# FloodSENS: Flood Segmentation in Partially Clouded Optical Satellite Images

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Earth Observation and Floods: Challenges and Proposed Solution

SAR is the preferred sensor: penetrates clouds and is all-weather, day & night capable

Optical is straightforward to interpret and many EO missions exist for a long time

But: optical is hampered by frequent cloud cover during floods

Solution: **use ML to reconstruct flooded area under partial cloud cover**

Benefit to industry: get longer archives of historical flood data for better risk mapping; make optical flood images more useful for disaster response
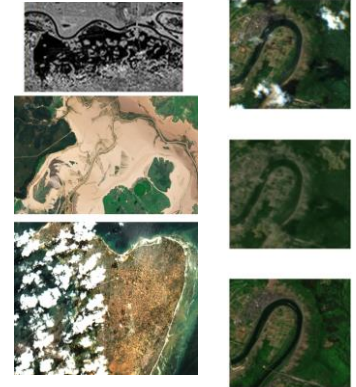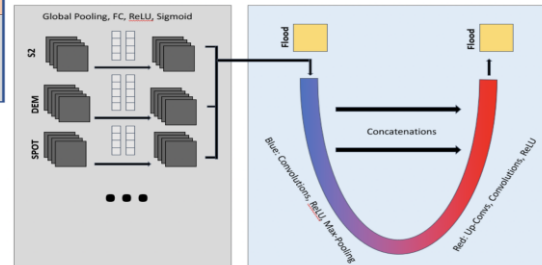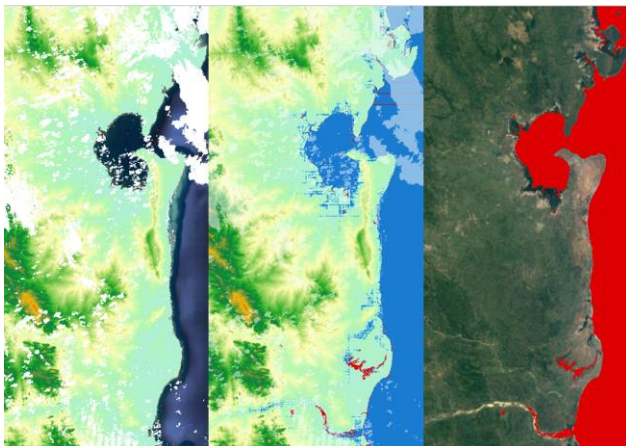
FloodSENS
Smart Sensing of Floods

https://incubed.phi.esa.int/portfolio/floodsens/
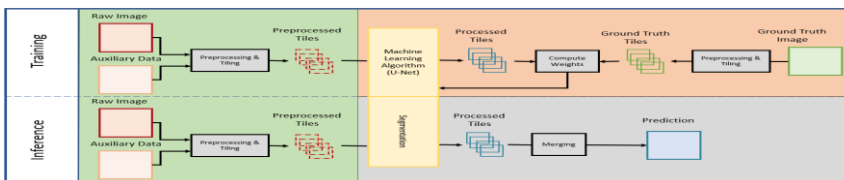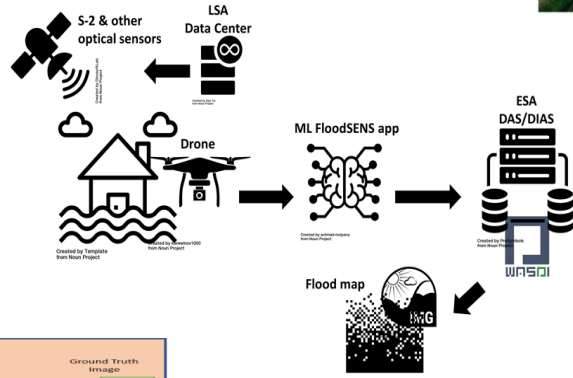
Overall structure: **(1) Pre-processing:** Input and reference data is pre-processed and tiles for training or inference. **(2) Training**: The loss is computed on a tile by tile basis. **(3) Inference**: Processed tiles are merged back together to create full sized prediction raster
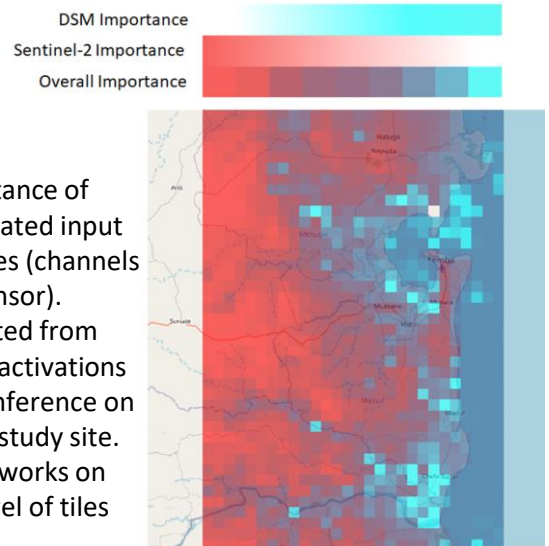
Proposed algorithm architecture: The combined Network Image with SENet block in UNet

Real example (below): TC Kenneth in Mozambique case using a simple UNET: Input: cloudy S2 & DEM; ground truth (GT): SAR flood map.

Importance of aggregated input features (channels per sensor). Extracted from SENet activations after inference on entire study site. SENet works on the level of tiles

Left: Input data, Clouds in white, DEM color
Right: GT in red on top of S2
Middle: Blue inferred water presence