FloodSENS: Smart Sensing of Floods

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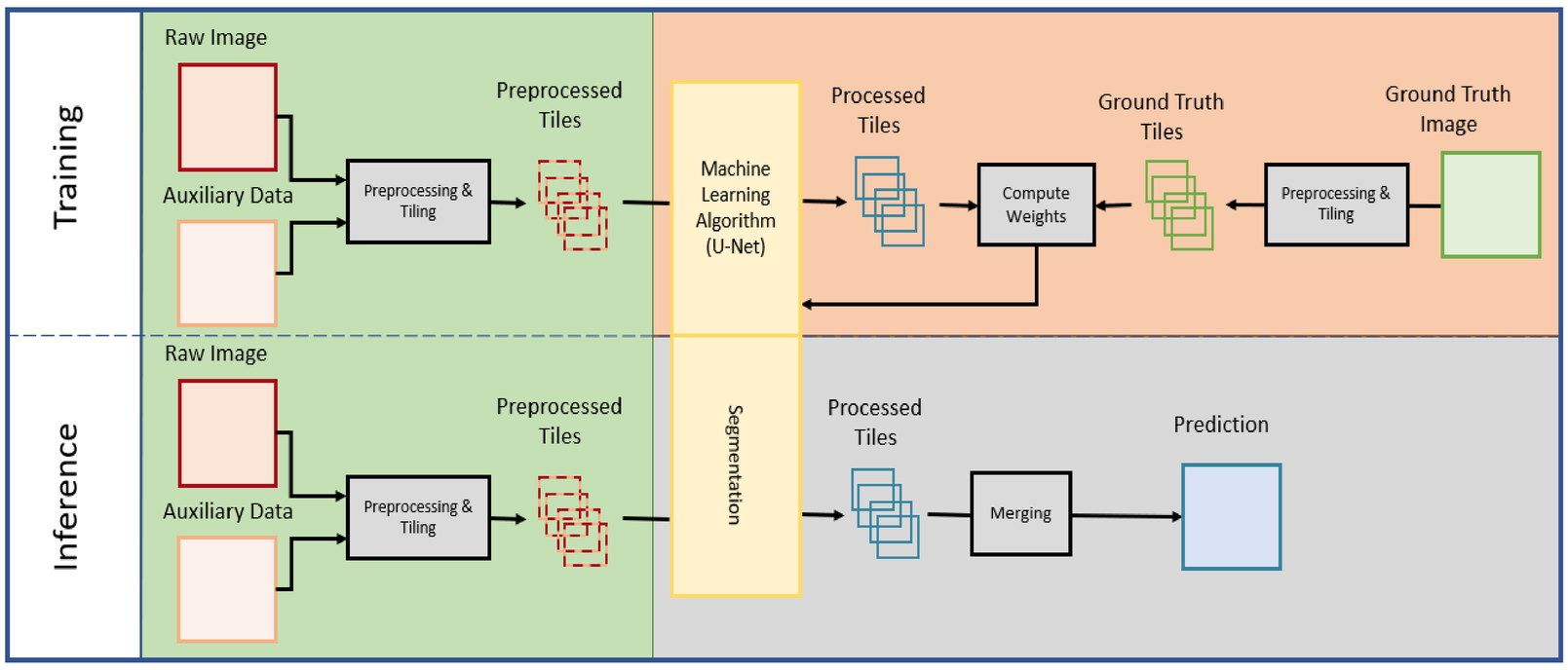
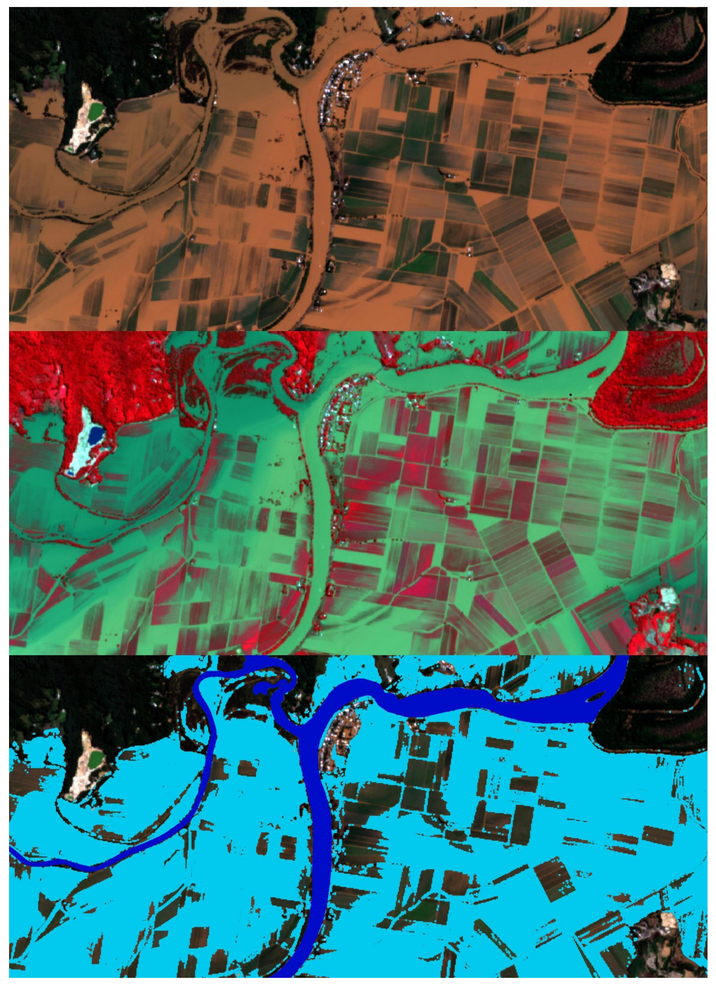
Earth Observation data-based solutions provide an alternative to traditional ground-based flood monitoring methods or computer models, namely the ability to cover wider areas, frequent revisit times, abundant open access data and long historic image archives. However, there are still important challenges left unaddressed that compromise the quality and reliability of the data, such as the persistent cloud cover during floods, latency issues and the problem of getting abundant high-definition images under less favorable weather conditions.

