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Progress and prospects for high-resolution remote sensing of fluvial flood inundation

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In recent years, much interest has focused on the use of synthetic aperture radars (SARs) for flood inundation mapping due to their day-night, all-weather capability and high resolution. Satellite SAR data has a resolution of 12.5 m, whilst airborne SAR data may have a resolution down to 0.5 m and both are of an appropriate scale for hydrodynamic model validation if the data can be processed to delimit the shoreline accurately. Unfortunately, this may not be straightforward, and such processing tends to be prone to misclassification errors, particularly for satellite data due to the reduced range of frequencies and polarizations available. This paper will provide an illustrated review of work undertaken by the authors over the past 7 years on the processing and application of satellite and air-borne SAR data in support of high-resolution flood inundation modelling.

At present, such observations are only applied in a binary sense for model validation (i.e. presence/absence of inundation at the pixel level). However, this undoubtedly raises the question of how measured state-variable data can be reasonably compared with what a model actually predicts, given that both may be averaged over very different time and space scales. The implications of this will be discussed and the further potential of remote sensing for flood mapping and model testing (e.g. direct remote sensing of flood levels) will be considered.