that "the community was considered indispensable by residents..." but I think whilst you can say this for the isolated area, I'm not sure you can say the same for the central and peripheral areas based on what you've described previously regarding putting own family first, etc. 43. You say its a higher average age that integrates neighbourhoods better but perhaps it would be more accurate to say it's the type of labour, i.e. community based agriculture, in this case. 44. Perhaps some additional discussion around the isolated community, in terms of if they are located near a mountainous area, prone to heavy snowfalls and landslides, they will have had more experience dealing with isolating events and have practised coping strategies before, which will be incredibly beneficial to them in terms of reducing vulnerabilities. 45. The final recommendation about using social activities and underlying social structures to promote awareness is fine if they exist already, such as you've shown in the isolated areas, but what about if they don't exist as you've described in more urban areas? 46. In Table 2 what is meant by annual activities – perhaps some examples would be useful.

Technical Corrections Page 40, line 22 – risk "of" earthquakes not "for" earthquakes Page 41, line 9 – years not yr Page 42, line 20 – full stop comes before quotation marks Page 42, line 21 – comma missing after full stop in et al., Page 43, line 15 – rephrase "organising to minimise" Page 45, line 2 – delete comma after urban Page 46, line 22 – spelling error – constructs Page 53, line 1 – comma missing after full stop in et al., Page 53, line 12 – probably don't need FEMA twice Page 53, line 14 – perhaps replace "limiting" with "influencing" Page 56, line 26 – area, not are,a Page 57, line 6 – comma missing after full stop in et al., Page 57, line 19 – comma missing after full stop in et al.,

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Interactive comment on Soc. Geogr. Discuss., 7, 39, 2011.

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7, C25–C31, 2012

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