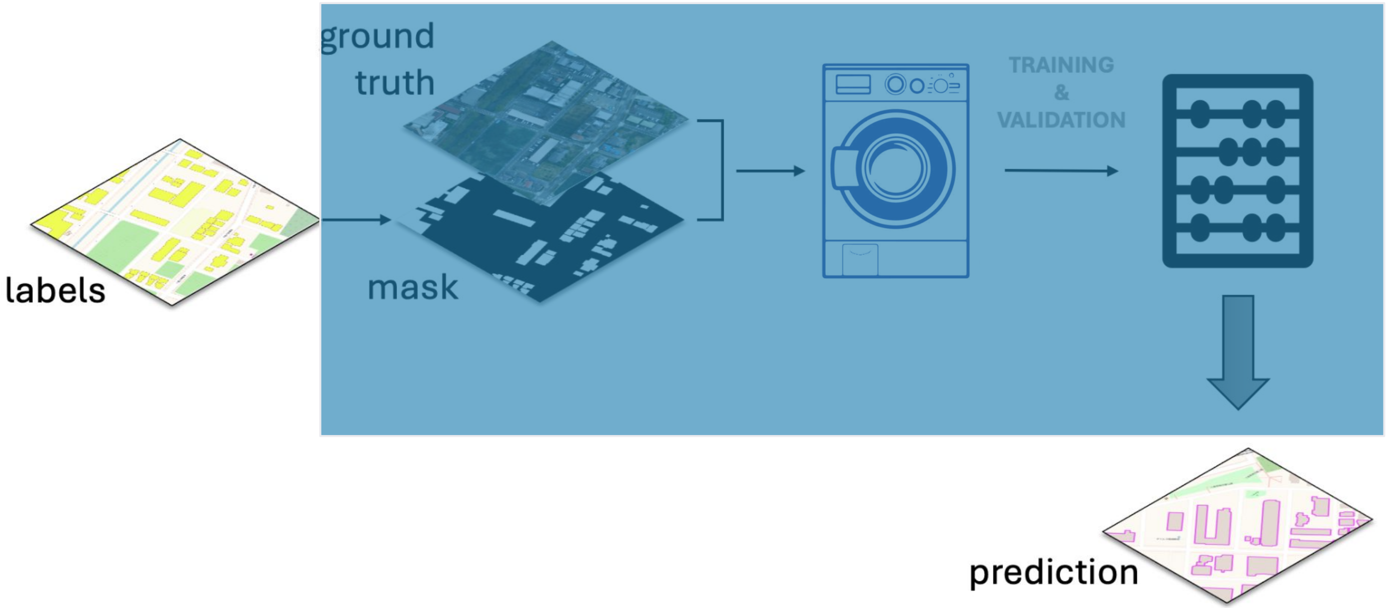
An academic insight on the functioning of fAIr

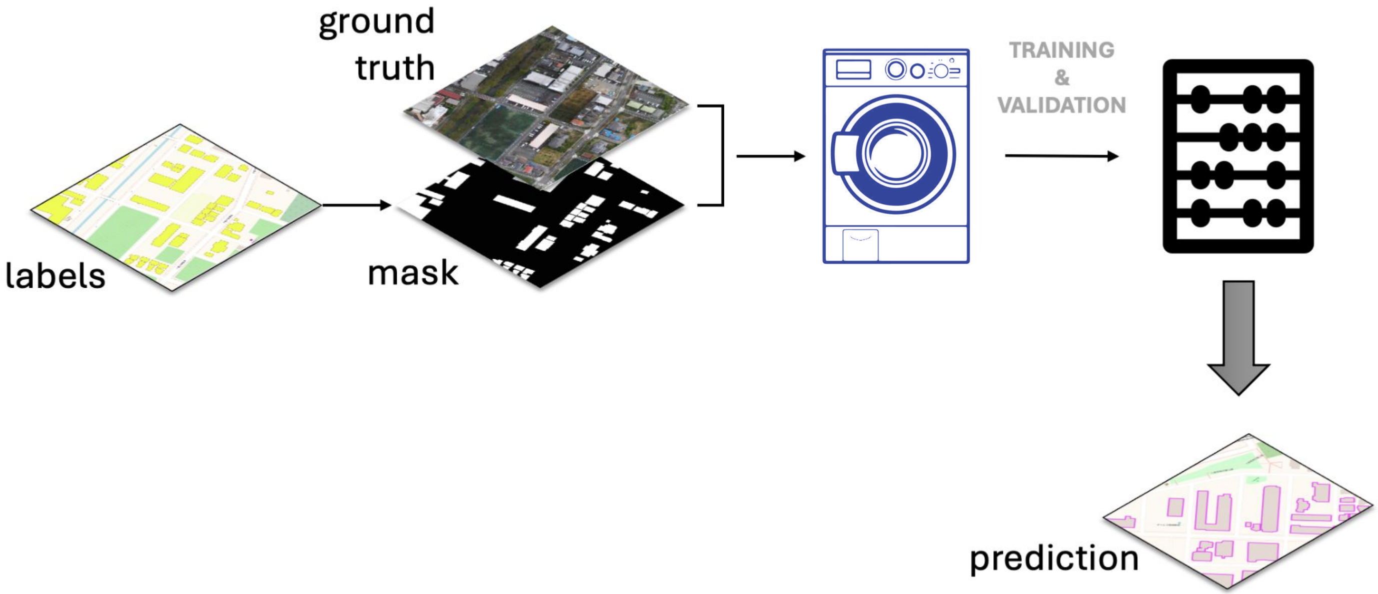
Anna Zanchetta, Marta Magnani, Benjamin Herfort

SoTM EU 2025 - Dundee, November 13

fair.hotosm.org

https://www.hotosm.org/tech-suite/fair/


ground
truth
mask
labels
TRAINING
&
VALIDATION
prediction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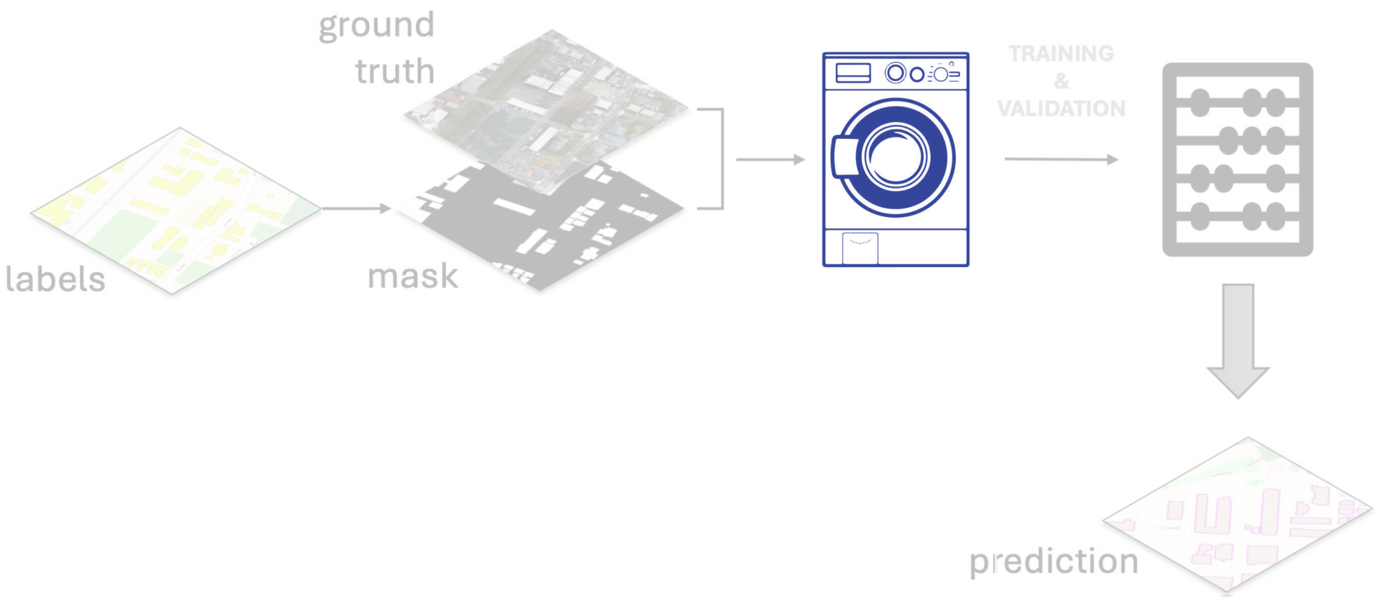
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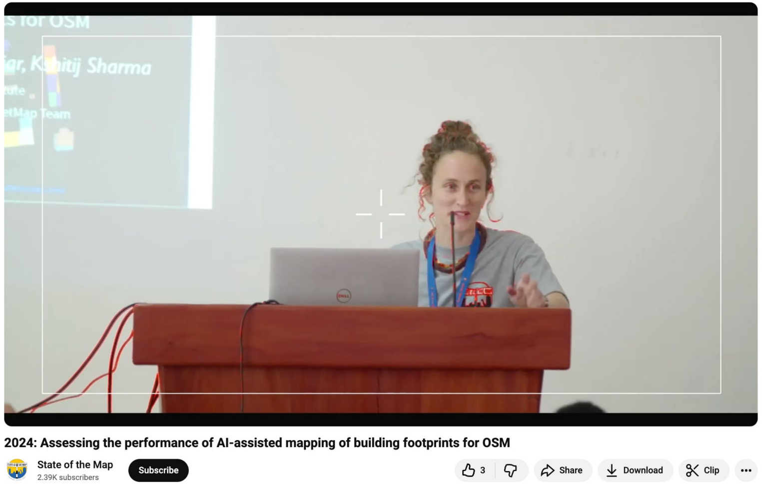
2024: Assessing the performance of AI-assisted mapping of building footprints for OSM
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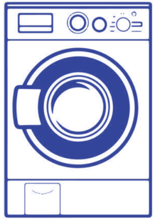
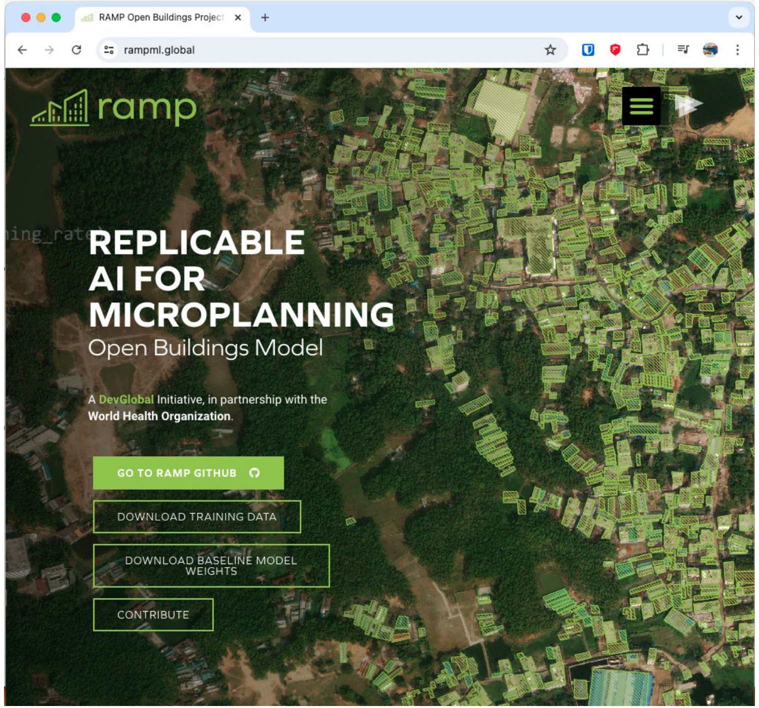
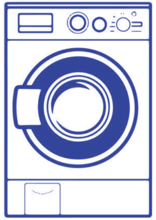


