Detection maps for pluvial flood deteriorations at plot level using the SPCD method for three Mediterranean events in France

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Raster files at 10 m spatial resolution containing classes of detection probability for pluvial flood damages as found by the SPCD detection method (Cerbelaud et al., 2021).

These rasters can be used for the evaluation of intense surface runoff susceptibility models (see for instance Cerbelaud et al., 2022).

The three coupled files (.hdr + .img) correspond to the following studied events:

- *Aude 1*: the floods of 15 Oct. 2018, in the Aude department, France (proj in WGS84 UTM zone 31N)
- *Aude 2*: the floods of 11 May, 2020, in the Aude department, France (proj in WGS84 UTM zone 31N)
- *AM*: the floods of 2-3 Oct., 2020, in the Alpes-Maritimes department, France (proj in WGS84 UTM zone 32N)

The SPCD method is a plot-based (using the land cadastre) supervised classification method (Gaussian process classifier) using open-source Sentinel-2 (S-2) closest cloud-free pre and post event optical products. Change images are used to determine specific statistical patterns in the temporal evolution of vegetation-/water-based spectral indices within affected plots. The maps given here were produced from a uniquely trained classifier, where learning was only performed on the Aude 1 event. This method uses various types of ground truth information (geo-referencing and labeling of areas affected by intense overland flow, Cerbelaud et al. 2021).

Detection rates greater than or equal to 70% and false positives lower than 12% were obtained on all three events using the following VNIR-based spectral indicators at the plot level: the standard deviation of the relative difference of NDVI + the maximum of the relative difference of NDWI.

The maps are in ENVI .hdr format with the following classes:

- 'Unaffected': plots with lowest probability of pluvial flood occurrence (<90th percentile of all probabilities given by the classifier)
- 'Lightly damaged': plots with medium probability of pluvial flood occurrence (>=90th and <95th percentile of all probabilities given by the classifier)
- 'Damaged': plots with good probabilities of pluvial flood occurrence (>= 95th and <99th percentile of all probabilities given by the classifier)

- 'Heavily damaged': plots with highest probabilities of pluvial flood occurrence (>=99th percentile of all probabilities given by the classifier)

If looking for fewer false positives, only display the 'Damaged' and 'Heavily damaged' classes.

Extended information about the method and its validation are available here:

Cerbelaud, A., Roupioz, L., Blanchet, G., Breil, P., Briottet, X., 2021. A repeatable change detection approach to map extreme storm-related damages caused by intense surface runoff based on optical and SAR remote sensing: evidence from three case studies in the South of France. ISPRS J. Photogramm. Remote Sens. 182, 153-175.
https://doi.org/10.1016/j.isprsjprs.2021.10.013

Example of use for the evaluation of the IRIP© model:

Cerbelaud, A., Breil, P., Blanchet, G., Roupioz, L., Briottet, X., 2022. Proxy data of surface water floods in rural areas: application to the evaluation of the IRIP intense runoff mapping method based on satellite remote sensing and rainfall radar. Water 14 (3), 393.
https://doi.org/10.3390/w14030393