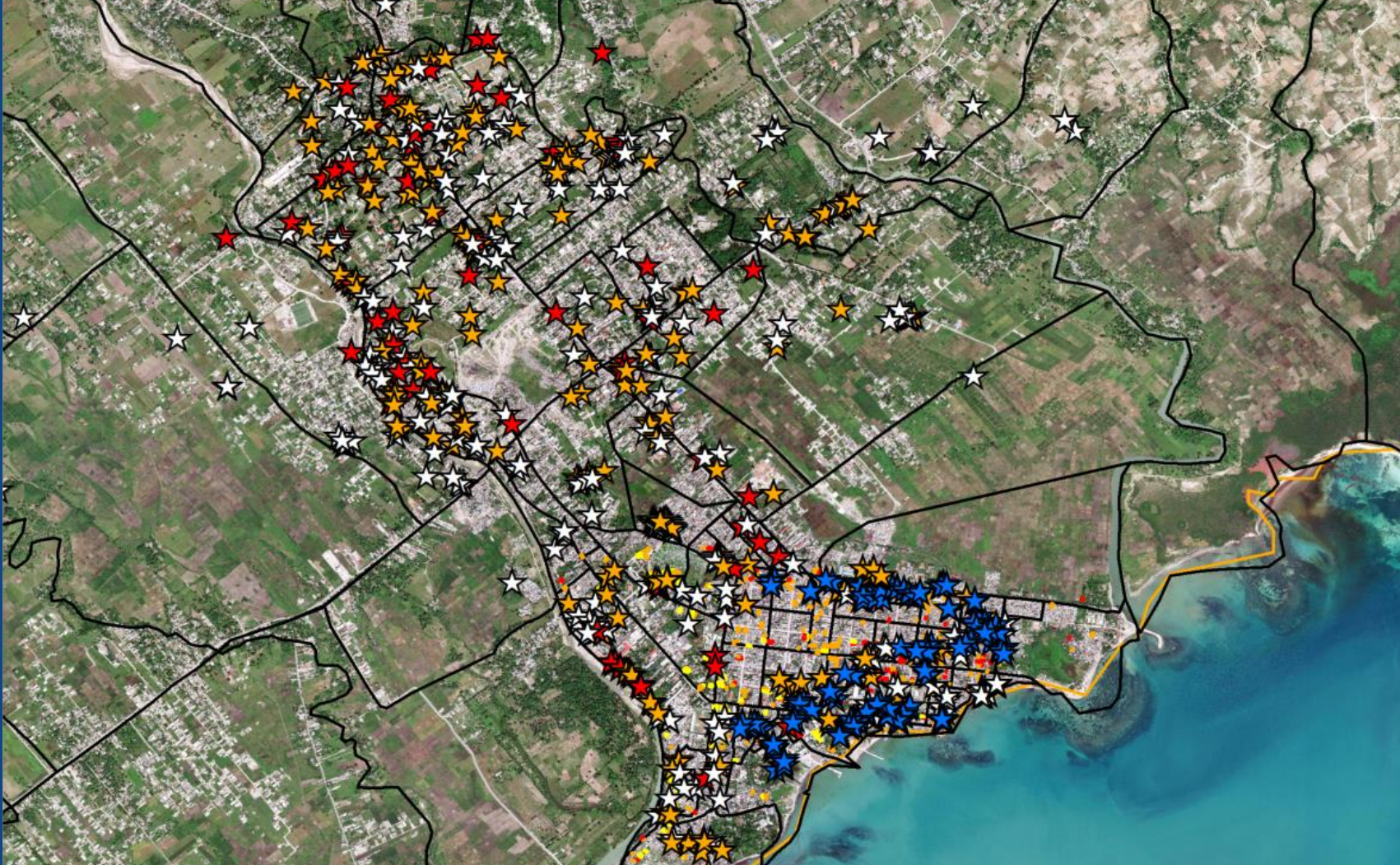# PRELIMINARY DAMAGE ASSESSMENT ANALYSIS WITH SATELLITE AND DRONE IMAGERY - SAMPLING OF CLASSIFICATION TO SUPPORT EARTHQUAKE AUGUST 14TH 2021, HAITI

