Nat. Hazards Earth Syst. Sci. Discuss., 1, C248–C254, 2013
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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "The possible negative consequences of underground dam and reservoir construction and operation in coastal karst areas: an example of the HEPP Ombla near Dubrovnik (Croatia)" *by* T. Roje-Bonacci and O. Bonacci

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Dear editor and reviewer, We are sending you revised manuscript of our paper "The possible negative consequences of underground dam and reservoir construction and operation in coastal karst areas: an example of the HEPP Ombla near Dubrovnik (Croatia)" (nhess-2013-141). We had accepted all your comment and corrections. The answers on the reviewer comments are: 1) P3 L12-18: please add some references confirming this statement The following references are added: Bonacci, O.:

Karst hydrology with special references to the Dinaric karst, Springer Verlag, Berlin, 1987. Bonacci, O.: Development of catchment area in karst as a result of natural and anthropological factors, in: Evolution of karst from prekarst to cessation, edited by Gabrovšek, F., Inštitut za Raziskovanje Krasa, Postojna, 359-365, 2002. Kresic, N. and Stevanovic, Z.: Groundwater hydrology of springs, Elsevier, Amsterdam, 2010.

2) P3 L28: I did not understand the meaning of ecological regime New sentence is: Human intervention, especially the construction of dams and reservoirs realized by creating large grout curtains (Bonacci et al., 2009), as well as interbasin water transfers through long tunnels and pipelines, can introduce instantaneous and distinct changes in catchment areas and boundaries, and, in turn, on the hydrological, hydrogeological and ecological regimes (limitation if energy flow, destruction of food cycle, blocking of connections between habitats and species, pollution of groundwater and underground environment etc.) (Bonacci, 2004).

3) P5 L1: please add references confirming on author's investigation The following reference is added: Žugaj, R. and Bonacci, O.: HE Ombla hidrološka obrada (HEPP Ombla hydrological analyses), Elektroprojekt Consulting Engineers, Zagreb, 1994. (unpublished)

4) P6 L24-28: please add references to explain these possible reasons Williams, P. V.: The role of subcutaneous zone in karts hydrology, J. Hydrol., 61, 45-67, 1983.

5) P7 L9: please add references about sediment transport Denić-Jukić, V., Juras, T., Plenković, M., Kadić, A. and Jukić, D.: Turbidity dynamics of the karst spring Ombla (Croatia), EGU2012-12428, EGU General Assembly 2012, Vienna, Austria, 2012.

6) P9 L12-18: how you can demonstrate that 95 The following references are added: Bögli, A.: Karst hydrology and physical speleology. Springer Verlag, Berlin 1980. Bonacci, O.: Karst hydrology with special references to the Dinaric karst, Springer Verlag, Berlin, 1987. Milanović, P.: Karst hydrogeology, Water Resources Publication, Littleton, 1981. Ford, D. and Williams, P.: Karst hydrogeology and geomorphology,

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John Willey, Chichester, 2007.

7) P10 L10: how you calculated that minimum discharge will be doubled This sentence is removed.

8) P11 L1-2: expectation of landslides is only an hypothesis: do you have or know analyses of instability of these slopes? New added sentences and reference are: The calculation of the Mokošica area slope stability had been performed with GWL at an altitude of 100 m a.s.l. The expectation of landslide occurrence is based on comparison with the Vajont landslide (Paronuzzi and Bolla, 2012). Their geological settings are similar. Eocene flysch layers build the Mokošica low permeable slope, which spread over the limestone and dolomite. The flysch layers can bee influenced by high uplift, caused by fast GWL rising. The siltstone layers in the flysch are very soft rocks, and sensitive to water content. In combination with low effective stresses and changes of its water content they can lose its shear resistance. Paronuzzi, P. and Bolla A.: The prehistoric Vajont rockslide: An updated geological mode. Geomorphology, 169-170, 165-191, 2012.

9) P12 L27: I suggest to avoid the word “conscious” related to the designer of the dam The word “conscious” is removed and new word is “considers”.

10) P14 L24-27: could you better explain how sea water can penetrate downstream of the grout curtain New added sentences are: The grout curtain will prevent fresh groundwater flow from the Ombla Spring aquifer to the downstream coastal area. Because of this sea water will penetrate all of the local area downstream of the grout curtain.

11) P15 L13-15 and L22-23: these statements have been discussed previously; remove from one of the paragraphs containing the same comments First paragraph (L13-15) is removed.

