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Global hydro(geo)logical modeling: are we missing an uncanny valley?

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The spatial and temporal resolution of global-scale hydrological modeling has enormously increased in recent years. Outputs are becoming available at spatial resolutions of 1x1 km, showing regional structures and changes, often in beautiful figures and large datasets covering the entire globe. The complexity of the underlying models has increased in parallel, as did the amount of input data. Model outputs start more and more to look like the actual planet.

If humanoids start to look more and more like actual humans, an adverse emotional reaction can be seen in humans. In robotics and other disciplines, the term “uncanny valley” was coined for this phenomenon of the creepy impression that humanoids that are too human-like leave on humans.

The increasing resolution of global hydro (geo)logical modeling outputs is partly mirrored by the increasing resolution of input data, e.g., satellite-derived climate data or vegetation information. However, input data based on in-situ observations can remain limited in resolution and remain highly uncertain. In addition, higher resolution models do not necessarily entail that our process understanding has improved. Here, we review and analyze the primary input data of global hydro(geo)logical models, identify critical datasets and discuss the implications of the reliance on these datasets for modern hydro(geo)logical model results. Moreover, we discuss if results that look more and more like the real planet should lead to skepticism in their interpretation similar to the emotional reaction to the uncanny valley in robotics.