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In Les Cayes centre-ville where WB drone imagery overlaps with the satellite imagery from DigitalGlobe, the Copernicus EMS photo-interpretation analysis revealed 66 buildings:
- 2 destroyed (red)
- 21 damaged (orange)
- 43 possibly damaged (white)

In the meantime, the photo-interpretation done by IOM added 140 buildings destroyed or high damages (blue color - under evaluation) in the same area based on drone imagery.
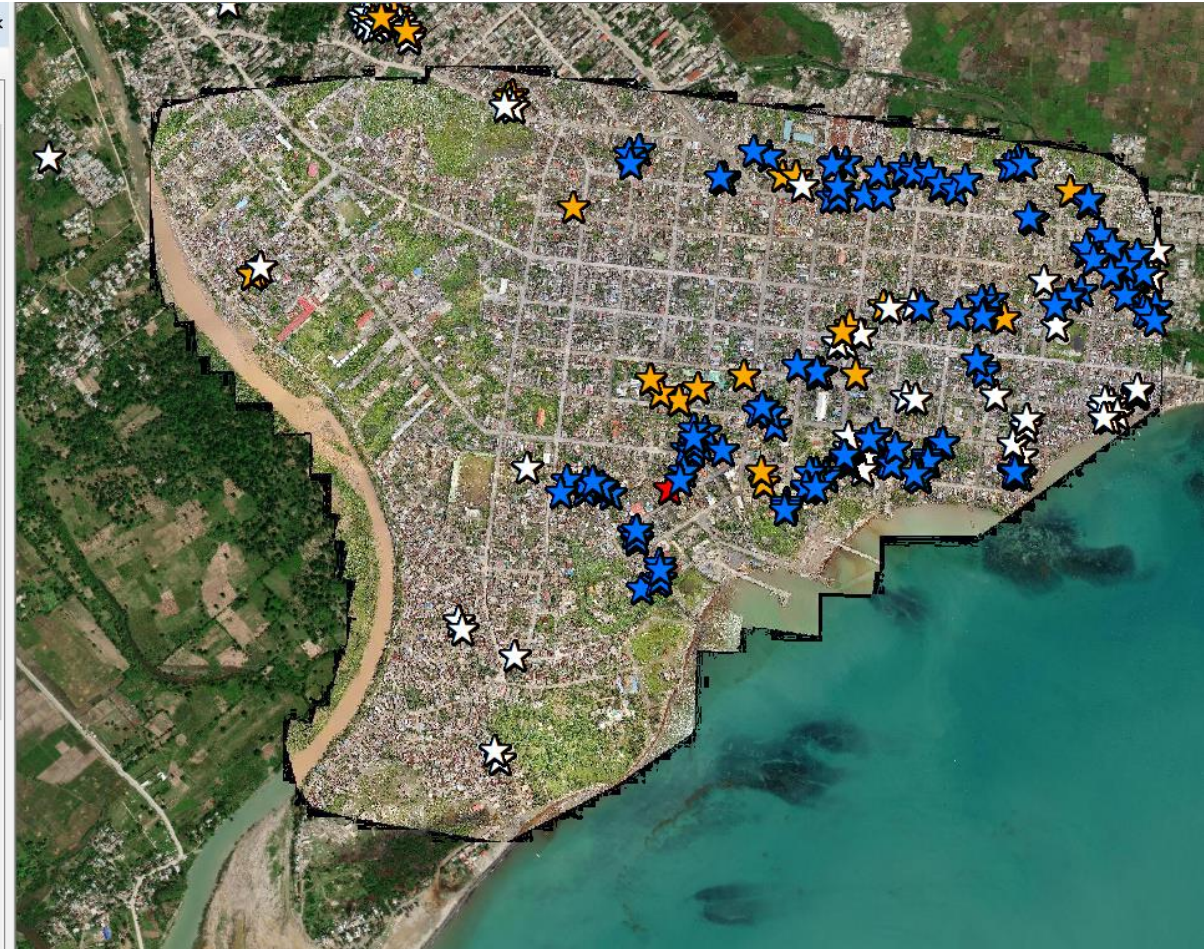This interpretation is going to improve the model for machine learning / A.I. recognition which will be loaded in the Picterra platform.
Every analysis in Picterra uses credits. Picterra accepted to support the mission by provided a 20 access to the platform.

