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Hydrology and Earth System Sciences Discussions

Interactive comment on "HESS Opinions "Classification of hydrological models for flood management"" *by* E. J. Plate

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I very much appreciate the discussion of Prof. Todini, which made me rethink a number of issues that had not been so clear in mind when I wrote the paper. I would have loved to write the book that should be written on a modern hydrology with guidance for people who would want to do flood risk management in a modern way. But this is not what I wanted to do in the paper under discussion: instead it was my intention to recommend a structured approach to modeling of floods – perhaps leading to a guideline for model users on how to proceed in selecting a model, although this task I must leave to younger and more qualified colleagues. This is why I only touched on very many issues, on which much recent research has concentrated. Including my

own research. I have in recent years directed my view on floods from a natural science dominated viewpoint to a people oriented viewpoint – seeing flood disasters not as natural events but as social events, in which the hydrologist has a role to play. This I had discussed in many previous papers, and it was not my intention to be exhaustive in the present paper –for example, I put only such equations into the text which I thought might support my views, and which were not repeated (or developed) in recent papers by others.

The first issue raised by Prof. Todini refers to the "holistic flood management approach". I have strongly supported this view - in fact, the two figures on risk management in Prof. Todinis intervention are figures which I had prepared and which through the RIBAMOD process got into the literature. (They were originally presented at a NATO Advanced Study Institute in Novosibirsk in 2005, and published as E.J.Plate (2007): Flood risk management for setting priorities in decision making. In O. F. Vasiliev et al. (eds.) : Extreme Hydrological Events : New Concepts for Security, NATO Advanced Study Institute Springer , Berlin pp. 21 – 44). This paper was an extension of my paper Plate (2000, see list of references). However, in contrast to Prof. Todini, I do not interpret the IWRM Fig.3 as an advanced development. I rather see Fig.3 as complementary to Figs. 1 and 2: the objectives or targets are more or less as indicated in Fig.3, whereas the necessary actions for reaching these targets are summarized in Figs.1 and 2, which are shortened for the purpose of the paper into my Fig.1. I feel that if I expanded on the discussion in section 1 of my paper I should be putting too much weight on the process of risk management, rather than meeting the purpose intended of providing a guidance for people seeking to only develop or select a rainfall runoff model for flood risk management at a given location. So after giving it due consideration I left the text of section 2 practically unchanged.

The second issue refers to the WFD of the European Community. The reference to the Water Framework Directive and the Flood Directive will be clarified, and appropriate references quoted. I loosely translated from the German, and I quoted from memory.

I appreciate the succinct presentation of the directive by Prof. Todini. I am aware that the Flood Directive is only directed towards the first part of risk management, namely the preparation of flood risk maps and flood management plans, which is the planning phase. I shall include a short expansion of this point, and of the role of hydraulic models.

The third point is on the different ways of classifying the model types. I not only use the major classification in section 2.1, but also the sub-classification of section 2.2, with much further discussion in sections 2.3 and 2.4. I used the following classifications: Continuous vs. event based Models based on rectangular grids, on sub-catchments, on response units Physically based, conceptual models, (statistical models: data driven) Sub-scale models: micro, meso, and macro (and basin) scale For all types, the specific area (geology etc.) to be considered, which made me propose the different model levels described in Fig.3, and briefly discussed in section 2.1.

The fourth point concerns planning and prediction errors. This is indeed the major issue of modern hydrology: how to handle the uncertainty inherent in natural hydrological processes, and how to account for their effect in decision making – either in the operational or in the planning phase. Again, this is a very complex issue, not covered in a paper of the kind intended by me. However, I shall briefly expand on this point in the context of flood forecasting, where ensemble forecasts will be mentioned.

The fifth issue had me pondering for a long time. I very much liked the outline proposed by Prof. Todini, which is rightfully titled “Hydrological models for flood risk management”. To do it full justice would require a very large additional effort, which at this time is not possible. I think it would be good idea for a younger person to write a book on Flood management Modeling, using Prof Todinis outline, but expanding on my paper, - expanded to include detailed discussions of processes and model structure, perhaps replete with numerical programs. My intention was to classify – and to use water resources management objectives to guide classification. In this way it is not at all comparable with the paper by Singh and Woolhiser (2000), and this I shall bring

out in my paper. The paper is more a narrative, perhaps more useful for a beginner (as Prof. Blöschl thinks in his comments) than for a scientist fully familiar with all the problems of modern hydrology. I wanted to get a message across, and in my opinion too much detail would dilute the message. This is also why I prefer my present title.

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