

EGU24-6307, updated on 18 May 2024

<https://doi.org/10.5194/egusphere-egu24-6307>

EGU General Assembly 2024

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## How far can we go in global flood inundation modelling?

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Over the last fifteen years, hydrodynamic modelling has, like so many branches of hydrology, made the leap from local to global scales. Where once we may have applied our models to single river reaches a few 10s of kilometres in length, we can now build and execute models at ~30m spatial resolution over the entire terrestrial land surface. In turn, this has allowed us to address scientific and practical questions that were hitherto impossible to answer. For example, global inundation modelling can help us understand and quantify large scale hydrological and biogeochemical cycles and many questions in flood risk management, for example decisions about future government spending on flood defences, analysing the solvency of flood insurance portfolios under extreme conditions, or determining climate change impacts, require predictions of flood risk at national, continental, or even global scales.

This paper therefore discusses the scientific developments that were needed to make this local-to-global transition possible and outlines what the latest generation of global inundation models now can (and cannot) do. Finally, the paper looks at current limits to inundation modelling in terms of boundary conditions, flood defence data and model validation and considers the prospects for further improvements in model skill using the data from recently launched and forthcoming satellite missions such as SWOT and NISAR.