Time-dependent Hillshades

Dispelling the Shadow Curse of ML Applications in EO

EGU22 - ITS2.6/AS5.1 - ML for Earth System modelling - May 23

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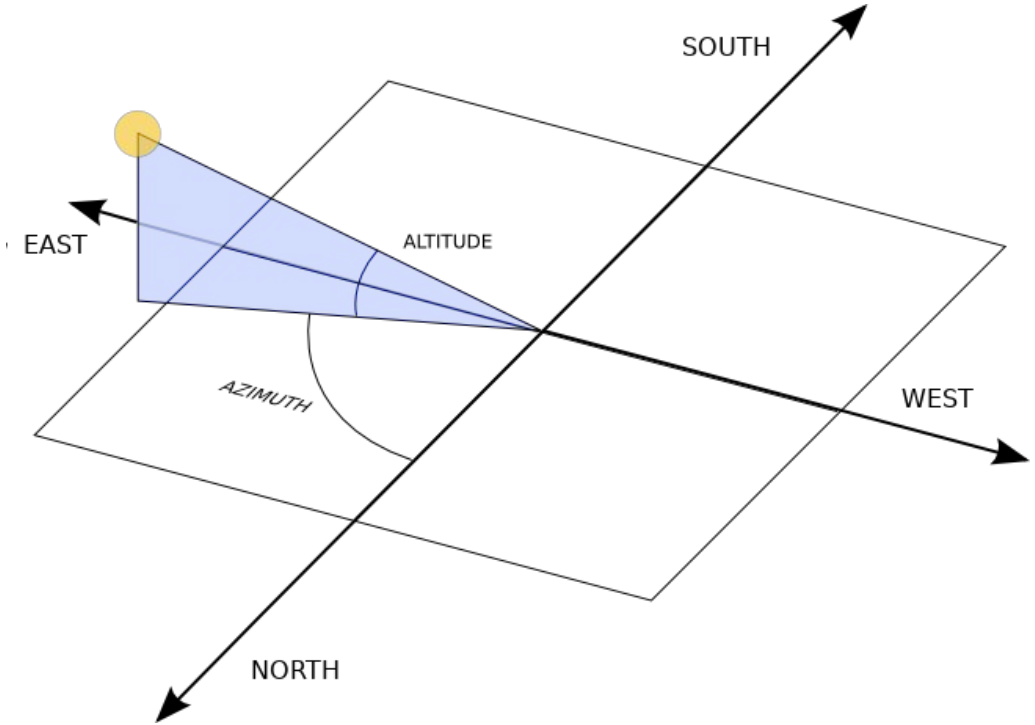
Kevin Dobbs (FDL)
Giovanni Marchisio (Planet)