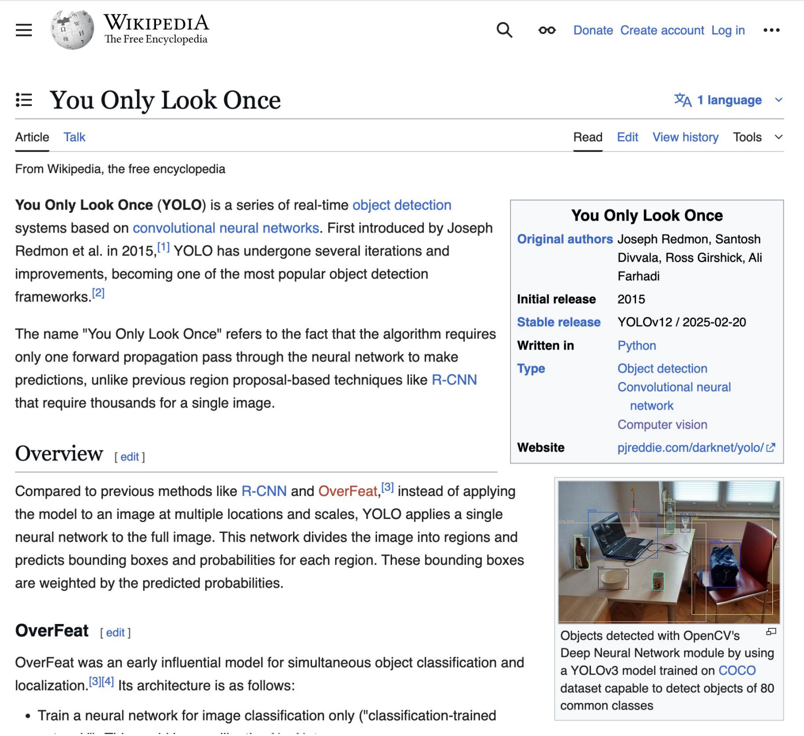

STATE OF THE MAP 2025
October 3-5, 2025 | Manila, Philippines
2025.stateofthemap.org
Research topic
– Masaryk University
– Missing Maps Czechia and Slovakia
– Humanitarian mapping in Brno
Missing Maps
– Contact with fAIr developers from HOT:
– Omran Najjar, Kshitij Sharma, Anna Zanchetta
– User study of fAIr
– Research goal:
– Compare AI-assisted mapping of buildings with the fAIr tool and manual mapping of buildings without AI assistance
– JOSM editor with plugins for mapping of buildings
– October – December 2024
STATE OF THE MAP 2025
4
#OpenStreetMap
#StateoftheMap2025

RAMP vs YOLO



RAMP Open Buildings Project
rampml.global
ramp
REPLICABLE AI FOR MICROPLANNING
Open Buildings Model
A DevGlobal Initiative, in partnership with the World Health Organization.
GO TO RAMP GITHUB
DOWNLOAD TRAINING DATA
DOWNLOAD BASELINE MODEL WEIGHTS
CONTRIBUTE





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You Only Look Once
1 language
Article Talk
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From Wikipedia, the free encyclopedia
You Only Look Once (YOLO) is a series of real-time object detection systems based on convolutional neural networks. First introduced by Joseph Redmon et al. in 2015,[1] YOLO has undergone several iterations and improvements, becoming one of the most popular object detection frameworks.[2]
The name "You Only Look Once" refers to the fact that the algorithm requires only one forward propagation pass through the neural network to make predictions, unlike previous region proposal-based techniques like R-CNN that require thousands for a single image.
Overview [edit]
Compared to previous methods like R-CNN and OverFeat,[3] instead of applying the model to an image at multiple locations and scales, YOLO applies a single neural network to the full image. This network divides the image into regions and predicts bounding boxes and probabilities for each region. These bounding boxes are weighted by the predicted probabilities.
OverFeat [edit]
OverFeat was an early influential model for simultaneous object classification and localization.[3][4] Its architecture is as follows:
• Train a neural network for image classification only ("classification-trained
You Only Look Once
Original authors Joseph Redmon, Santosh Divvala, Ross Girshick, Ali Farhadi
Initial release 2015
Stable release YOLOv12 / 2025-02-20
Written in Python
Type Object detection Convolutional neural network Computer vision
Website pjreddie.com/darknet/yolo/
Objects detected with OpenCV's Deep Neural Network module by using a YOLOv3 model trained on COCO dataset capable to detect objects of 80 common classes

Dataset

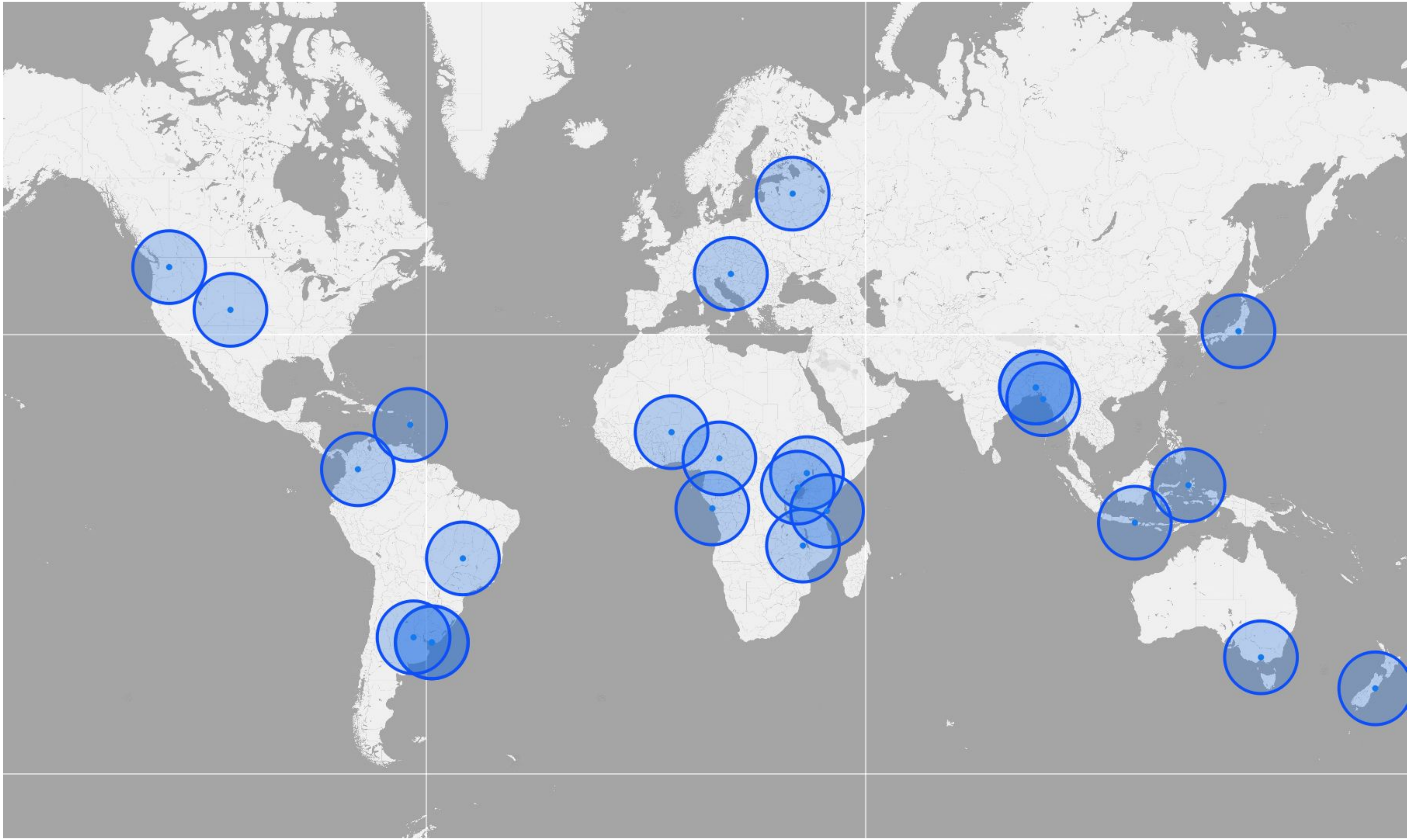
25

21

3

8400

256
x
256



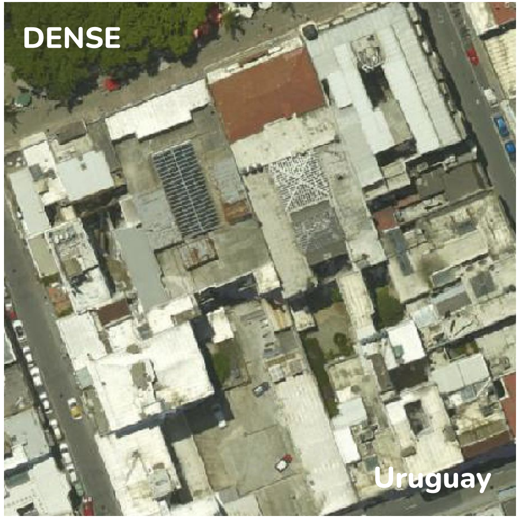
Urbanity


RURAL
Indonesia
PERI-URBAN
Uganda
URBAN
Colombia
REFUGEE CAMP
Kenya

Roof cover

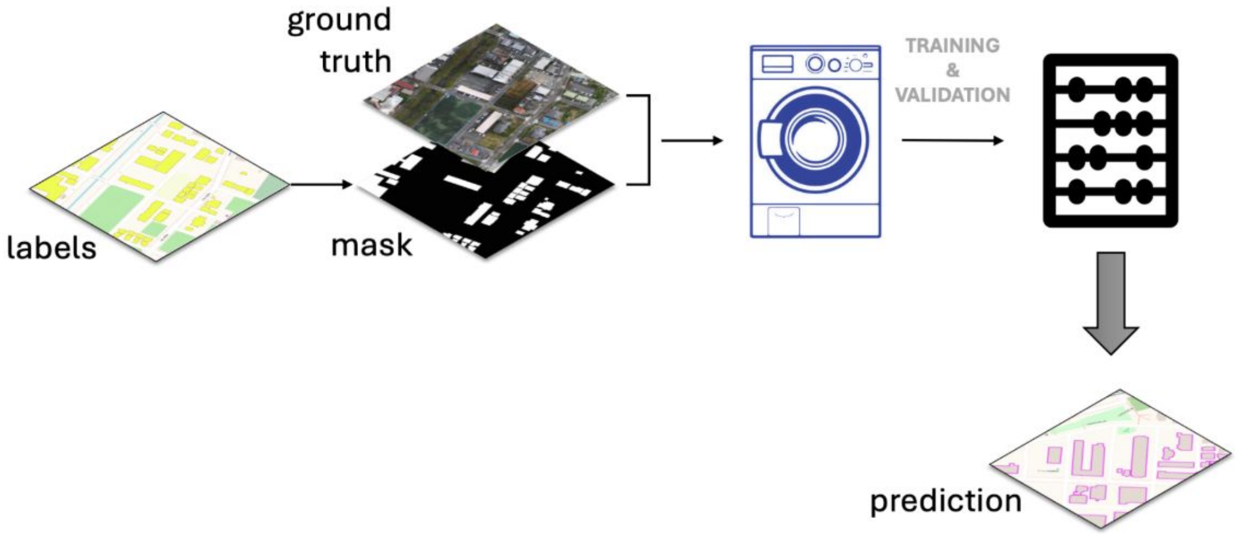

SHINGLES
Brazil
METAL (TIN)
Cameroon
CEMENT
Australia
MIXED
Bangladesh

Density

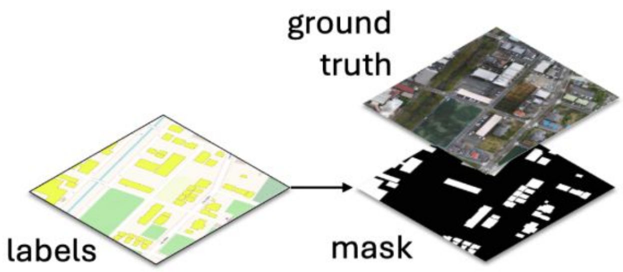


RAMP vs YOLO

RAMP vs YOLO



RAMP vs YOLO



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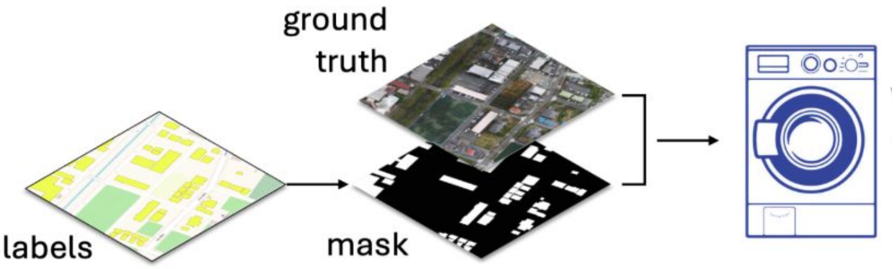
RAMP vs YOLO



0

1

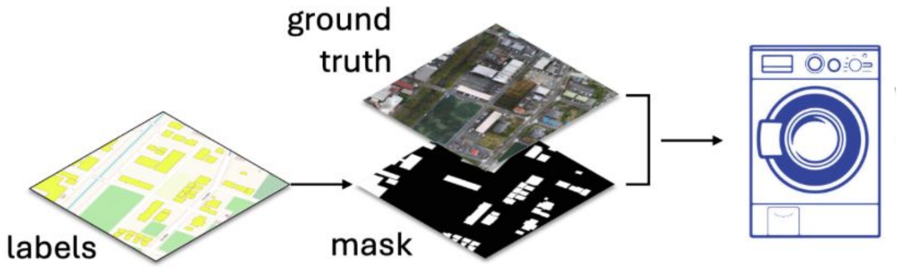
train /val / test

70	15	15

x 5 50 epochs

(K-fold cross validation)

