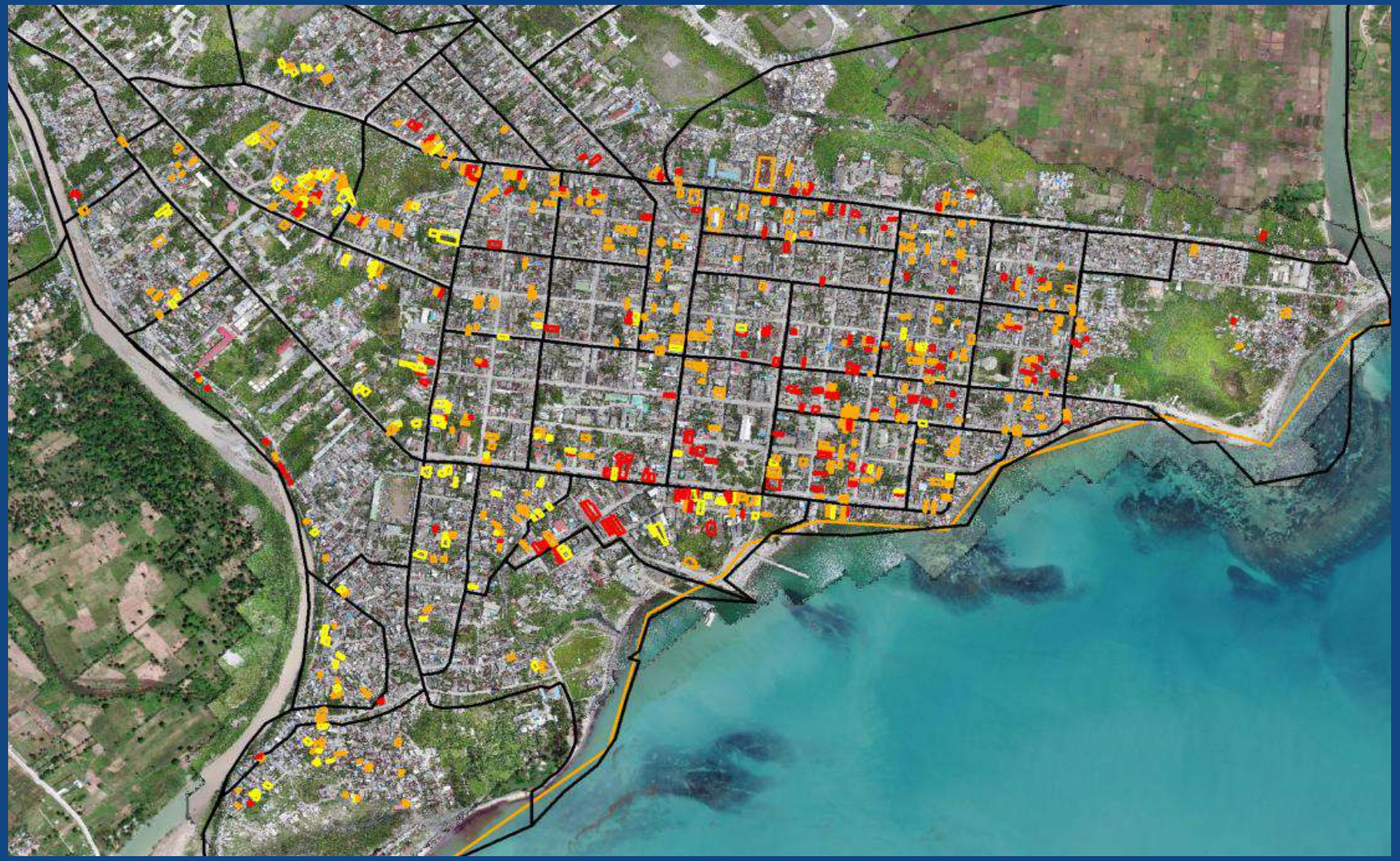
PRELIMINARY DAMAGE ASSESSMENT ANALYSIS WITH SATELLITE AND DRONE IMAGERY – MACHINE LEARNING TO SUPPORT EARTHQUAKE AUGUST 14TH 2021, HAITI

