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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Dynamic maps of people exposure to floods based on mobile phone data" *by* Matteo Balistrocchi et al.

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We thank you for your general evaluation of the work and for the question that you arose, which gives us the opportunity of a deeper discussion on this aspect.

Q1: "However, if the methodology proposed correctly identifies human positions and people exposure, it does not take into account human disaster response behavior (during floods daily activities can drastically change). Some modeling techniques, including agent-based models (ABMs), have been recently introduced to the in the field of flood risk assessment to simulate the dynamic distribution of the population during flooding, while still introducing inevitable simplifications of the human behavior patterns and disaster responses. For an integrated flood risk management in the future, it will be in-

creasingly essential to consider the feedback between floods and people in a dynamic way and I suggest to give a comment on this issue."

A1: Indeed, exposed people behaviors and habits can significantly change after hydroclimatic alarms or during flood event occurrences, as well as their ability to decrease vulnerability by implementing flood proofing practices. However, these virtuous behaviors are usually the result of extensive campaigns to raise public awareness against flood risk, coupled with trusted and effective warning systems. In the analyzed area the risk perception towards the secondary network is almost absent, as well as a capillary local warning system. In addition, the knowledge and a widespread application of flood proofing practices do not exist (both structural and non-structural). Flood risk perception is mainly related to the primary hydrographic network (i.e. Mella River). Despite the dramatic increase in flooding episodes and in consequent economic damages, the impairment of the conveyance capacity of the hydrographic network and the urbanization sprawl still continue. Therefore, in the regards of the specific test case, in this research the possibility of drastic changes in human behavior during heavy rainfalls are not expected. On the other hand, a dynamic approach to the flood risk is becoming mandatory, especially in consideration of the auspicated-future application of non-structural practices to the risk mitigation. Actually, agent-based modelling falls into the framework of a dynamic assessment of flood risk. The methodology herein proposed has potential to monitor people mobility dynamic during crises, evidencing modifications of their spatiotemporal distribution. Mobile phone network hardly fails during floods, thus observations of people dynamic under crisis conditions could be beneficial for a better calibration of any dynamic model. Finally, mobile phone data are richer than the ones used in this study, since vector data allows provider to follow users along their path. This type of information was not available for this study. However, there are potentials to further improve this technique in order to assess mobility preferential ways and to change them to increase escape security. The need for a dynamic approach to flood risk assessment, along with the following references to ABMs, has been remarked in the introduction section, to better set this work inside the most updated research (lines

89-97). Then, a brief discussion on people behavior change during flood alarms has been added in the final part of the conclusion section. Dawson, R. J., Peppe, R., & Wang, M. (2011). An agent-based model for risk-based flood incident management. Natural Hazards, 59(1), 167-189. doi:10.1007/s11069-011-9745-4 Haer, T., Botzen, W. J. W., & Aerts, J. C. J. H. (2016). The effectiveness of flood risk communication strategies and the influence of social networks-insights from an agent-based model. Environmental Science and Policy, 60, 44-52. doi:10.1016/j.envsci.2016.03.006.

Q2: “Minor comments: at lines 285-289 and 297-299 there are little mistakes”

A2: Repetition has been removed from section 3.1 (lines 285-289 of the first submission).

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