RAMP vs YOLO



0

1

train /val / test

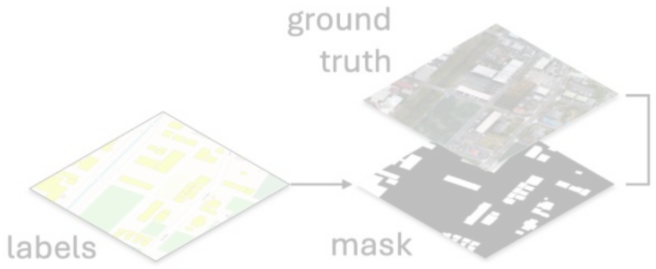
70	15	15

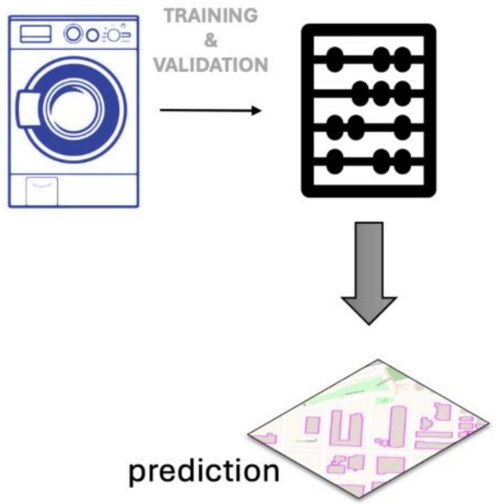
x 5 50 epochs

(K-fold cross validation)

2

RAMP vs YOLO





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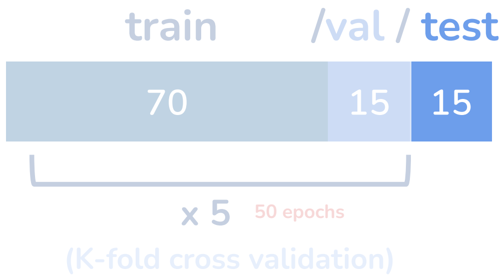
1