We overcome these issues by developing a flood mapping application, called FloodSENS, that is capable of integrating a EO datasets and information related to topography and water flow using Machine Learning. This novel application being developed to market, uses a UNET with a Squeeze and Excite Network to efficiently reconstruct flooded areas under partial cloud cover in satellite images, thus creating far more reliable flood risk assessments and flood mapping during emergencies.



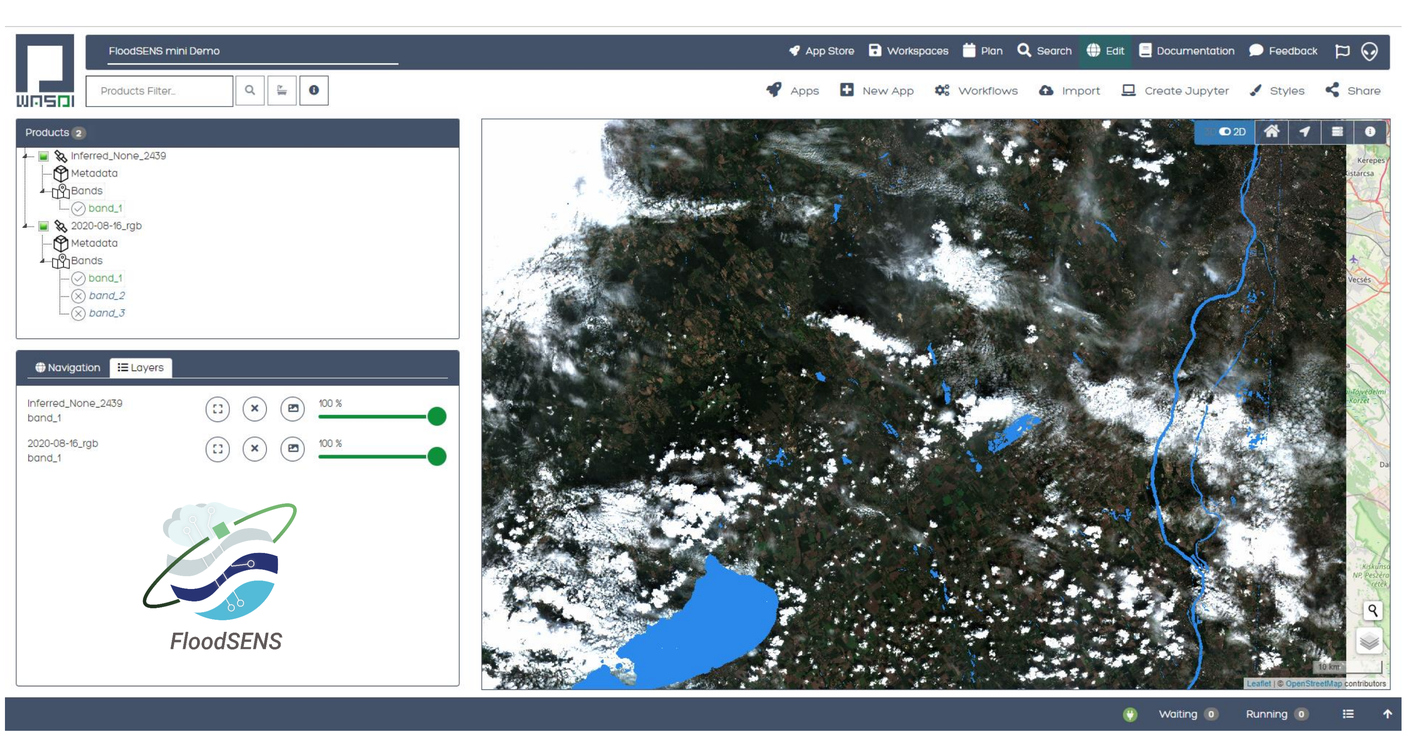
Overall structure: **(1) Pre-processing:** Input and reference data is pre-processed and tiles for training or inference. **(2) Training**: The loss is computed on a tile by tile basis. **(3) Inference**: Processed tiles are merged back together to create full sized prediction raster



Generating a flood label database: We expertly label a diverse set of Sentinel-2 images acquired during flood events over different biomes of the globe. Example shows the Sentinel-2 image (top) and the extracted flood labels (bottom) of the 2022 Australia flood disaster

Development work and iterative testing on several testcases, located in different parts of the globe have been completed. We utilize the Azure platform for development and inference, and have built a first deployable FloodSENS version for WASDI (https://www.wasdi.cloud/), which is not publicly released yet.

The next steps now are to test the FloodSENS architecture for transferability and to continue working on customer-led flood use cases.



Deployment on WASDI: WASDI as an online cloud computing platform to allow location-specific inference as well as validation by our end-user partners

https://incubed.phi.esa.int/portfolio/floodsens/

ECMWF-ESA Machine Learning for Earth Observation and Predictions Workshop
November 2022, Reading, UK