DTM
IOM DISPLACEMENT TRACKING MATRIX



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Detection through machine learning into Picterra platform: overview results

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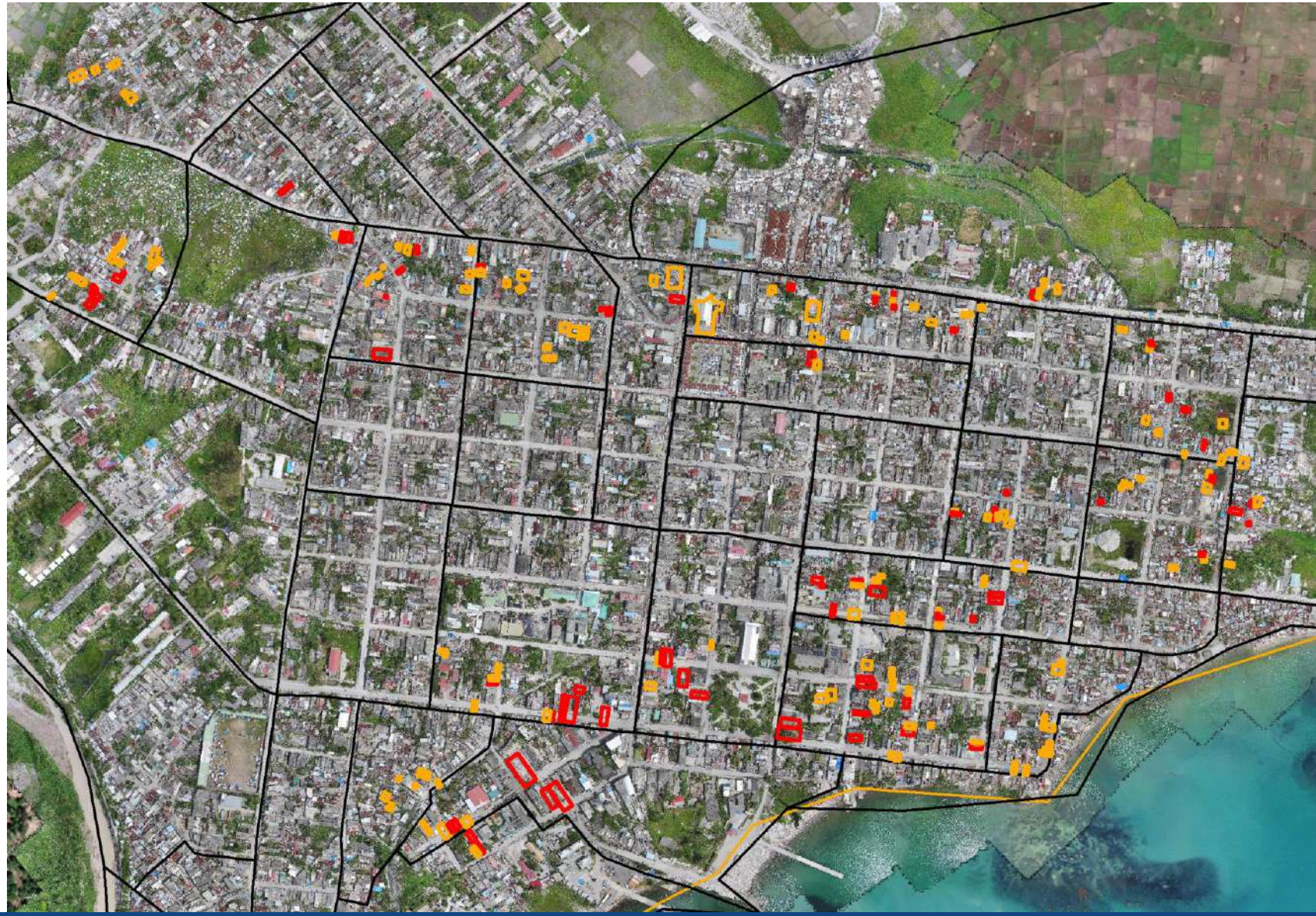
First step: to create polygon sample of destroyed and damaged buildings from damage assessment point from UNOSAT, Copernicus and IOM photo-interpretation