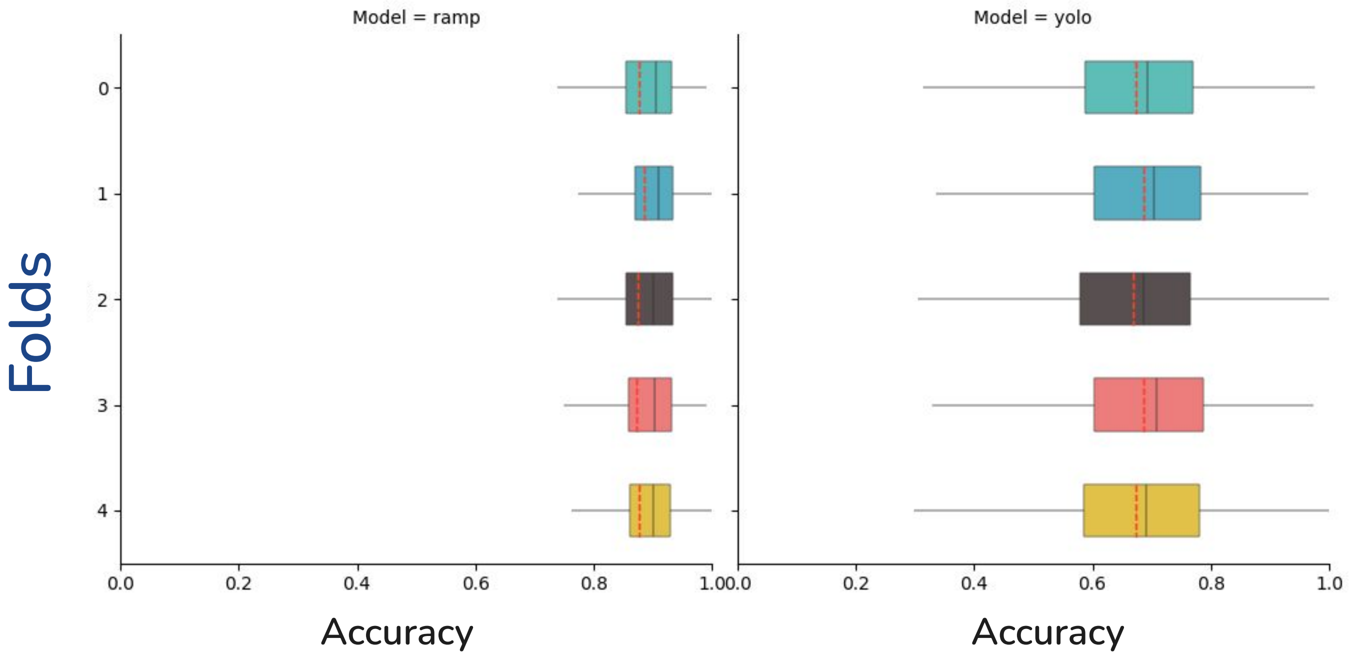


2

3

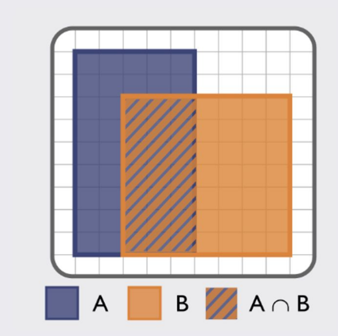
1

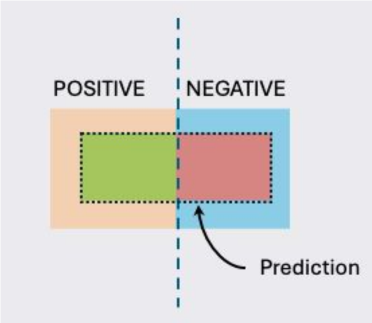
RAMP vs YOLO



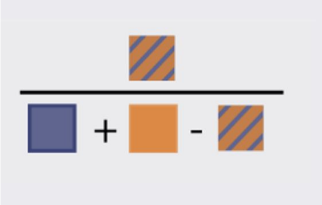
2

RAMP vs YOLO

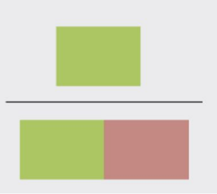




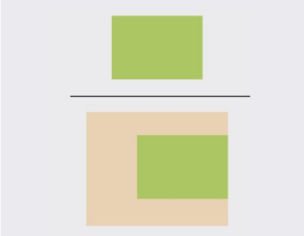
IoU



Precision



Recall



F1 score

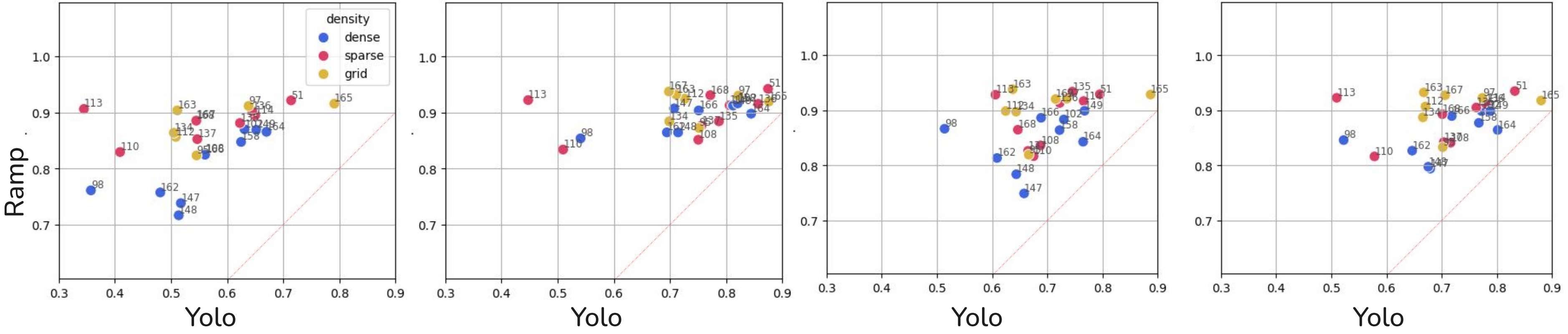
Σ

https://metrics-reloaded.dkfz.de/metric-library

2

RAMP vs YOLO

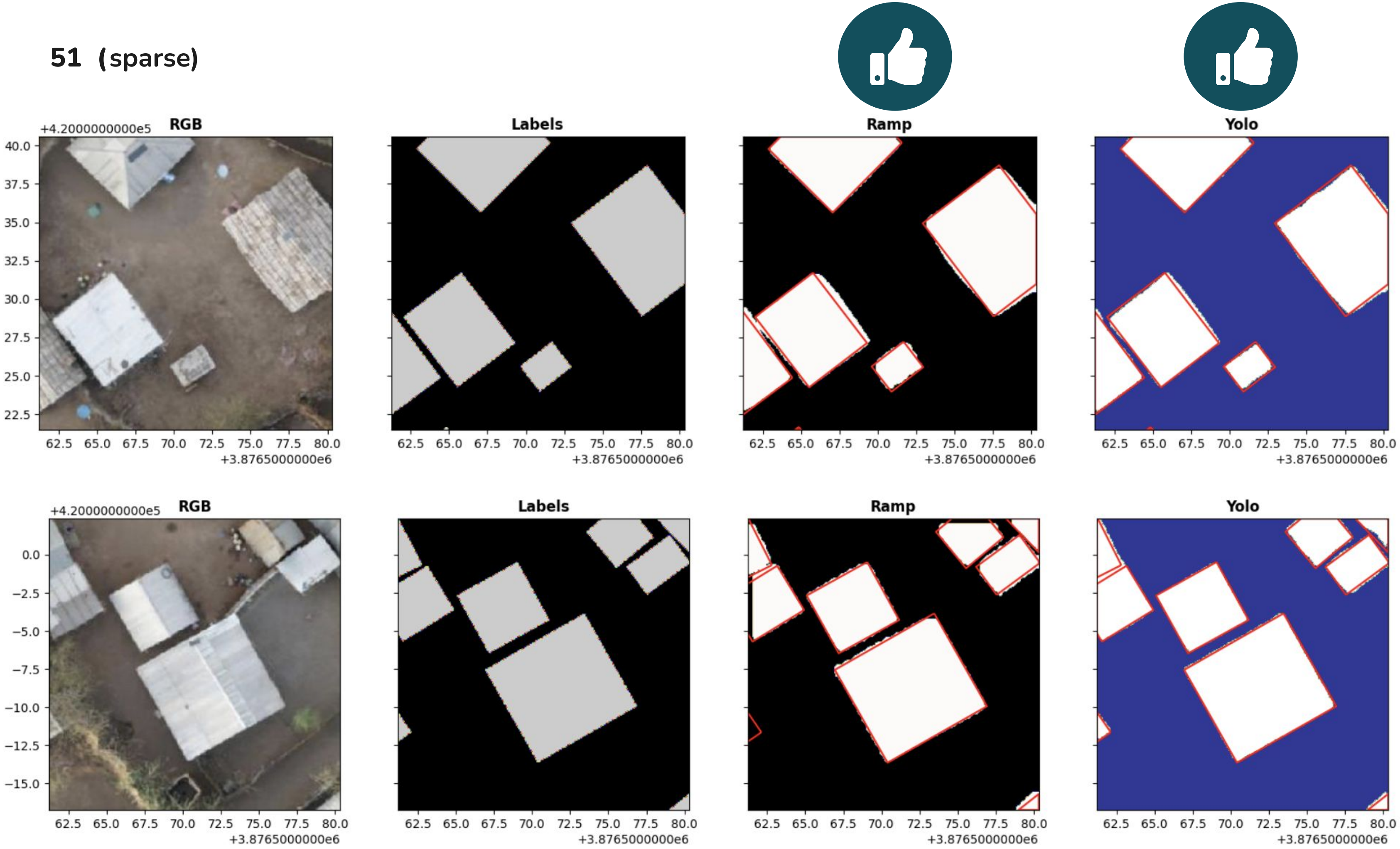
IoU | Precision | Recall | F1 score



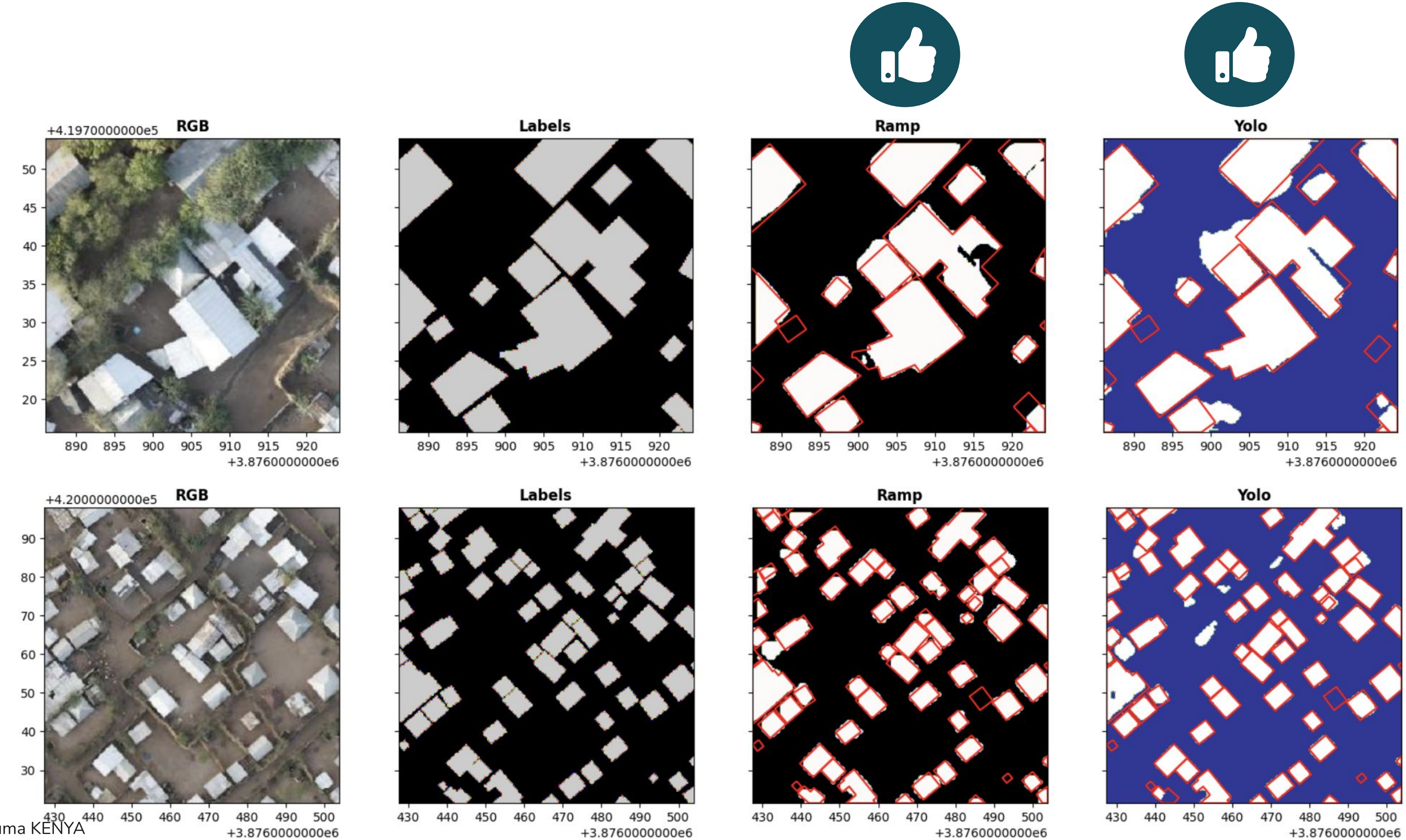
3

RAMP vs YOLO

51 (sparse)

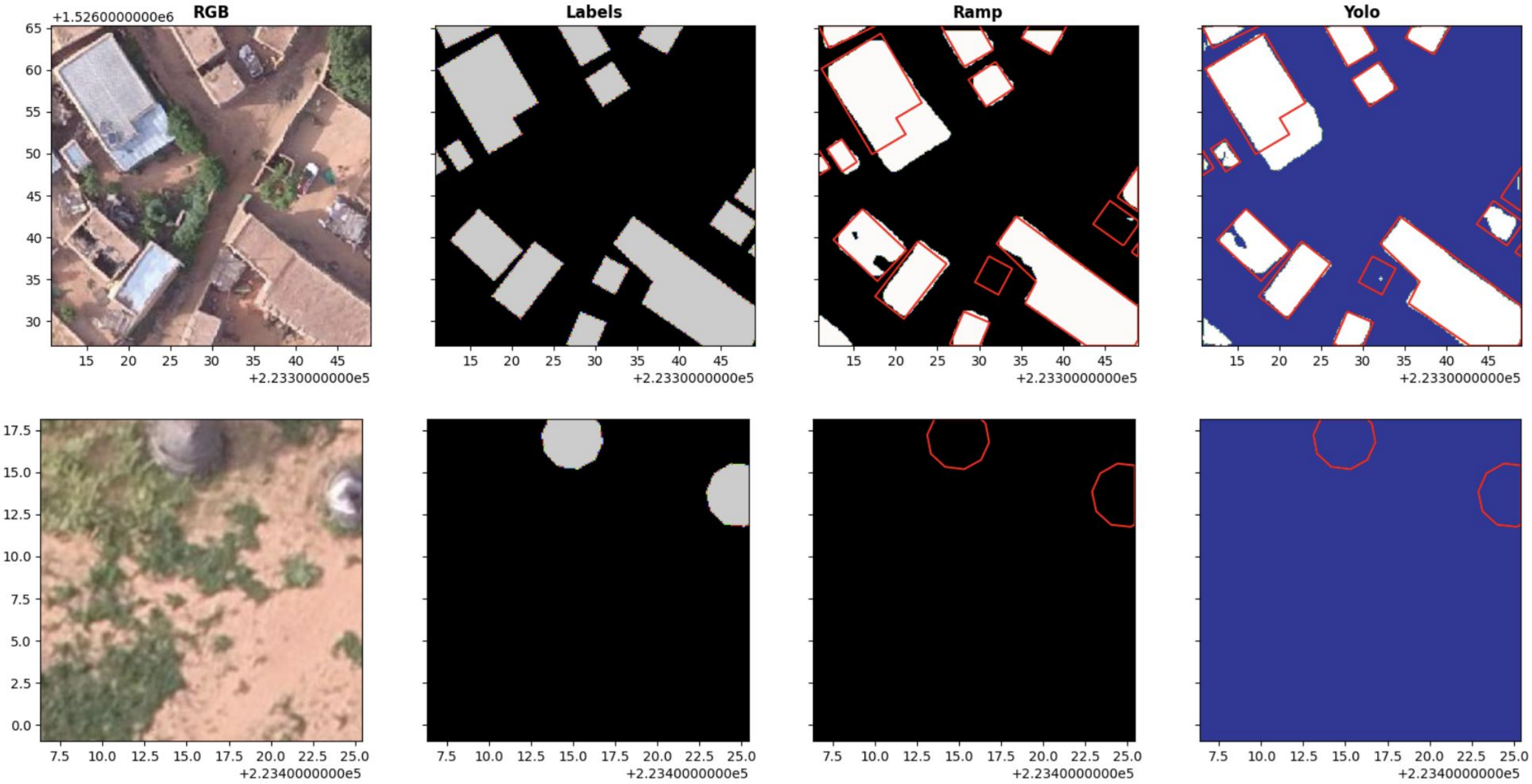


Kakuma KENYA



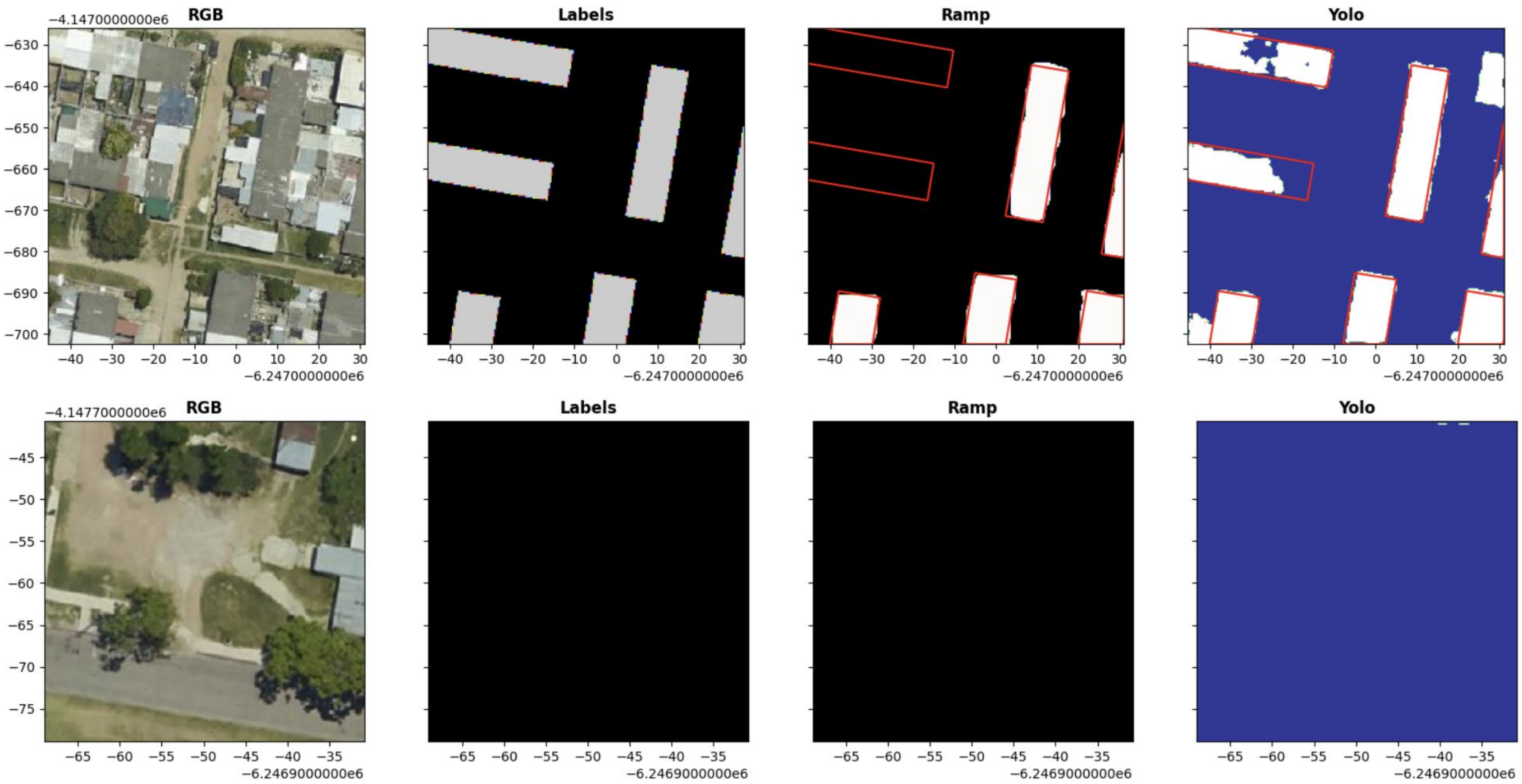
Kakuma KENYA

164 (dense)

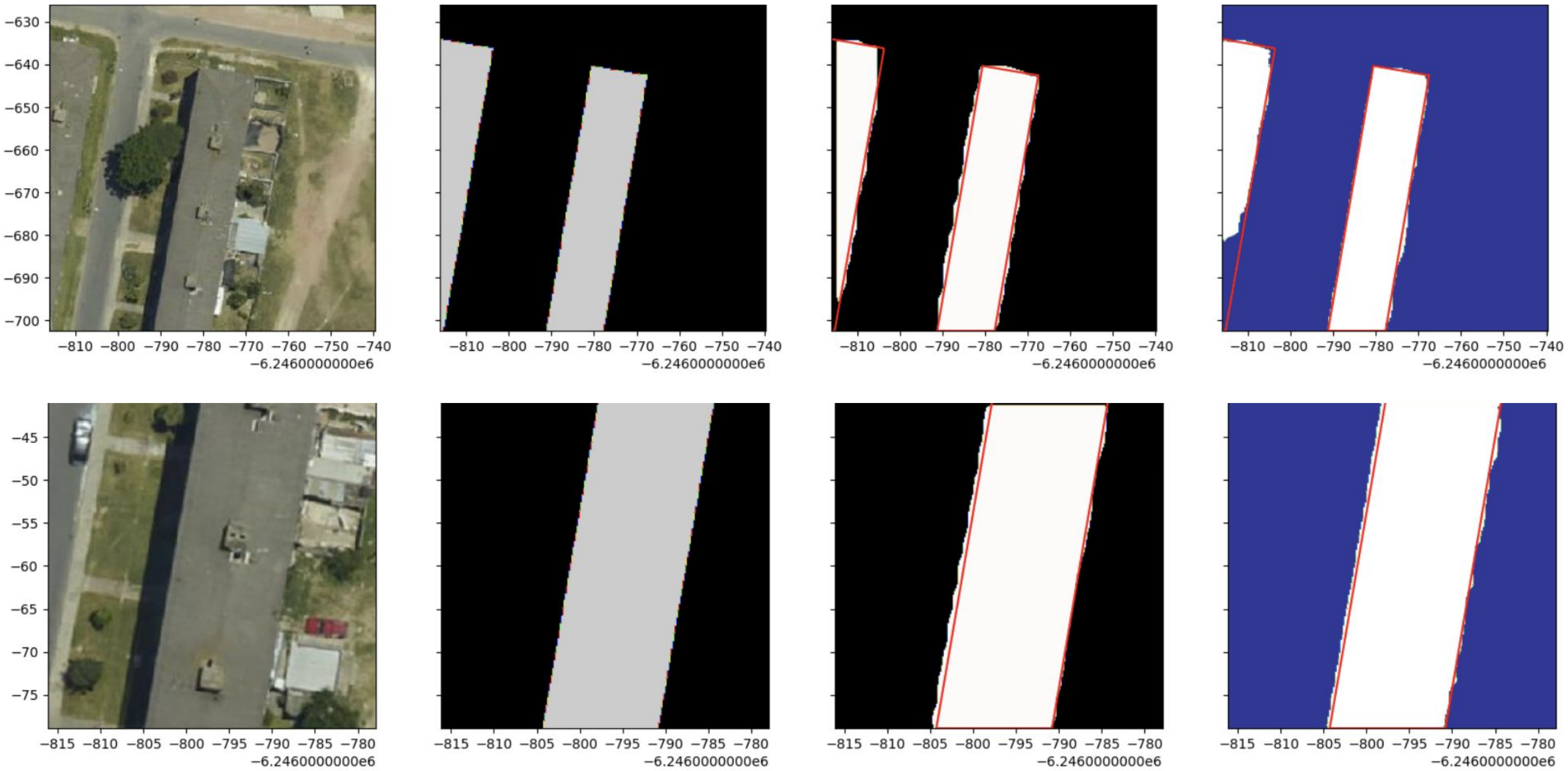


Soudure NIGERIA

97 (grid)

