Supplement of Nat. Hazards Earth Syst. Sci., 18, 463–477, 2018
https://doi.org/10.5194/nhess-18-463-2018-supplement

Natural Hazards and Earth System Sciences
Open Access

Supplement of

Investigating compound flooding in an estuary using hydrodynamic modelling: a case study from the Shoalhaven River, Australia

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In the following, we present supplementary remarks and explanations concerning the data and methods in our manuscript.

S3.1 Model input data

Bathymetric points measurements in the Shoalhaven and Crookhaven rivers comprise cross-river points taken every 10 m while the distance between measured transects was approximately 20 m. Smaller creeks such as Broughton Creek were surveyed with a distance of up to 250 m between transects. These point measurements were interpolated to a raster surface of 5 m spatial resolution using an ordinary Kriging method with a spherical semivariogram model.

The accuracy of the bathymetric point interpolation (following Chaplot et al. (2006)) was assessed by comparison of interpolated cell values to original point measurements. The interpolated raster (using only 80 % of original data) was compared with a random subset (using 20 % of the original data). The mean error between the interpolated cell values and actual measurements was -0.05 m while the root mean square error was 0.91 m. The largest differences were observed in sparsely surveyed creeks.

As the bathymetric data set was collected at a time when the intermittent entrance at Shoalhaven Heads was closed, an additional data set of breached entrance conditions originating from 2015 was used to approximate the entrance conditions for the June 2016 storm event. This bathymetric data set of the breached Shoalhaven Heads entrance was provided by the Office of Environment and Heritage (OEH). It was collected after the opening of the intermittent entrance in November 2015 using a jet ski. This post-storm data set was used to adjust the interpolated bathymetry data set of the Shoalhaven River for open entrance conditions at Shoalhaven Heads using a Geographic Information System (GIS).

S3.2 Observational data

The processing steps of radiometric calibration, terrain correction, speckle filtering and pixel reclassification of the SAR imagery are illustrated in Fig. S1.

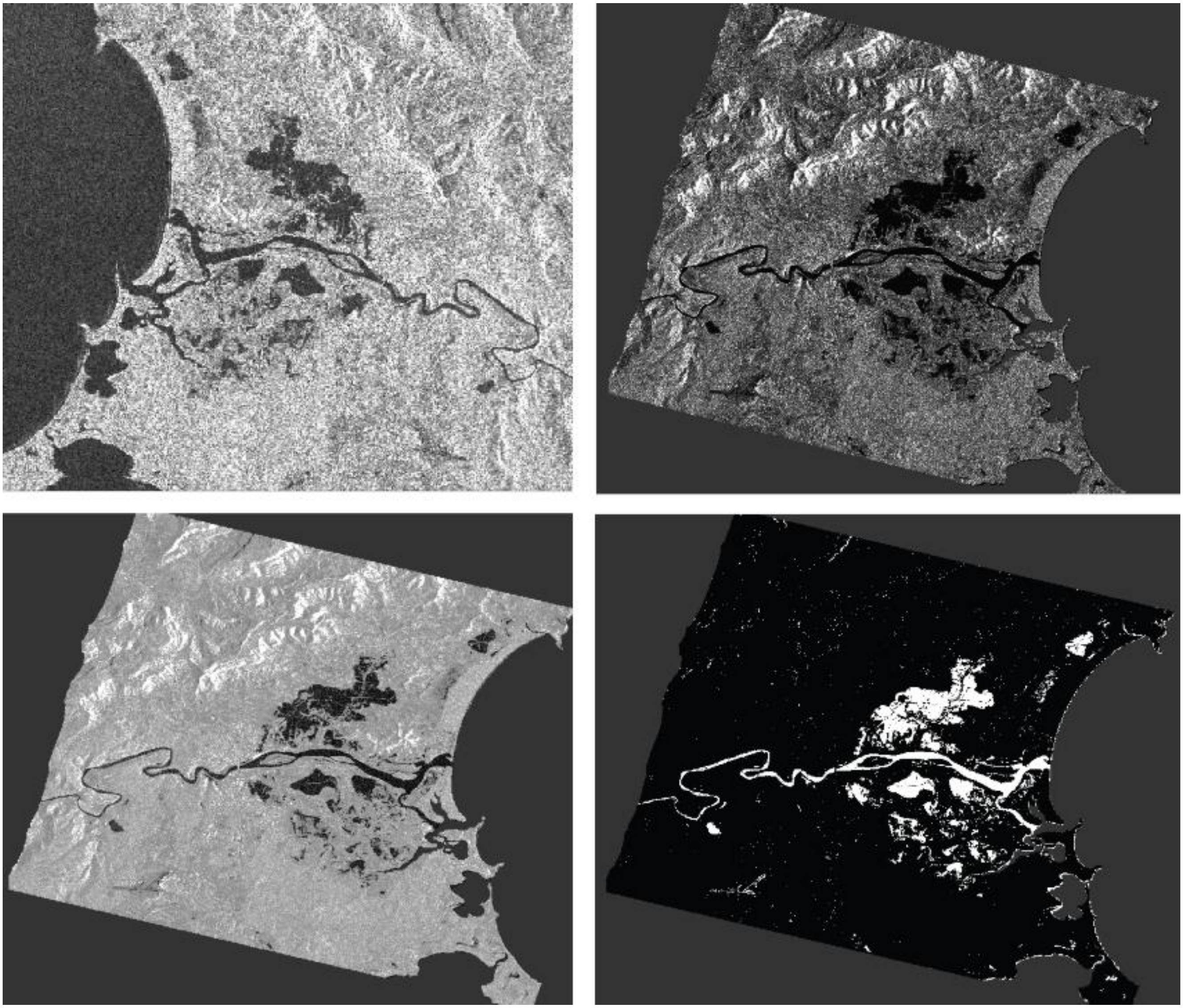

Figure S1: Processing of SAR imagery. Original imagery (top left), calibrated and terrain corrected (top right), speckle filtered (bottom left) and reclassified wet/dry imagery (bottom right). SAR imagery modified after Copernicus Sentinel Data.

Reference

Chaplot, V., Darboux, F., Bourennane, H., Leguédois, S., Silvera, N. and Phachomphon, K.: Accuracy of interpolation techniques for the derivation of digital elevation models in relation to landform types and data density, Geomorphology 77, 126–141, doi: 10.1016/j.geomorph.2005.12.010, 2006.