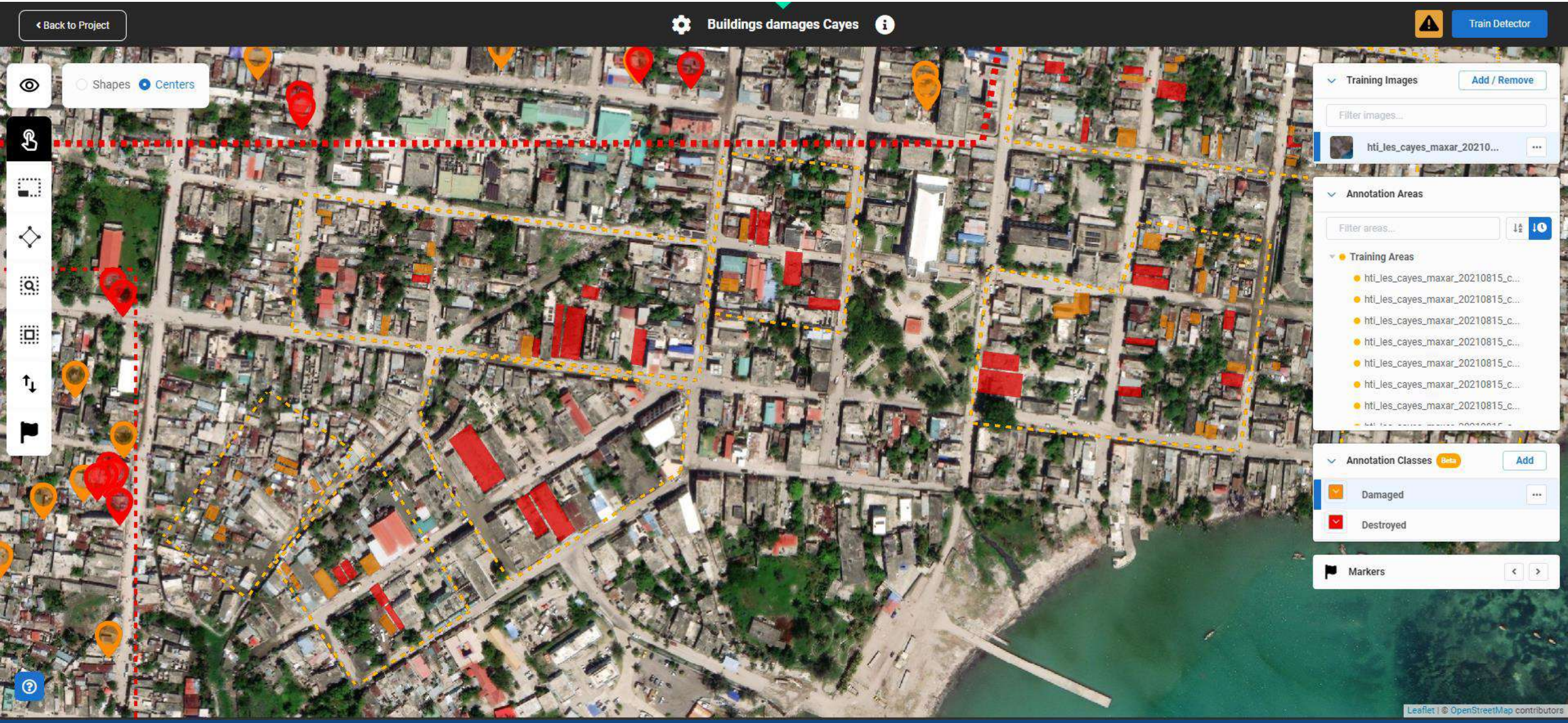
Second step: validate those polygons using drone imagery to match with satellite imagery