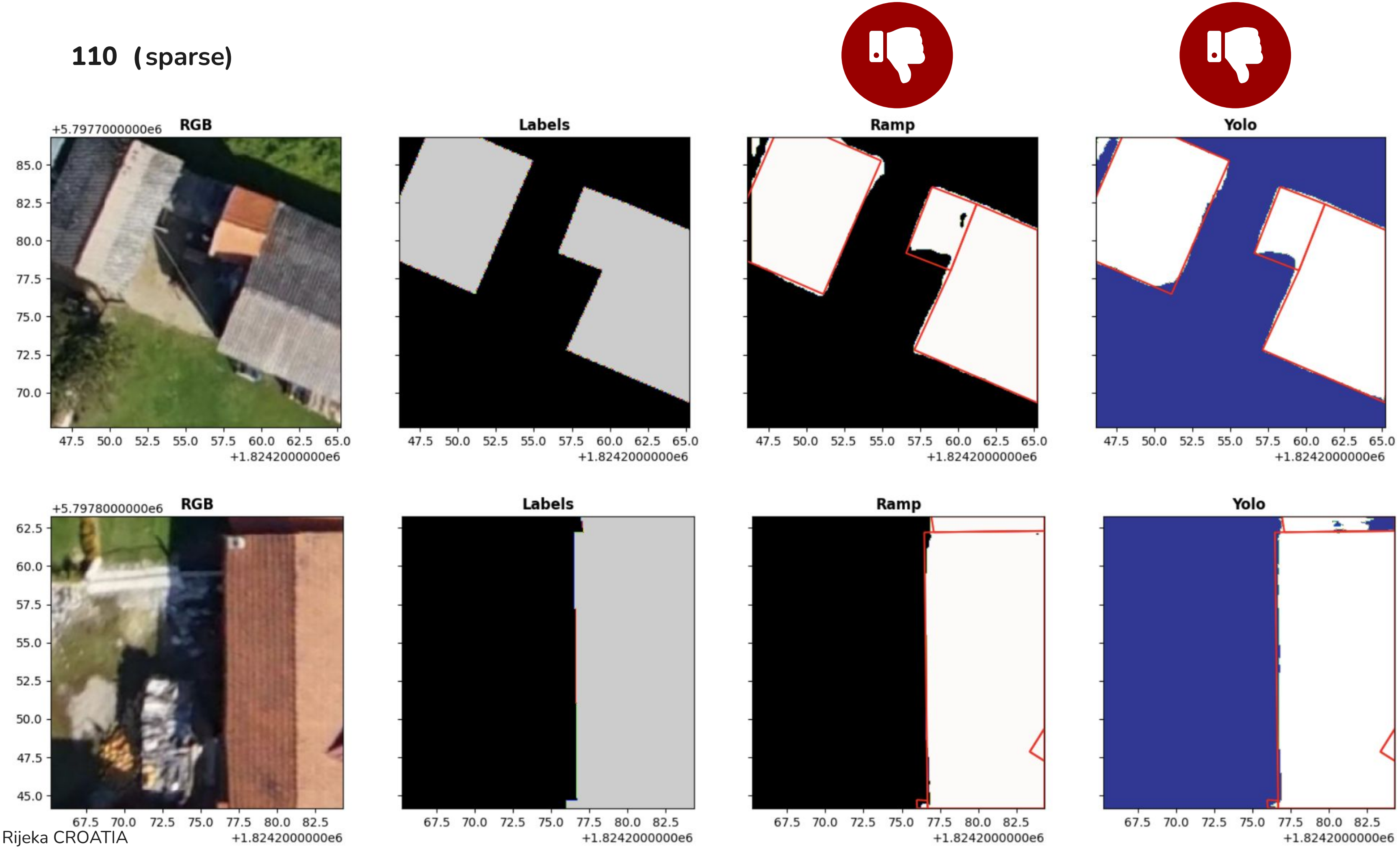


Montevideo URUGUAY

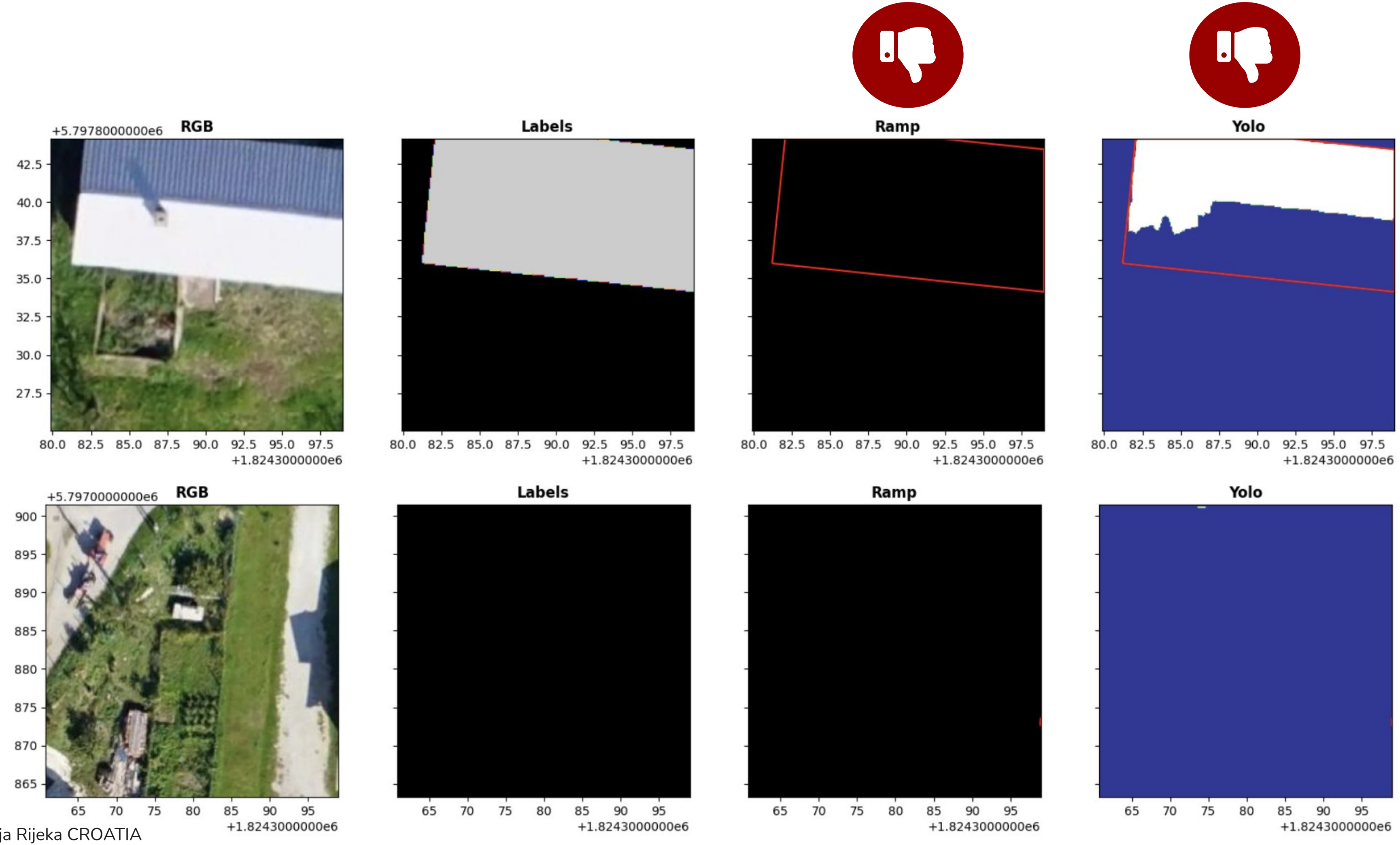


Montevideo URUGUAY

110 (sparse)