• When buildings destroyed or damaged are identified, then the team is drawing the polygon on top of rooftop and adding the debris and/or pan of wall which fall on the ground, or structure (metal, wood) around the area. Those details are visible in the drone image.

- It is harder to identify those damages in satellites imagery. And geo-referencement is slightly shifted from one image to the other. So polygons need to be done on satellite imagery and duplicated on drone image.
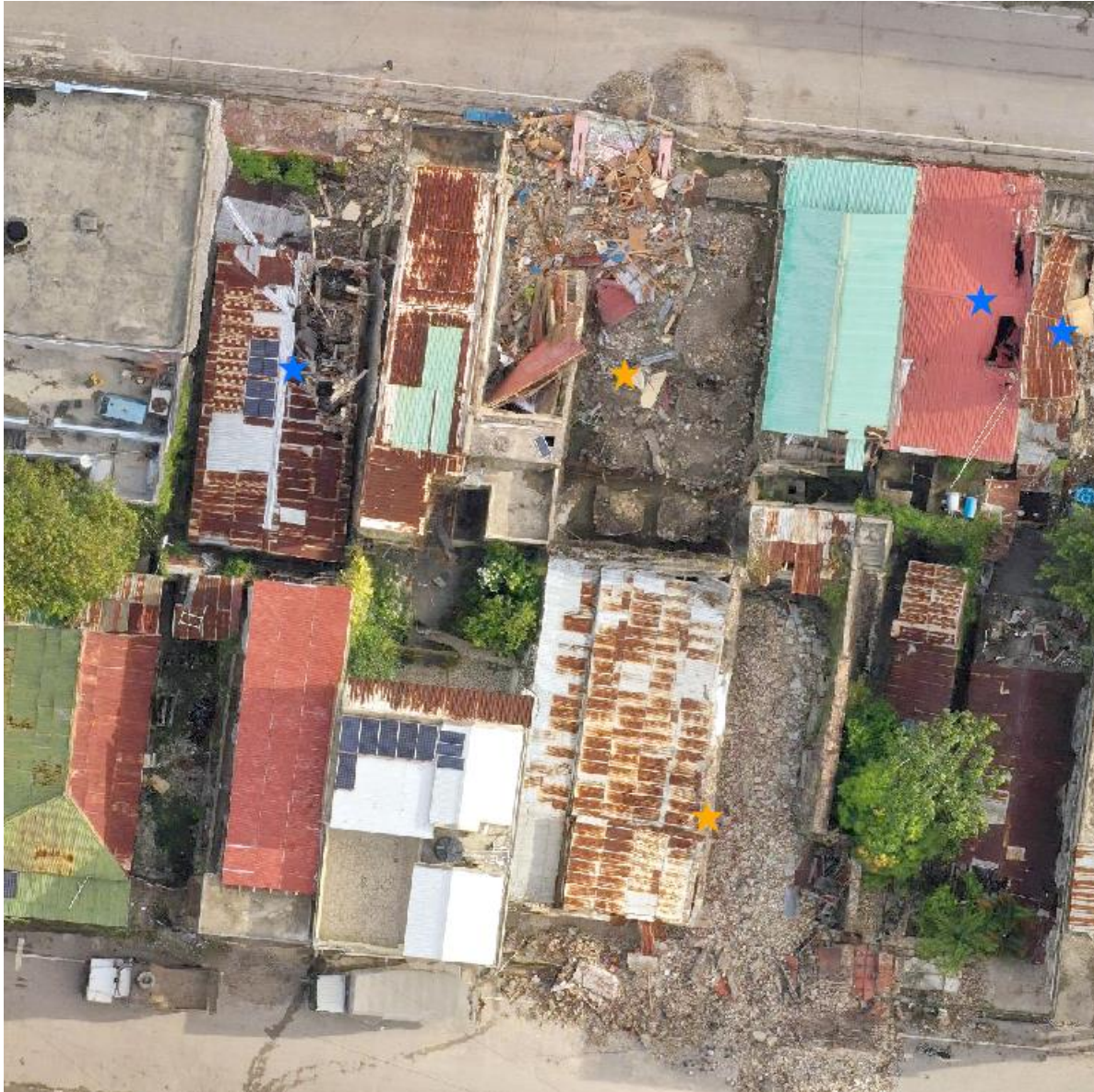
Some sampling of buildings destroyed on drone imagery