Third step: upload of imagery and sampling into Picterra to train the detector

Fourth step: run the model and check first result. Compare dataset and providing more polygons with all kind of damages and destroyed buildings to improve the detector. Then rerun the model



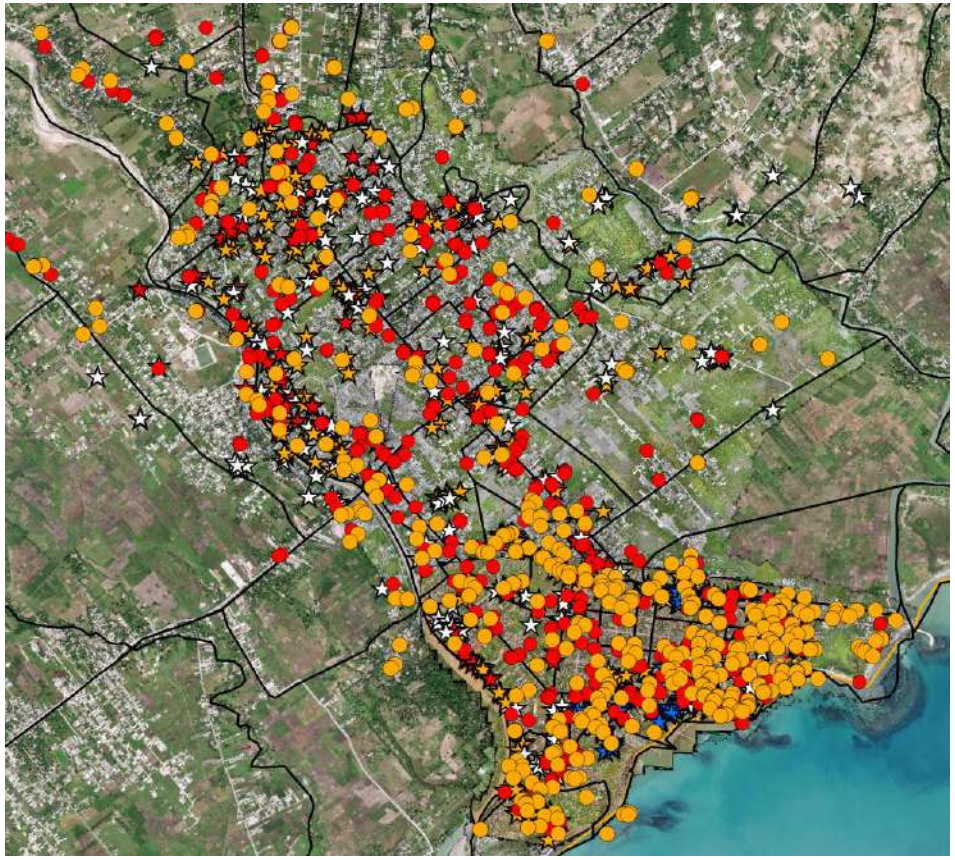
Creating training areas with damage analysis and check if it lacks to detect or over detect damaged or not buildings



Need to provide to the machine all kind of shape of damages or destroyed rooftop. Older debris or cinder blocks car be considered as damaged or destroyed. Need to provide more areas of training with different scenarios of type of damages in different location from satellite imagery.

Les Cayes is analyzed through photo-interpretation to catch all damaged and destroyed buildings. Manually, buildings can be missed, and procedure is taking time to evaluate. Harder to check on satellite imagery because many buildings seems not having damages. The use of drone images can validate the type of damage on satellite imagery.

- Quick symbology to understand the analysis.
- The stars are the point identified with classification
- Red and orange dots are classes identified by Picterra



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Buildings damages missed during the photo-interpretation

Buildings damages matching the photo-interpretation…

… but also adding

Over interpretation in areas where shape and color was not well included in sampling. This need to be improved by adding more polygons

In around more than 1.200 damaged / destroyed buildings analyzed, Picterra has discovered around same number but dataset need more cleaning and need validation

