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Hydrology and Earth System Sciences
Discussions

Interactive comment on "The June 2013 flood in the Upper Danube basin, and comparisons with the 2002, 1954 and 1899 floods" *by* G. Blöschl et al.

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The authors would like to thank the reviewer for the comments.

The reviewer suggests that chapter 7 is not linked well to the analysis of the flood events. In the revision the authors will better link the general recommendations about flood risk management to the June 2013 flood as requested.

As requested by the reviewer, the authors will provide precipitation as flux rather than as totals.

The authors appreciate the remark on the Rossby waves and will include two refer-

ences, the textbook pointed by the reviewer (from J.R. Holton), and the original paper from Rossby and collaborators: Rossby, Carl-Gustaf and Collaborators (1939). Relation between variations in the intensity of the zonal circulation of the atmosphere and the displacements of the semi-permanent centers of action. Journal of Marine Research 2 (1): 38–55.

Regarding page 9537, line 8, the authors acknowledge that the expression "Vb", while locally known in Central Europe, may not be internationally recognisable. The sentence will be revised as: "As the system positioned itself over the Alpine area, its cyclonic, counter-clockwise rotation and spatial extent allowed it to collect additional moisture from the Mediterranean, feeding in particular from local depressions in the Ligurian and Adriatic seas (Fig. 3), and advecting that additional moisture cyclonically into Central Europe. This regional cyclonic track is known in Central Europe as "Vb", after van Bebber (1891)".

As requested, the authors will provide more details on the soil moisture presented in section 4 and will be more specific about the groundwater levels.

The reviewer suggests to provide precipitation information throughout the study area and to show the locations of the raingauges on the map. The authors selected the Weißbach catchment because of the particularly large event precipitation and associated (specific) discharge and therefore provided detailed information in that catchment. Rainfall of the entire study area is shown in Fig. 4. The authors therefore believe that additionally giving rainfall data may be redundant and therefore not needed. On the map in Fig. 1 the climate stations mentioned are very close together (and close to the gauges referred to), so showing them would not provide much additional information while cluttering the map. The authors therefore prefer to keep the map as it is. The authors will give a clearer description of the location of the stations in the text and will also provide some information about the regional representativeness of the Weißbach catchment as requested.

As requested, the authors will provide more detailed information on snow processes, ground water levels and the reference period of long term averages where available.

In response to the request of adding information on the spatial interpolation of the rainfall field of the 1899 event the authors will give the number of stations used. In fact, the map is based on more than 100 stations in the area (Lauda, 1900).

The authors will correct the typos on the runoff coefficient on p. 9542 pointed out by the reviewer and add references for the average runoff coefficients.

The authors will revise the statement on 'where rainfall was most severe' on p. 9544 as requested.

The reviewer queries why the precipitation amounts for the 1954 and 1899 events were not included in the statistical analysis of Fig. 7. The consecutive rainfall data available for the analysis were for 1961–2013. The flood peak discharges were available for 1959–2013. While the authors could have included the 1954 and 1899 events in the rainfall plots, the authors chose not to do so for (approximate) consistency with the flood plots.

The reviewer suggests that an analysis of runoff generation would be of interest for larger catchments. The authors have chosen not to add such a comparison for space reasons.

The locations of Vils, Naab, Regen and Rott will be added in Fig. 1 as requested.

The authors will also clarify the sentence regarding attenuation due to snow accumulation and indicate the order of magnitude of retention volume in the flood plain that has been lost.

As requested, a number of sentences on p. 9549 will be reworded for clarity and details will be provided on the performance of the levees and the operation of the hydraulic structures where available.

The authors prefer not to include sub-catchment borders and elevation details in Fig. 1 as the authors think the figure will lose clarity.

As suggested, Figure 2 will be revised in such a way as to provide larger labels for key isolines (especially in the centre of depressions and anticyclones), maintaining some secondary isolines and cleaning out excessive labelling on less relevant isolines. The geopotential height difference between consecutive isolines is 15 (m).

The reviewer suggests expanding the display detail of Fig. 3 to provide information also for the Atlantic Ocean and eastern Europe. The authors had tried to find a compromise between the spatial coverage of the synoptic charts and the level of detail at the vicinity of the Central European depression. The submitted figure was the solution found to avoid losing relevant local detail, leaving the large-scale atmospheric situation to Fig. 2 (for 2013). The connections between the different events and their detailed large-scale atmospheric context were then discussed in the text as thoroughly as possible. The authors therefore prefer to keep the figure as it is.

Regarding the request on Fig. 7 see above.

As requested, a scale for elevations will be added to Fig. 8. Since the names of the gauges are given in Fig. 1 the authors prefer not to duplicate them in Fig. 8.

Regarding the request of changing the order of gauges according to their sequence in the river network in Table A1 the authors prefer to keep the alphabetic order since, in a tree-like network, the order is not uniquely defined.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 9533, 2013.