Natural Hazards
and Earth System
Sciences

Open Access

EGU

Discussions

Interactive comment on "Simulating historical flood events at the continental-scale: observational validation of a large-scale hydrodynamic model" *by* Oliver E. J. Wing et al.

Oliver E. J. Wing et al.

oliver.wing@bristol.ac.uk

Received and published: 4 January 2021

This study is an valuable contribution which improves the understanding of the quality of continental-scale flood models, while highlighting the complexity of validation exercises and the existing limitations of observed data. The manuscript is well written and structured. I especially appreciated the use of a large dataset of case studies, which allows a comprehensive validation, and the detailed discussions of the different results. I think this manuscript should be accepted for publication after addressing the following issues.

RESPONSE: We are extremely grateful to Francesco Dottori for imparting his expertise

to the benefit of this manuscript. We are delighted by his positive review; the response to his points are detailed below.

- Section 3 is quite long and I would suggest splitting into subsections to improve readability

RESPONSE: Thanks for this point. We will split this into subsections relating to the nature of the validation exercise in the revision.

- Section 3, lines 209-24: I'm not fully convinced about the use of interpolated linear water profiles to evaluate HWMs along the two rivers. While it is true that Altenau et al. found an roughly linear water surface slope in their study, in general the water surface is influenced by the magnitude and variations of the bed slope (see Dottori et al. 2009, apologies for the self-citation). In fact, the average bed slope in the Platte River (approx 1m/km) is likely to determine a quasi-kinematic behaviour of the flood wave, with the water surface being roughly parallel to the bed profile (as indeeed suggested by the HWMs in figure 3d). Using a steady flow profile consistent with the peak flow would be more appropriate than the linear interpolation. However, I reckon that in this case simulating steady flow conditions using a 1D model would be complex in this case due to the widespread flooding, so maybe this issue could just be mentioned in the text to improve the discussion.

RESPONSE: This is an interesting point and is worthy of further investigation, or further discussion at least. We will explore this in the revision.

Minor remarks - Line 24-25: Flood models are generally used to produce a range of flood maps, so I suggest: "The output of these models is typically one or more flood maps..."

RESPONSE: Thanks. Will do so.

-Line 37: "Researchers" is probably better than "geographers" here

RESPONSE: A good point: we will amend this.

- Section 2.1: My suggestion is to modify the title in "USGS Gauge input and event selection"

RESPONSE: Thank you, yes, we will modify this.

-Line 102: "Model domains of a 50x50km were constructed..." yet in Figure 1 some areas look much larger than 50x50km. Could you please explain this difference?

RESPONSE: A good point. Where events are larger than 50 x 50 km, this is where multiple 'seed gauges' are merged (as described in line 107). This means the 'final' set of events can have domains more widespread than this initial process. We will make this clearer in the revision.

-Lines 172-180: I guess HWMs are referred to NED for the comparison, right?

RESPONSE: Yes, the datums of the model and observations are consistent (NAVD88; see line 136) to facilitate a valid comparison.

-Lines 172-180: You could mention that the interpolated water surface map interpolated from HMWs might be affected by further errors due to the distance between HWMs

RESPONSE: For sure. This point only impacts the extent comparison, however: no interpolation is required for the water surface elevation comparison. We make this point in line 325 but will make it clearer here also.

-Line 218: 90km reach

RESPONSE: Thanks for spotting this.

- Lines 370-374: Here you don't mention the possibility of combining remote sensing data (for instance flood extent from satellite imagery) with dedicated field campaigns. Given the growing availability of remote sensing data, this could be an effective strategy to improve validation datasets.

RESPONSE: You're absolutely right, we'll add this to the concluding remarks.

NHESSD

Interactive
comment

Printer-friendly version

Discussion paper