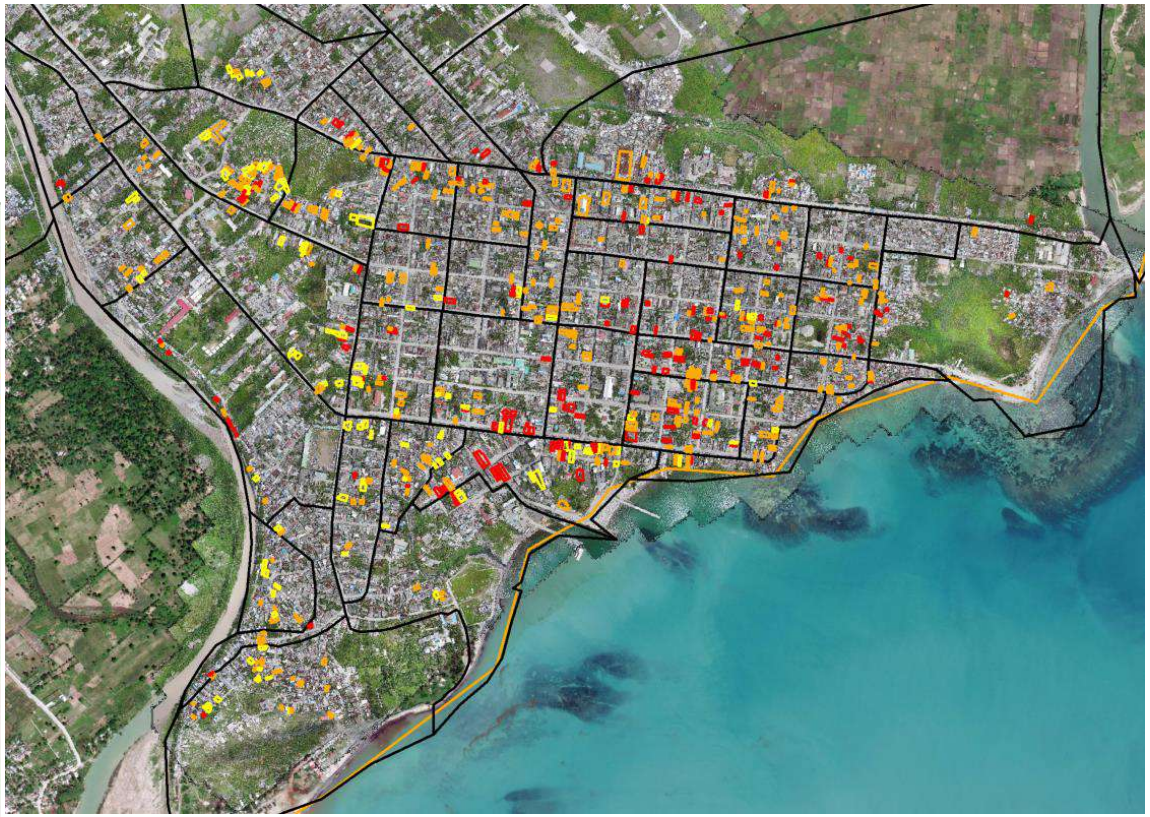
The increase of type of buildings damaged and building destroyed will adjust the machine learning and it will offer a more precise analysis.

The digitization of buildings with damage assessment will be increased to perform better automatic analysis. This analysis should be done in various type of area and scenarios as urban, rural, empty zones, crowded areas, to be sure the machine learning platform catch all type of buildings (basically it detects the shape and pixel color value to determine the visible damages).