Some sampling of buildings destroyed on satellite imagery

Need to improve the classification of damaged and destroyed for machine learning. Need photo-interpretation to understand if roof collapse (checking amount of debris), and from Copernicus analysis to check whether damaged or destroyed.

Different photo-interpretation from drone and satellite imagery.
Using not damaged building in the system will bring errors that will need to be check during quality control.

Is it damaged? ★

Is it damaged?

Obviously destroyed

- Les Cayes was used as a test area as numbers from preliminary analysis done by Emergency Mapping Service (EMS) of Copernicus estimated around 200 buildings destroyed / damaged / partially damaged. DGPC numbers estimation in commune of Les Cayes are around 7.000 destroyed and 7.000 damaged.
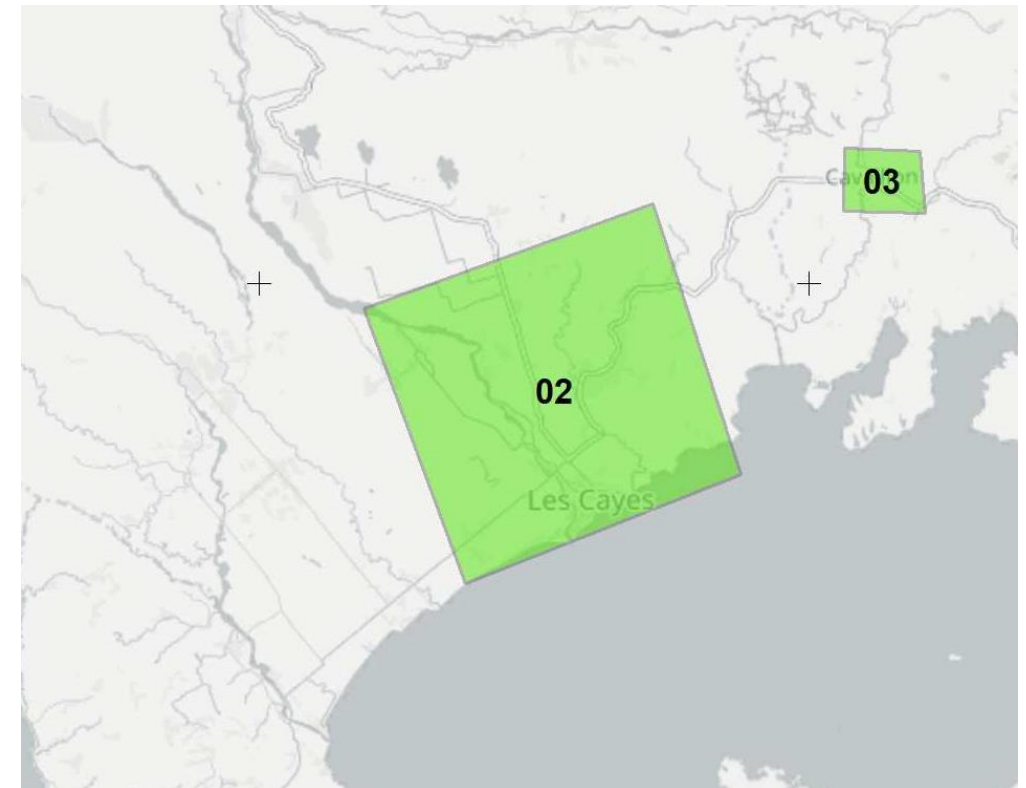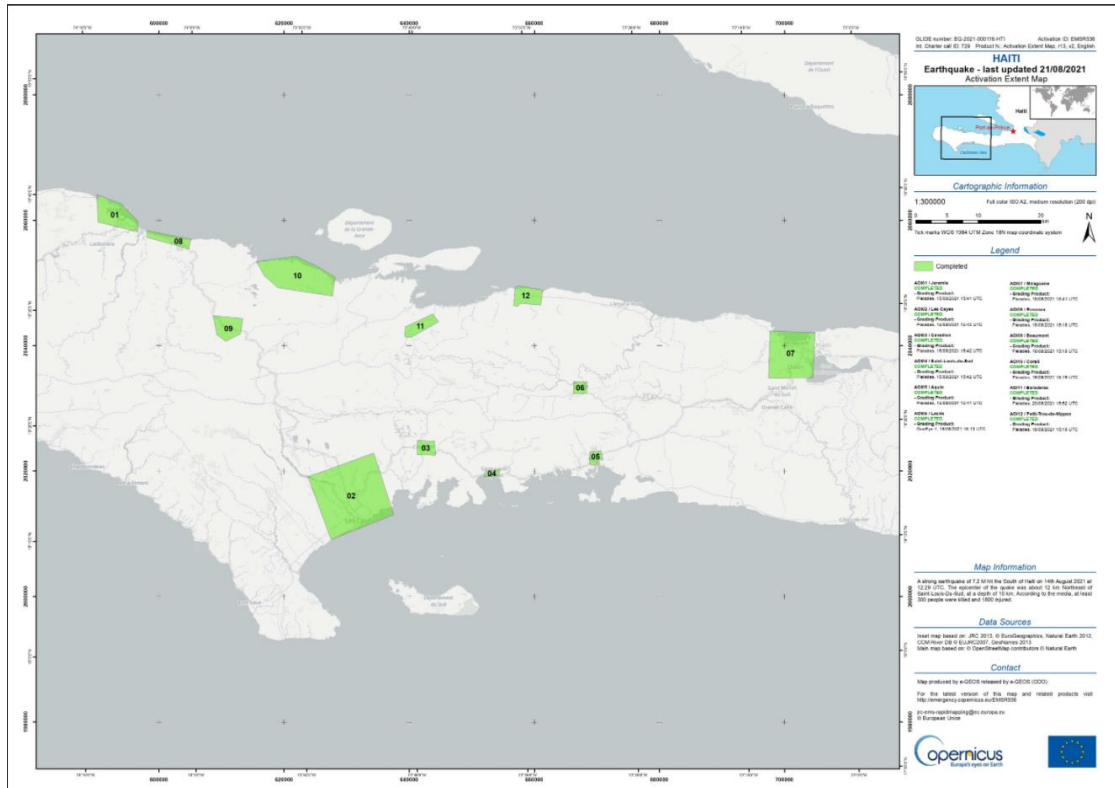
Copernicus EMS area of analysis in Les Cayes.