12) P16 L10: low water stands probably for low water table or low discharge; please,

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specify New sentence is: It is known that during low discharges (until about 10 m3/s) fresh water flows over sea water without mixing.

13) P17 L15-17: the poor quality of hydrological modelling in karst depends by several factors, in my opinion; it is not demonstrated that this is one of the “main” reasons; I suggest to change in “one of the reasons”; and there are aso hydrological models of good quality in karst region The suggestion is accepted with pleasure. The word “main” is removed.

14) P18 L16-17: please add references about frequency and intensity of earthquakes The following references are added: Cvijanović, D.: Seizmičnost dubrovačkog područja (Dubrovnik region seismicity), Acta Seismologica Iugoslavia 1, 31-56, 1971. Garašić, M. and Cvijanović, D.: Seasonal occurrence of series of minor earthquakes and roars in the area of Dubrovnik, Ston and Mljet, Naš Krš 30, 55-62, 1991.

15) P19 L1-2: this is an opinion of the authors which has to be substantiated, discussed This opinion (sentence) is removed.

16) P20 L8-10: the strong and negative influence has to be schange "will" with "can", or add a discussion on this problem Word "can“ is acepted.

17) P20 L18: I did not understand the reference to Fig 9 (see Fig.9) is removed

18) P21 L4-7: I suggest to change with "will be very serious respect with possible benefits". In my opinion, in this manuscript the authors correctly highlighted the negative consequences, but there is not a complete discussion about possible benefit; there is not a comparison in terms of environmental impact evaluation procedure; nevertheless, I agree that negative impacts will be very strong and must be better take into account before realizing such a big settlement New sentence is: On the basis of the analyses developed in this paper, it is very probable that the negative consequences of the construction and development of the HEPP Ombla will be very serious.

19) Fig. 3: piezometers in figure are five and not four; green boxes are not explained in

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the caption. In Figure captions four is corrected by five, New Figure 3 with green boxes explanation is prepared.

Again, thank you so much. We greatly appreciate your efforts to make the paper better. With best regards. Authors Tanja Roje-Bonacci and Ognjen Bonacci

Please also note the supplement to this comment:
http://www.nat-hazards-earth-syst-sci-discuss.net/1/C248/2013/nhessd-1-C248-2013-supplement.pdf

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Interactive comment on Nat. Hazards Earth Syst. Sci. Discuss., 1, 1409, 2013.

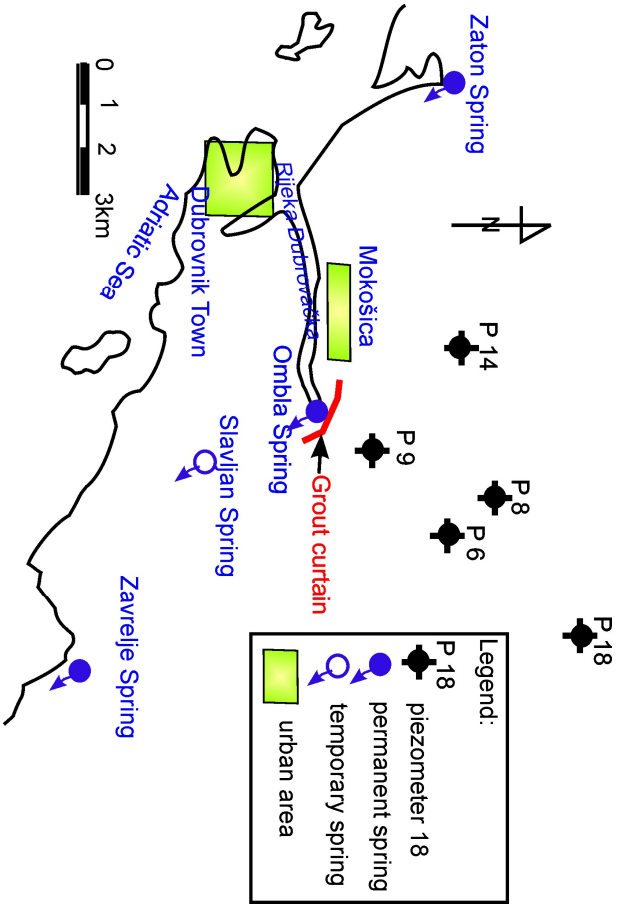

Fig. 1. New Figure 3

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Fig. 2. All Figures

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