Natural Hazards
and Earth System
Sciences

Discussions

# *Interactive comment on* "First steps towards an All-European Indoor Radon Map" *by* Javier Elío et al.

**Anonymous Referee #2**

Journal: Natural Hazards and Earth System Sciences 1. Research article 1.1. Recommendation Accept 2. Comments to Author: Ms. Ref. No.: nhess-2019-102 Title: First steps towards an All-European Indoor Radon Map Javier Elío, Giorgia Cinelli, Peter Bossew, José Luis Gutiérrez-Villanueva, Tore Tollefsen, Marc De Cort, Alessio Nogarotto, Roberto Braga

Overview and major comments: It was a pleasure for me to read about this comprehensive and excellent work on the efforts to finalize All-European Indoor Radon map which would permit to estimate the radon exposure at European scale. The paper is entirely within the scope of NHESS because it addresses development and validation of new interpolation techniques for mapping of one of the most hazardous natural occurring pollutant. The paper is interesting and contains a worthy scientific contribution

to indoor radon risk prediction and implementation of geo-statistic methods. Using uranium concentration, topsoil geochemistry and bedrock geology as secondary variables is an original novel contribution to the methodology of radon mapping. Four interpolation techniques: inverse distance weighted (IDW); ordinary kriging (OK); collocated cokriging with uranium concentration as secondary variable (CoCK) and regression kriging with topsoil geochemistry and bedrock geology as secondary variables (RK) have been proposed and tested for mean indoor radon concentration at ground floor level prediction by using the arithmetic mean (AM) over grid cells of 10 km x 10 km. Cross-validation exercises have been carried out to assess the uncertainties associated with each method. Described methods are very useful for identification of radon priority areas (RPA) according to the Council Directive 2013/59/EURATOM with the aim of reducing the number of radon-induced lung cancer cases. All methods are outlined clearly with the support of results and well described to allow fellow research at smaller national and local levels. The authors reach substantial conclusion about the best method for predicting mean indoor radon concentrations over grids of 10 km x 10 km (i.e. arithmetic mean, ground floor). The title and abstract clearly reflect the contents of the paper. The paper is well structured with defined concept, discussion of results and consideration of related work, including appropriate references. Mathematical formulae and symbols are correctly defined and used. The quality of figures is satisfactory. Language is precise and understandable. Based on all the above, I highly recommend this manuscript for publishing in NHESS. Minor comments: I recommend the authors to add one sentence about the method and protocol of indoor radon measurements that have to be used to make the results valid and acceptable for mapping