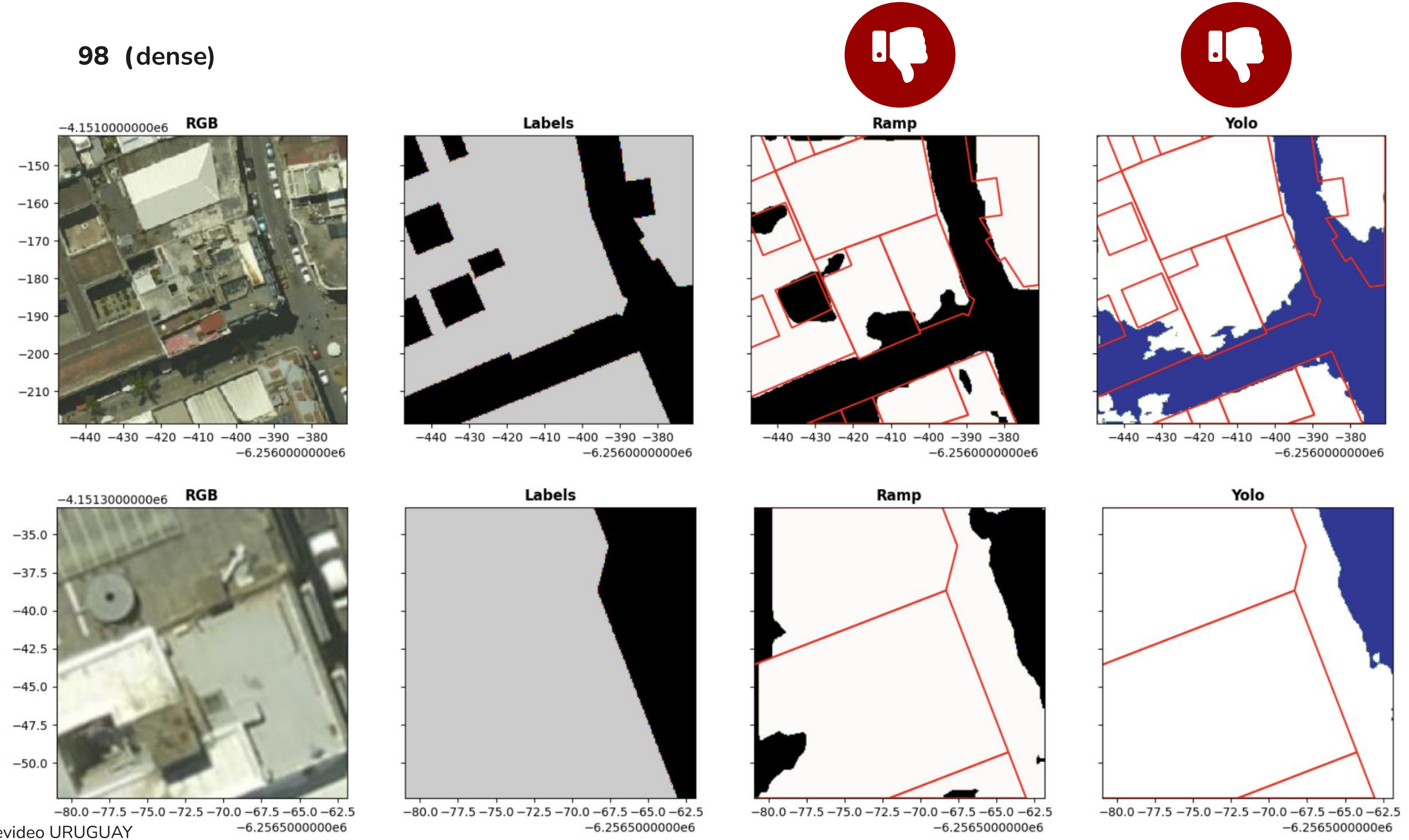


Gornja Rijeka CROATIA



Gornja Rijeka CROATIA

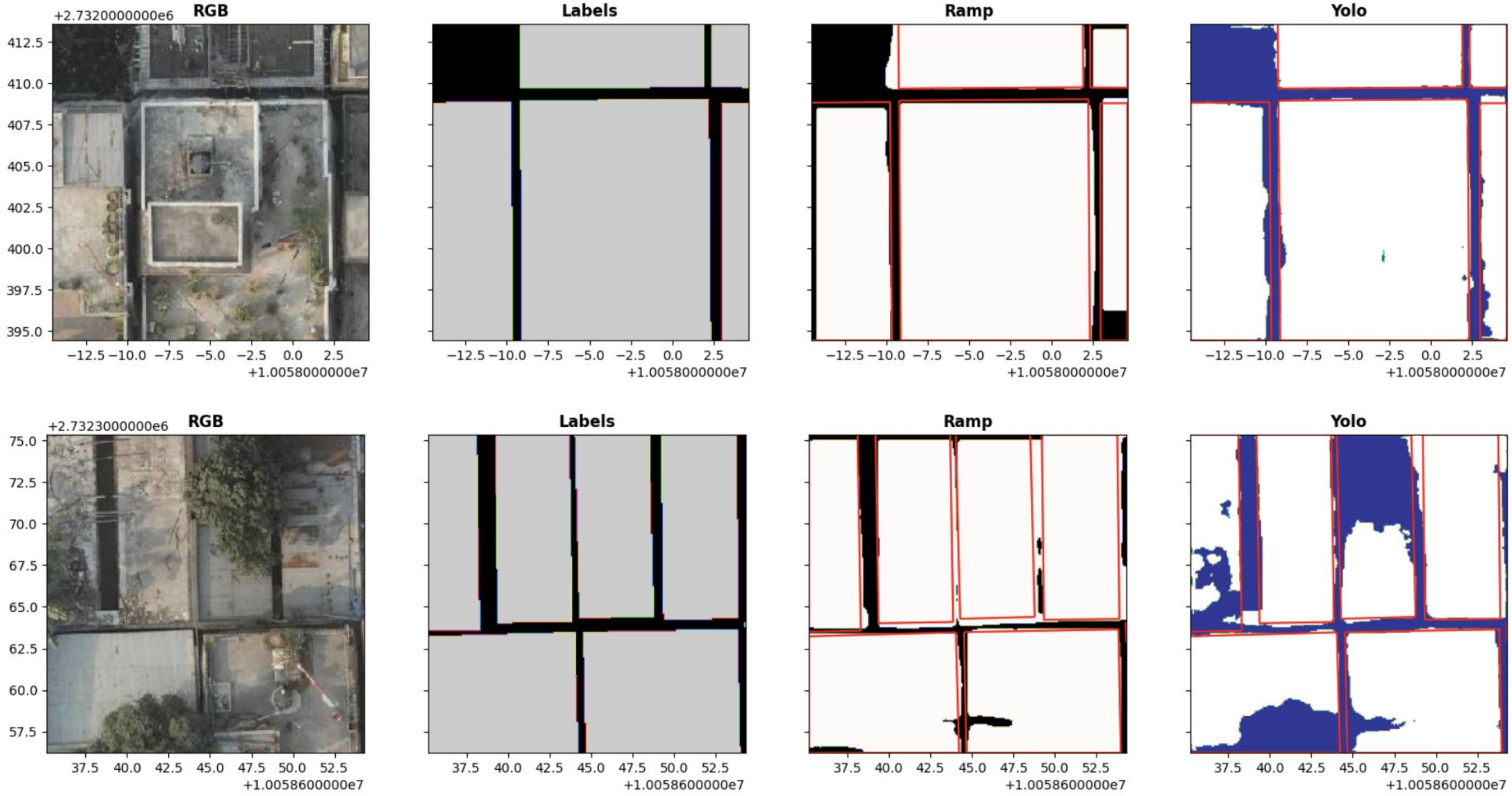
98 (dense)



Montevideo URUGUAY

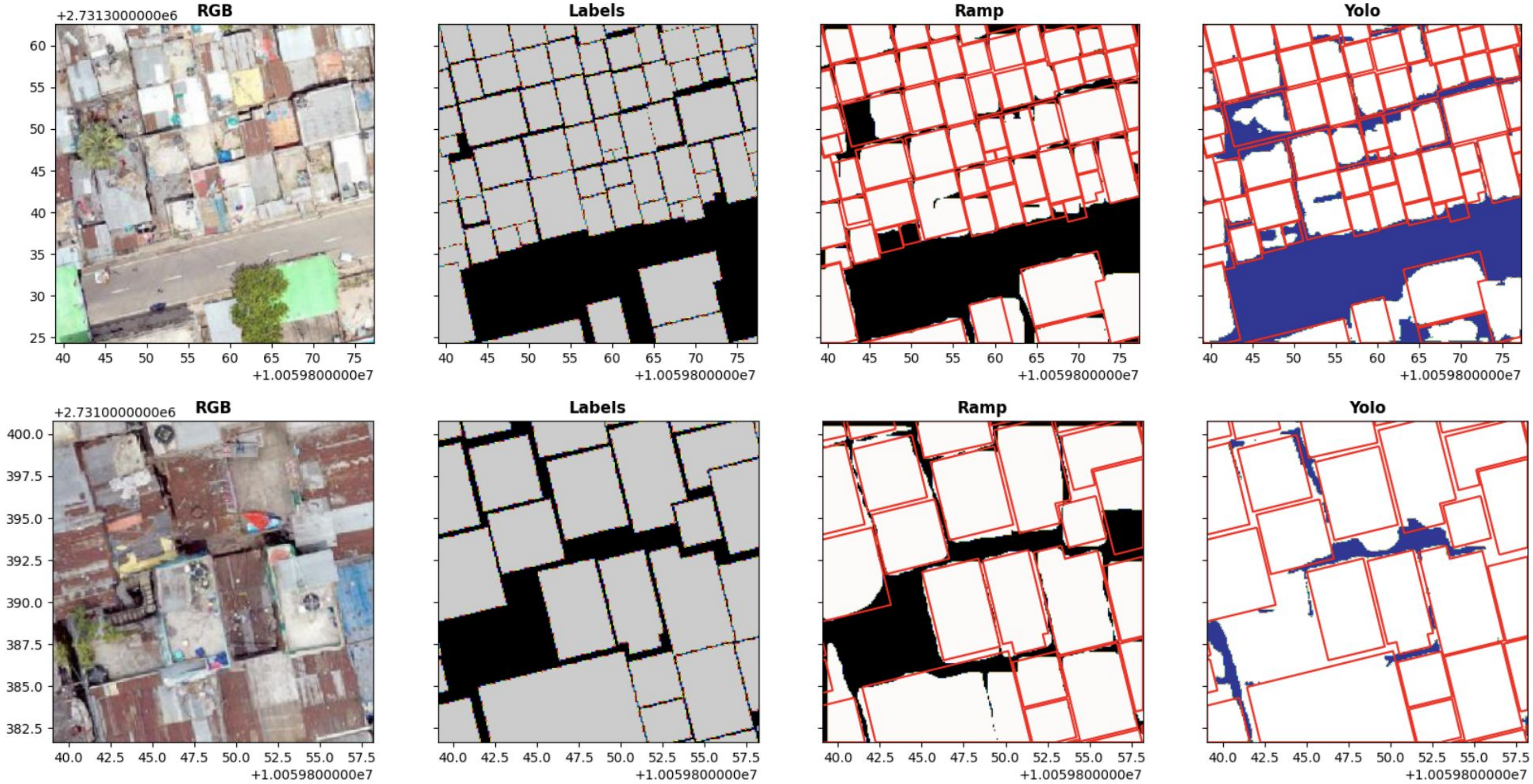
147 (dense)

IoU, recall



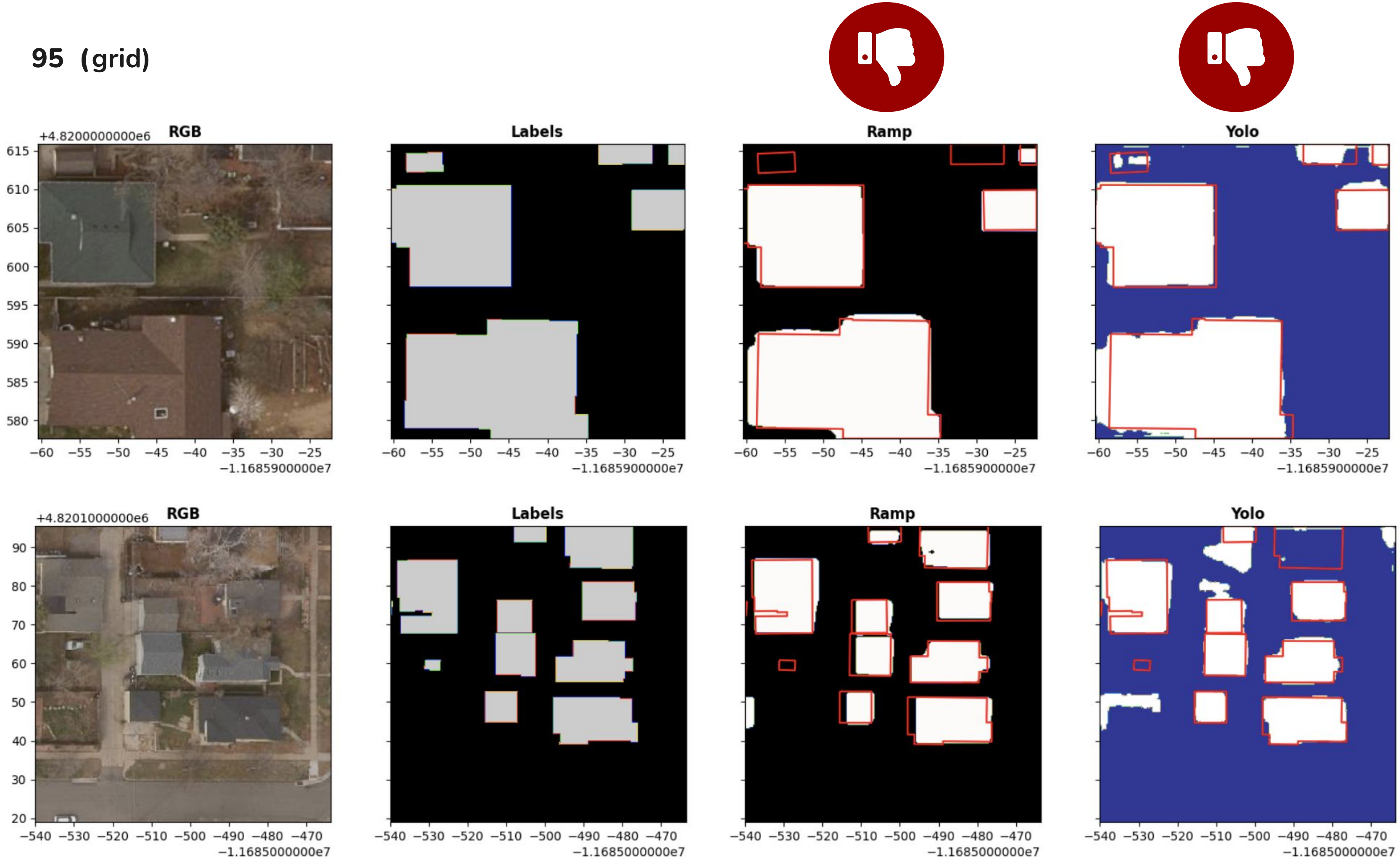
Dhaka BANGLADESH

IoU, recall



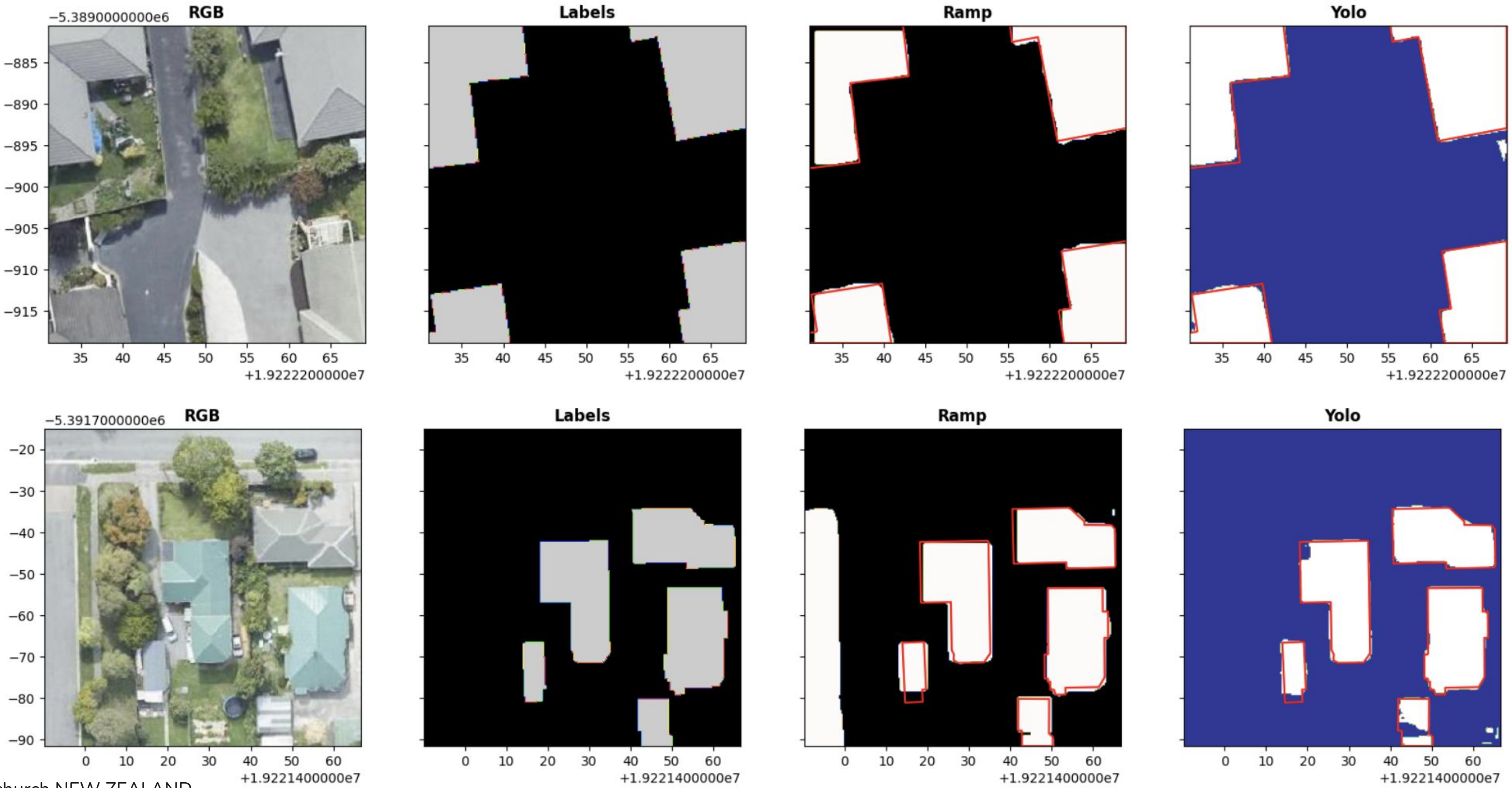
Dhaka BANGLADESH

95 (grid)