Recommendations plan:
- We contacted Picterra to have access to their platform to try to analysis wider area when the classification of buildings is well prepared.
- First test was done on satellite imagery, but classification need improvement. Damaged buildings with grey rooftop and not real visible damage bring the platform to identify many grey rooftops.
- We have limited credits depending on area and imagery resolution. So, working on classification should remain priority if we want to use Picterra.
- Drone imagery has a higher quality for photo-interpretation and for machine learning training detector.
- Satellite imagery might not show all debris around buildings and if roof didn't collapse it is hard to do photo-interpretation.
- Satellite imagery capture larger geographical area and can be acquire remotely
- Drone imagery need to be in place and will need more days to capture wider areas even if it cannot achieve the satellite imagery area.
- Resolution imagery used by World Bank is too high (2cm/pixel) and it needed to make many flights and take more time to process the image
- Recommendation is to use drone in area where we can analyse there is a gap and if we have the info that numbers of buildings damaged and/or destroyed are significant.
- Recommendation to use drone in higher altitude to catch more km2 in less time. Using resolution between 6cm and 8cm per pixel. The time processing should be also faster
- To identify priority zone based per commune using the Section D'Enumeration (SDE alias census blocks – smallest blocks – around 200/250 buildings per block) where we have number of buildings per blocks. This will support for any drone planification to know how much flights, time, and delivery of products.