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Calibrating and validating an inundation model with and without crowdsourced water depths and velocities

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Remote sensing and crowdsourcing data are new sensing methods that have the potential to improve significantly inundation modelling. That is especially true in data-scarce situations, for example when resources for acquiring sufficient traditional data are limited or when field conditions are not favourable. Crowdsourced water depths and velocities have been demonstrated to be useful for improving inundation models, ranging from the calibration of 1D models to data assimilation in 2D models. In this study, we aim to further evaluate how much the amount and type of crowdsourced data influence model calibration and validation, in comparison with data from traditional measurements. Further, we aim to assess the effects of combining both sources. For that, we developed a 2D inundation model of the Sontea-Fortuna area, a part of the Danube Delta in Romania. This is a wetland area, where data was collected during two 4-day field campaigns, using boat navigation together with the involved citizens. Citizens obtained thousands of images and videos that were converted into water depth and velocity data, while technicians collected ADCP data. We calibrated and validated the model using different combinations of data (e.g. all water depth data, half water depth and half water velocity). Results indicated that velocity data by themselves did not yield good calibration results, being better used in conjunction with water depths or by combining them into discharge. We also observed that calibration by crowdsourced water depths is comparable to the use of water depths from traditional measurements.