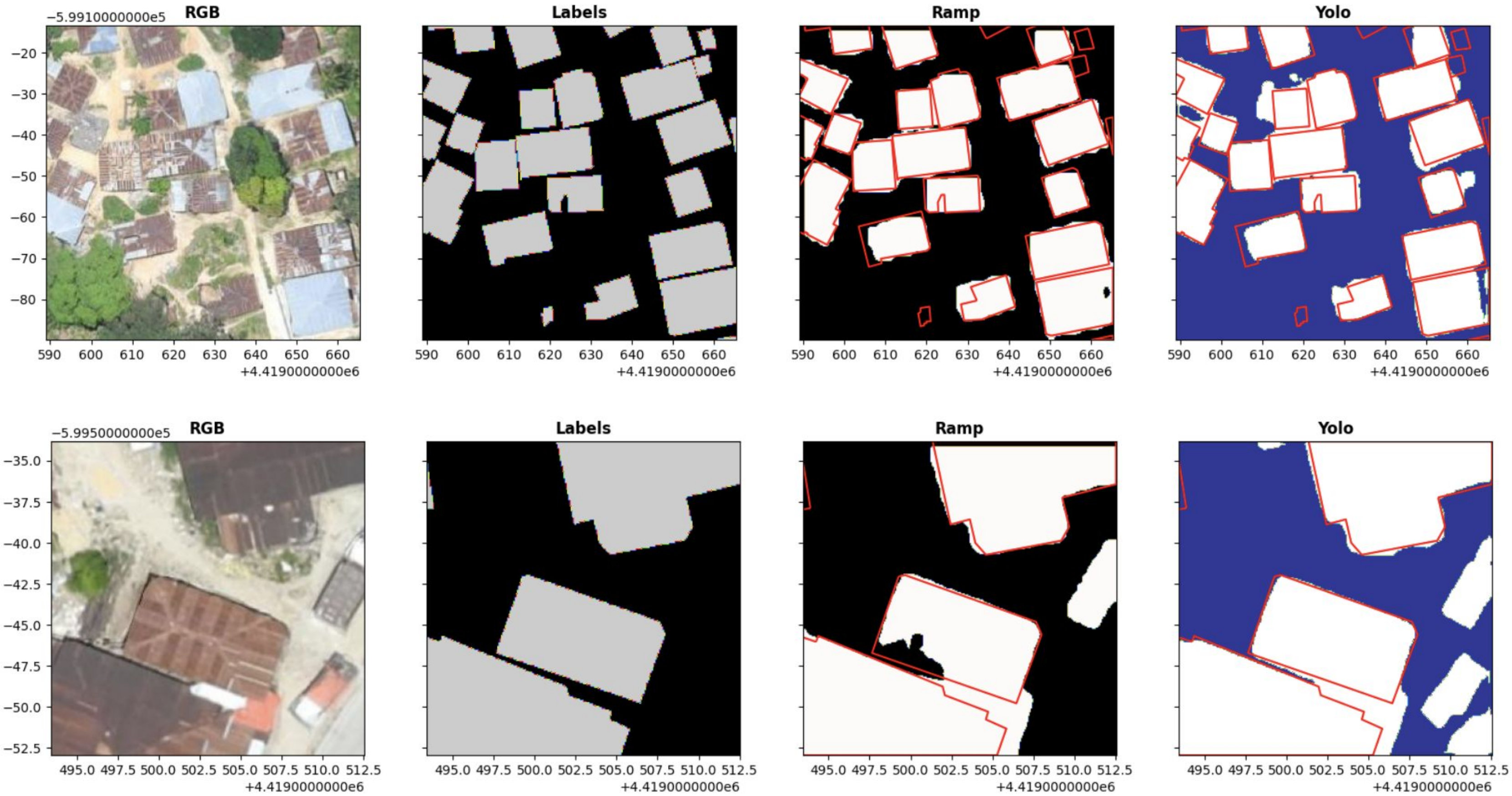
Denver USA

114 (sparse)

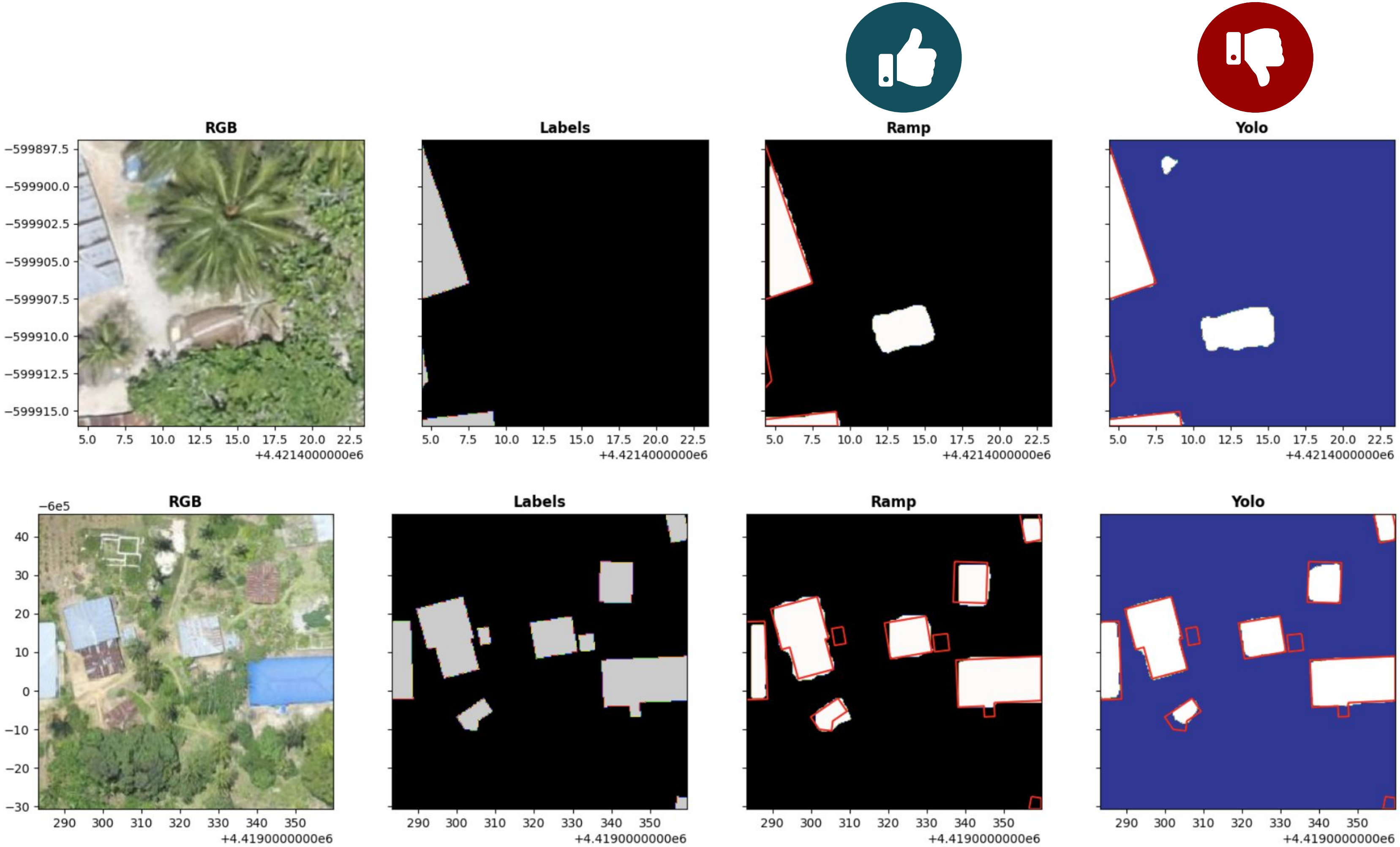


Christchurch NEW ZEALAND

113 (sparse)