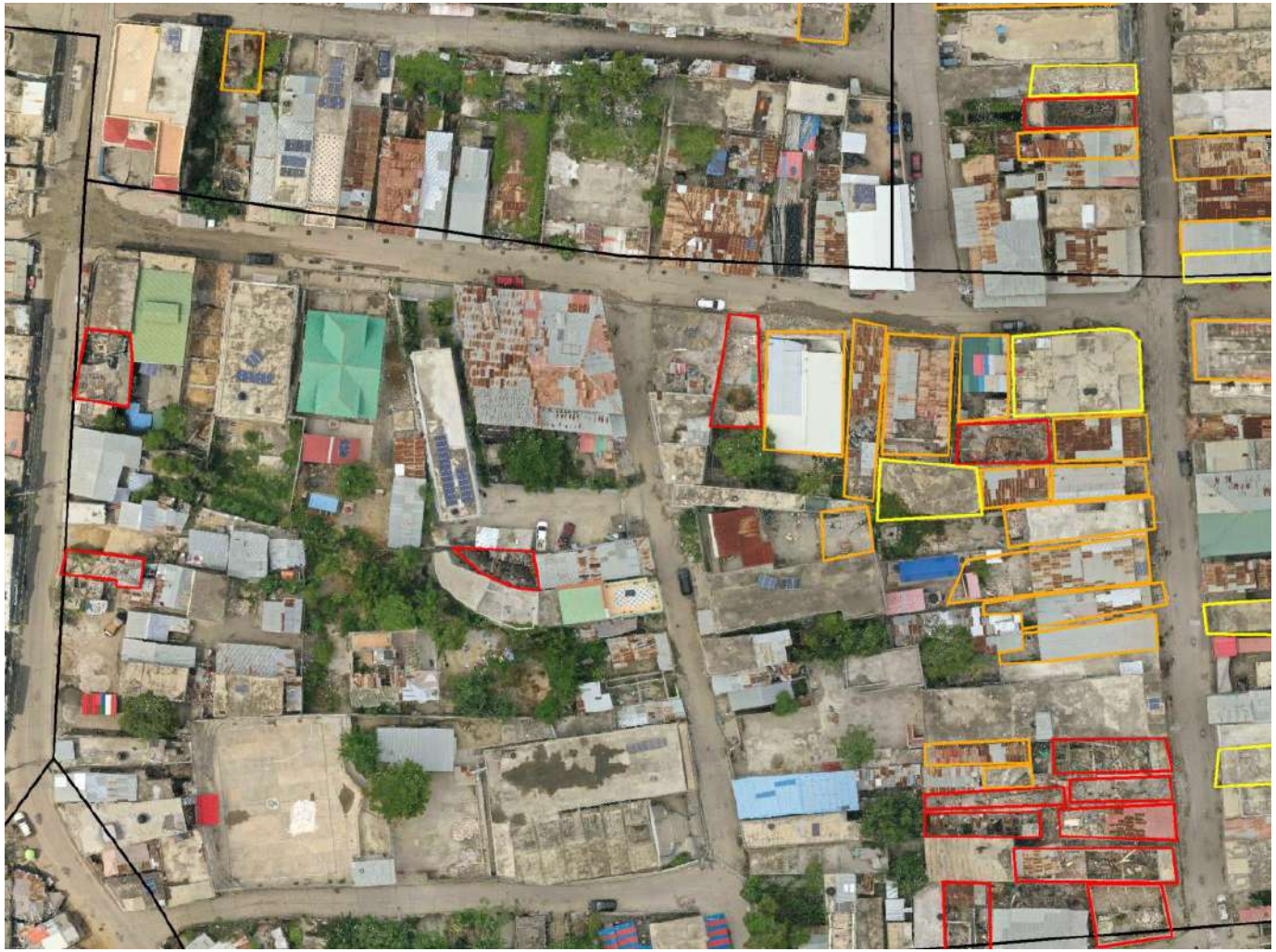
If the rooftop is not damaged but walls collapse but without visible debris, it will not be detected.

