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Object-Based Flood Analysis Using a Graph-Based Representation

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Describing spatio-temporal dynamics of a flood using an object-based approach with a graph-based representation proved useful for analysis of small-scale flood dynamics in Belgium (about 100 km²) (Debusscher, et al., 2019). Starting from pre-processed Sentinel-1 SAR imagery, the water bodies are delineated in each timestep (using a thresholding algorithm), after which all water-polygons are grouped into graphs according to their spatial overlap on consecutive timesteps. Change in (water)area and backscatter are used to quantify the amount of variation. Products of this tool are a global variation map covering the whole study area, and a temporal profile for each waterbody, visually describing the evolution of the backscatter and number of polygons that make up the waterbody.

After establishing this proof of concept in a small region (flood of June 2016 in Schulensbroek, a nature reserve in north-eastern Belgium), this approach is applied on floods covering larger areas (about 10000 km²). Two cases are studied, the Mozambique flood of March 2019 (near Beira) and the India flood of September 2019 (near Patna). The process of upscaling leads to solving issues regarding the minimal mapping unit, adding extra pre-processing in order to simplify polygons (morphological operators), increasing code efficiency (mainly regarding for-loops).

In the absence of ground truth, produced flood maps are compared to existing flood extent maps (from Disaster Charter (unitary) and Hasard (LIST)) in order to estimate accuracy.

References

Debusscher Bos and Van Coillie Frieke Object-Based Flood Analysis Using a Graph-Based Representation, Remote Sensing. - 2019. - p. p. 1883.