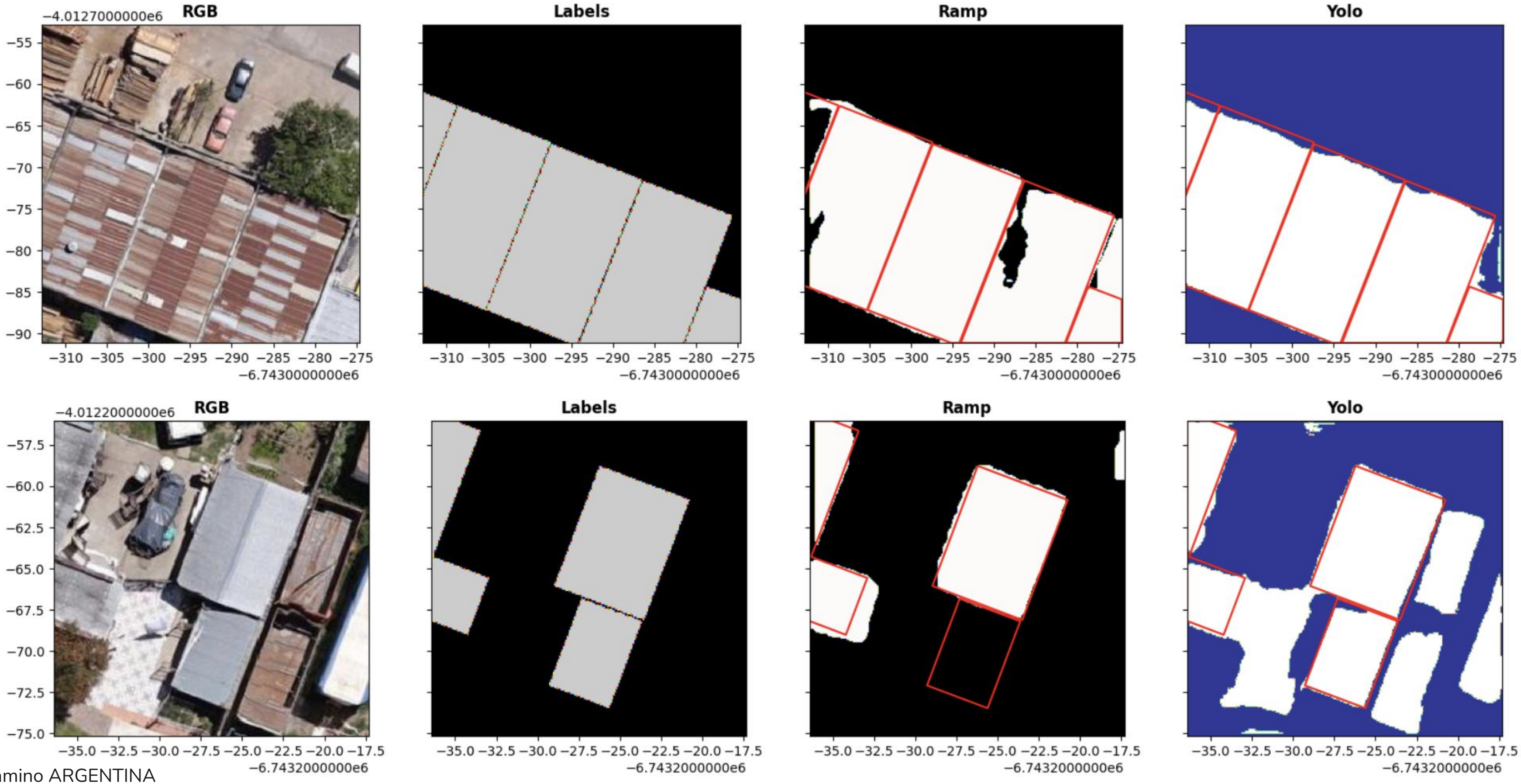


Pemba TANZANIA

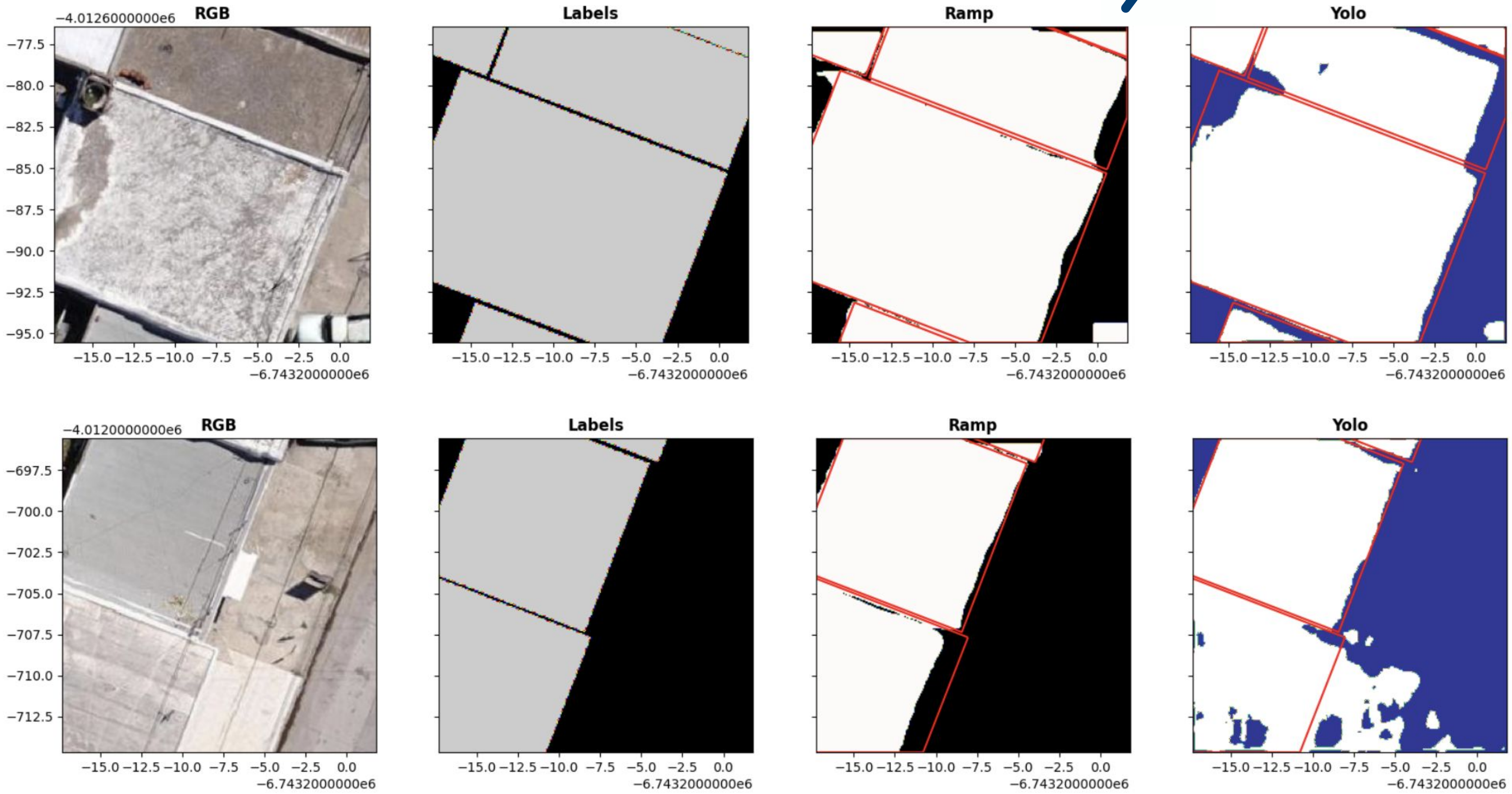


Pemba TANZANIA

134 (grid)

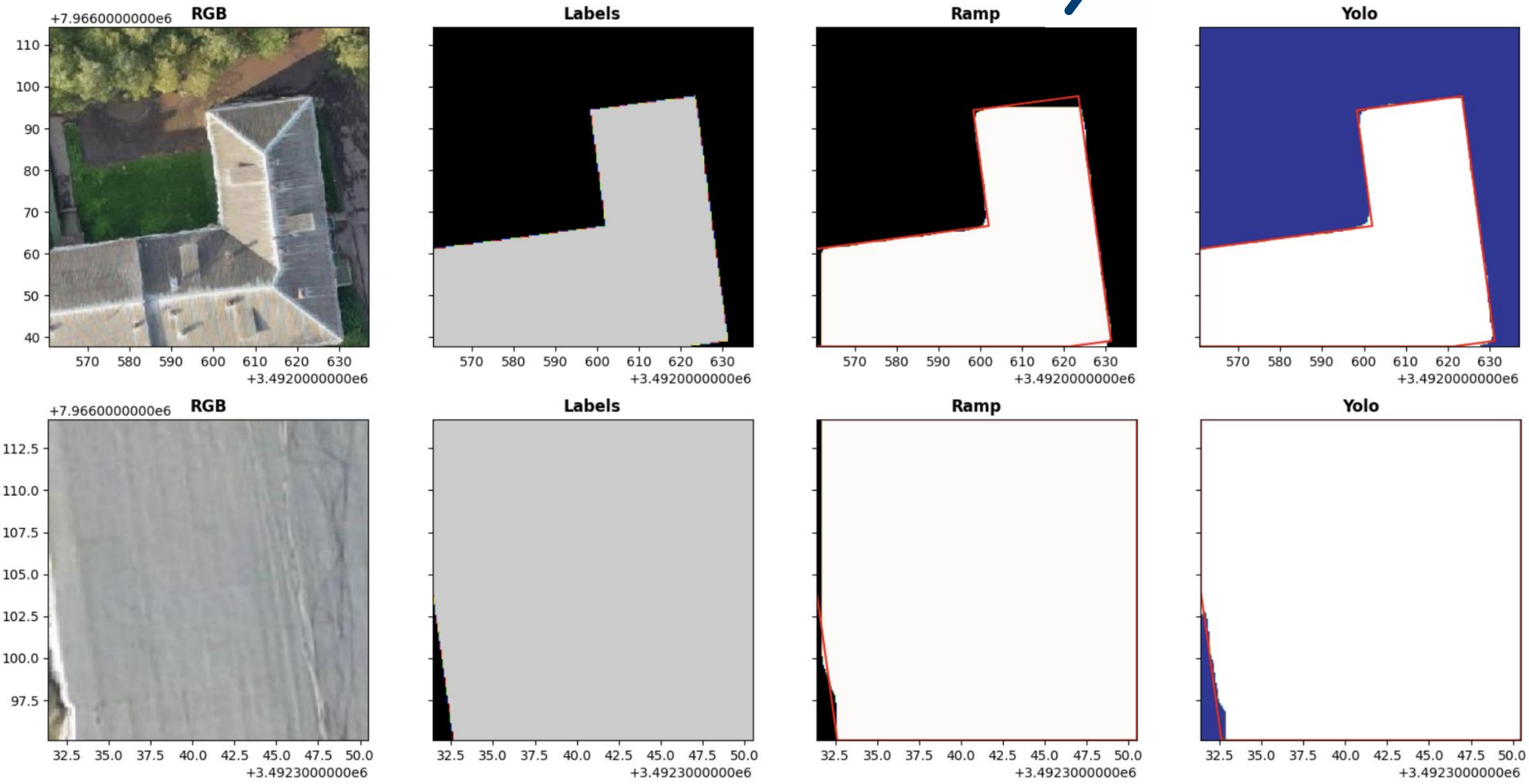


Pergamino ARGENTINA

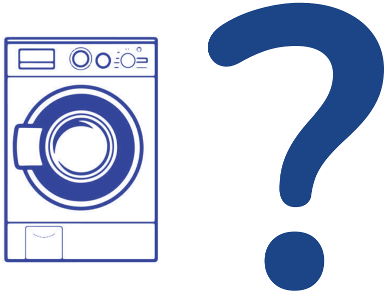


Pergamino ARGENTINA

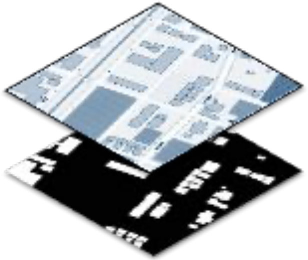
168 (sparse)

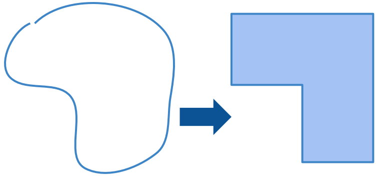


Staraya Russa RUSSIA




WINNER

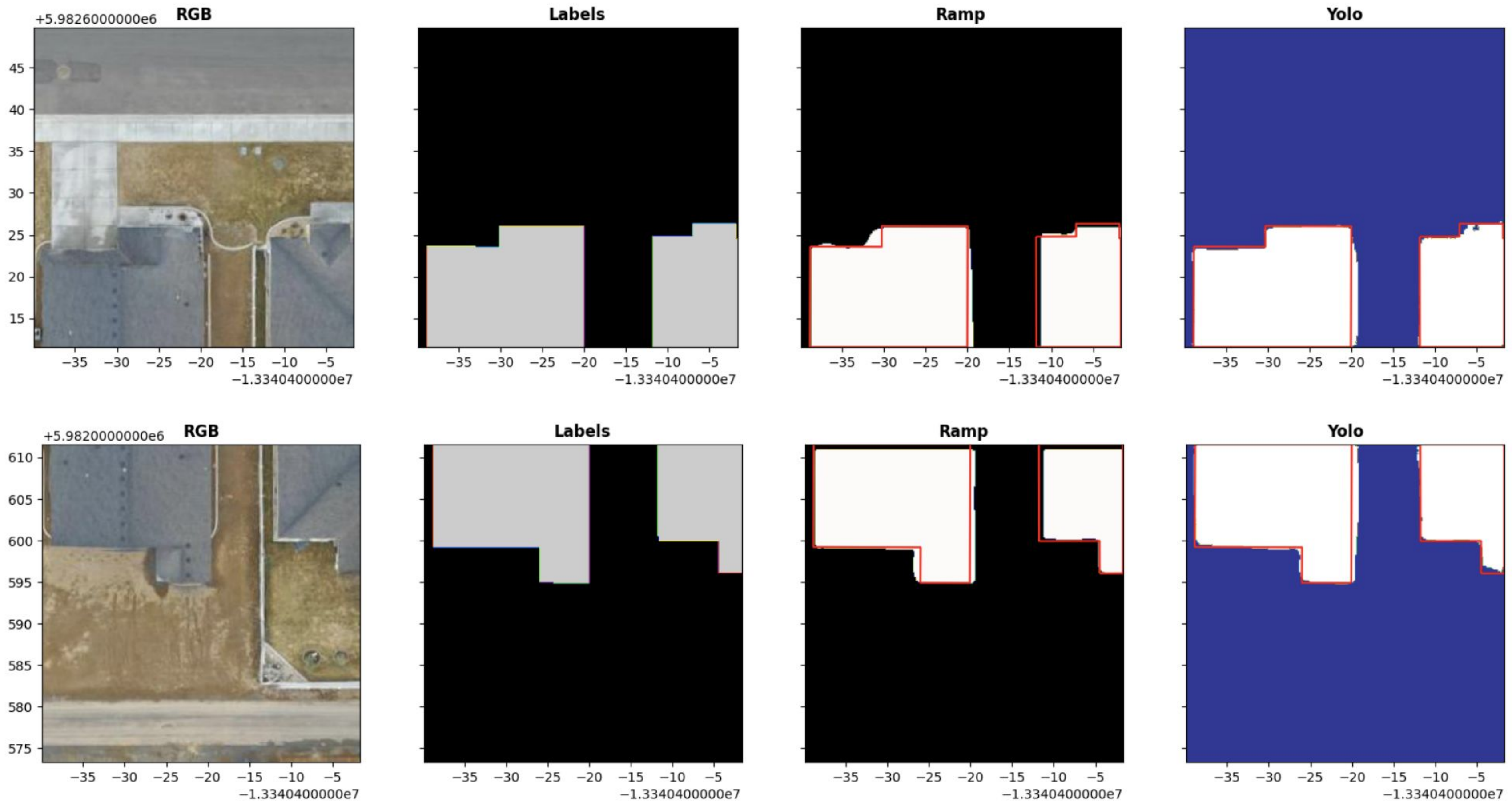





WINNER

		
	YOLO	RAMP
	YOLO	RAMP
	RAMP	YOLO

Would you use these to map in OSM? And for disaster mapping?



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