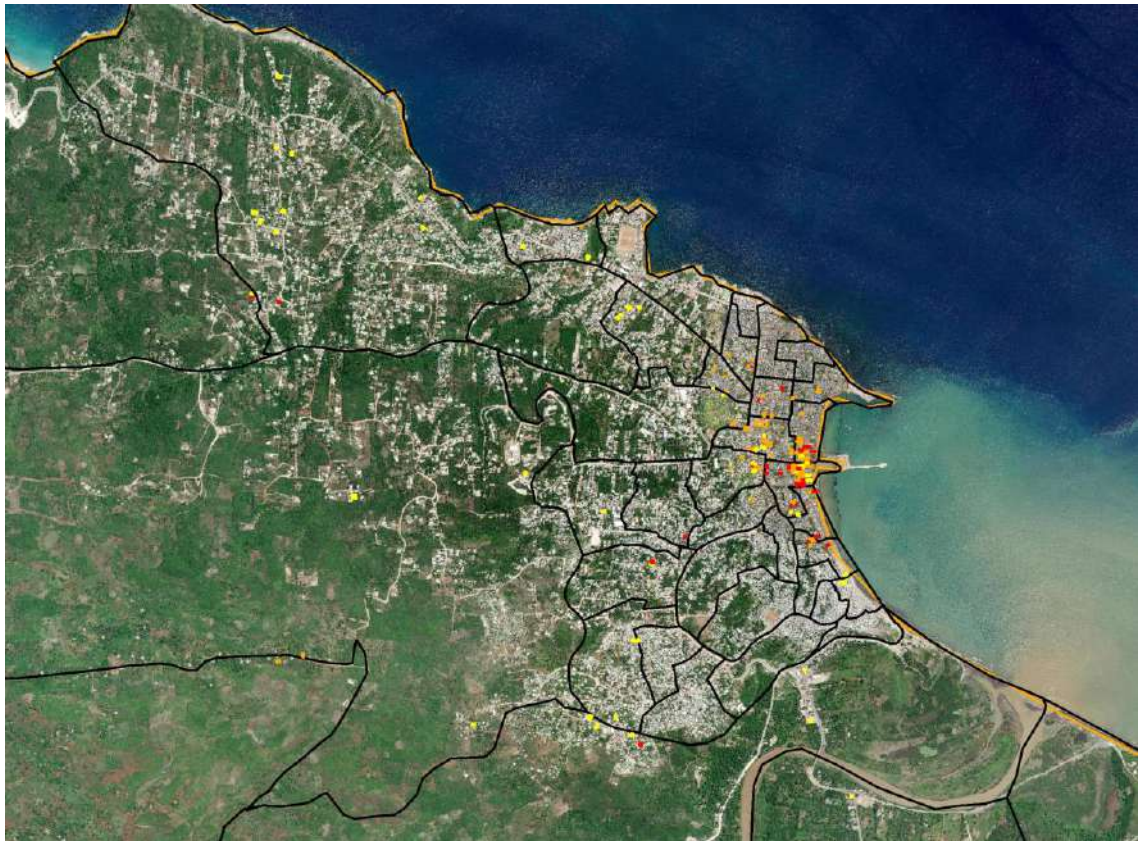
Drone imageries offer better quality but it will not cover very large areas as satellite imagery. Detection will be better but in smaller zones. Satellite imagery and machine learning is aiming to target some areas where not assessment is done prior. Or it will catch areas that photo-interpretation with manual work by looking differences between imagery is missed.

Around 700 buildings destroyed, damaged or possibly damaged were digitized in Les Cayes (testing area).



Around 145 buildings destroyed, damaged or possibly damaged were digitized in Jeremie.





Statement of Picterra:

Picterra (www.picterra.ch) is the first ML/AI Software-as-a-Service geospatial platform enabling businesses to autonomously extract intelligence & analytics from satellite and aerial imagery. Picterra's users build and deploy unique actionable and ready to use deep-learning models, quickly and securely without a single line of code. Thanks to its pre-trained base detectors, only a few human-made annotations are needed to identify and monitor any object or patterns (road cracks, roofs, animals, crops, trees, etc.) at scale, anywhere on Earth.

The platform was used previously to detect shelters or buildings or type of buildings. Here we are using the platform to detect type of damages. We needed to simplify the type of damage (avoiding severe, moderate, light damages). We needed also to classify type of destroyed because if half of building / long house is destroyed (but two houses without knowing now if two households or houses sharing same wall) could we admit if it is destroyed or not. Those are quick examples.

GIS datasets sharing (in shapefile format):

- Sampling of destroyed or damaged buildings polygons (work on going):

Click here

- Merged datasets from Copernicus EMS, UNOSAT, IOM (work on going):

Click here