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Benchmarking flood models from space in near real-time: accommodating SRTM height measurement errors with low resolution flood imagery

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In February 2000, the Shuttle Radar Topography Mission (SRTM) measured the elevation of most of the Earth's surface with spatially continuous sampling and an absolute vertical accuracy greater than 9 m. The vertical error has been shown to change with topographic complexity, being less important over flat terrain. This allows water surface slopes to be measured and associated discharge volumes to be estimated for open channels in large basins, such as the Amazon. Building on these capabilities, this paper demonstrates that near real-time coarse resolution radar imagery of a recent flood event on a 98 km reach of the River Po (Northern Italy) combined with SRTM terrain height data leads to a water slope remarkably similar to that derived by combining the radar image with highly accurate airborne laser altimetry. Moreover, it is shown that this space-borne flood wave approximation compares well to a hydraulic model and thus allows the performance of the latter, calibrated on a previous event, to be assessed when applied to an event of different magnitude in near real-time. These results are not only of great importance to real-time flood management and flood forecasting but also support the upcoming Surface Water and Ocean Topography (SWOT) mission that will routinely provide water levels and slopes with higher precision around the globe.