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Earth Surface Dynamics Discussions

Interactive comment on "sedFlow – an efficient tool for simulating bedload transport, bed roughness, and longitudinal profile evolution in mountain streams" *by* F. U. M. Heimann et al.

Anonymous Referee #3

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Overview

This paper presents the sedFlow model, a new model to simulate bedload transport and associated changes in channel elevation in alpine river systems. The structure of the model and the underlying equations are described in detail. The new model is contrasted, qualitatively, with other existing models. A companion paper (Heimann et al., 2014, ESDD, 2, 773-822) provides a more quantitative evaluation of the model.

Evaluation

This is an interesting paper. The presented model seems versatile and computationally efficient, and is likely a useful addition to the modeller's arsenal. I have no comments

on the technical aspects of the presented model, but some general comments for improvement of the manuscript are given below.

Comments

1) Apart from describing the technical details of the sedFlow model, this paper presents a qualitative comparison with other existing models (Topkapi ETH, SEDROUT, and TomSed). Although this is useful, there is no evaluation of the model's behavior or performance. I think the paper would benefit from the inclusion of a detailed sensitivity analysis, so that the reader can get a sense of the relative influence of all the parameters and model options that are described. A limited sensitivity analysis is included in the companion paper, but a more rigorous sensitivity analysis is needed to get a better understanding of the model's dynamics. One suggestion is to expand the sensitivity analysis of the companion paper and include it here. This would allow the second paper to focus in more detail on the comparison with observed data (calibration and validation). Another option might be to combine both companion papers into one large manuscript.

2) In the discussion, the sedFlow model is contrasted against three other existing models (Topkapi ETH, SEDROUT, and TomSed) and some additional studies, in terms of handling grainsize distributions (section 3.1), adverse slopes (section 3.2), and simulation speeds (section 3.3). However, in each of these three discussions one of the three of the other models is ignored: section 3.1 does not refer to TomSed, while sections 3.2 and 3.3 do not include SEDROUT. Why is this?

Evaluation Criteria

Does the paper address relevant scientific questions within the scope of Esurf? Yes

Does the paper present novel concepts, ideas, tools, or data? Yes

Are substantial conclusions reached? Yes, but see comments above

Are the scientific methods and assumptions valid and clearly outlined? Yes

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Are the results sufficient to support the interpretations and conclusions? Somewhat - see comments above

Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? Yes

Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes

Does the title clearly reflect the contents of the paper? Yes

Does the abstract provide a concise and complete summary? Yes

Is the overall presentation well structured and clear? Yes

Is the language fluent and precise? Yes

Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? Yes

Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? No

Are the number and quality of references appropriate? Yes

Is the amount and quality of supplementary material appropriate? n/a

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Interactive comment on Earth Surf. Dynam. Discuss., 2, 733, 2014.