OTTER WORKS

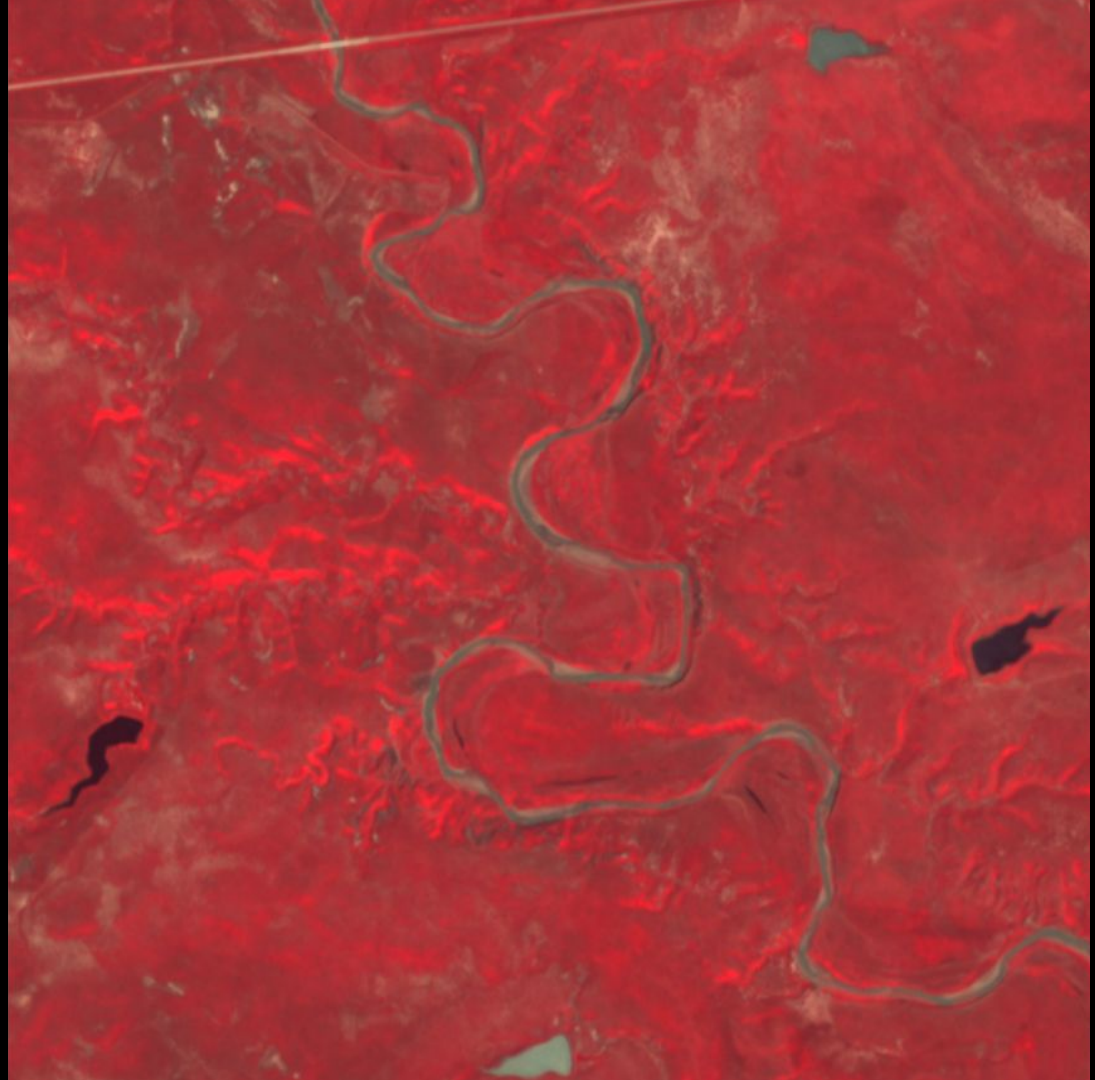
TRILLIUM USA

USGS science for a changing world

Compute hillshade with the sun altitude and azimuth angles.

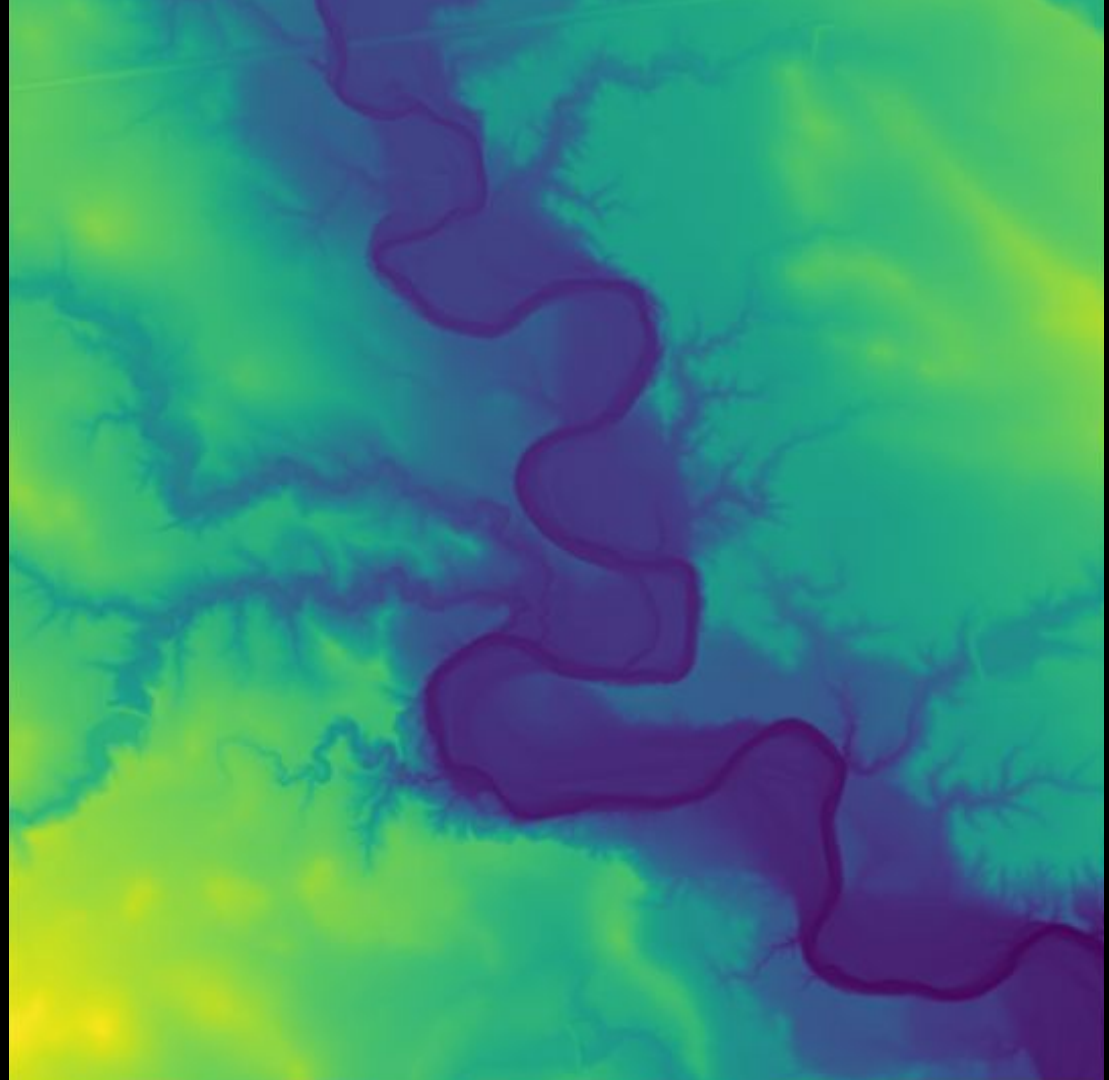


satellite



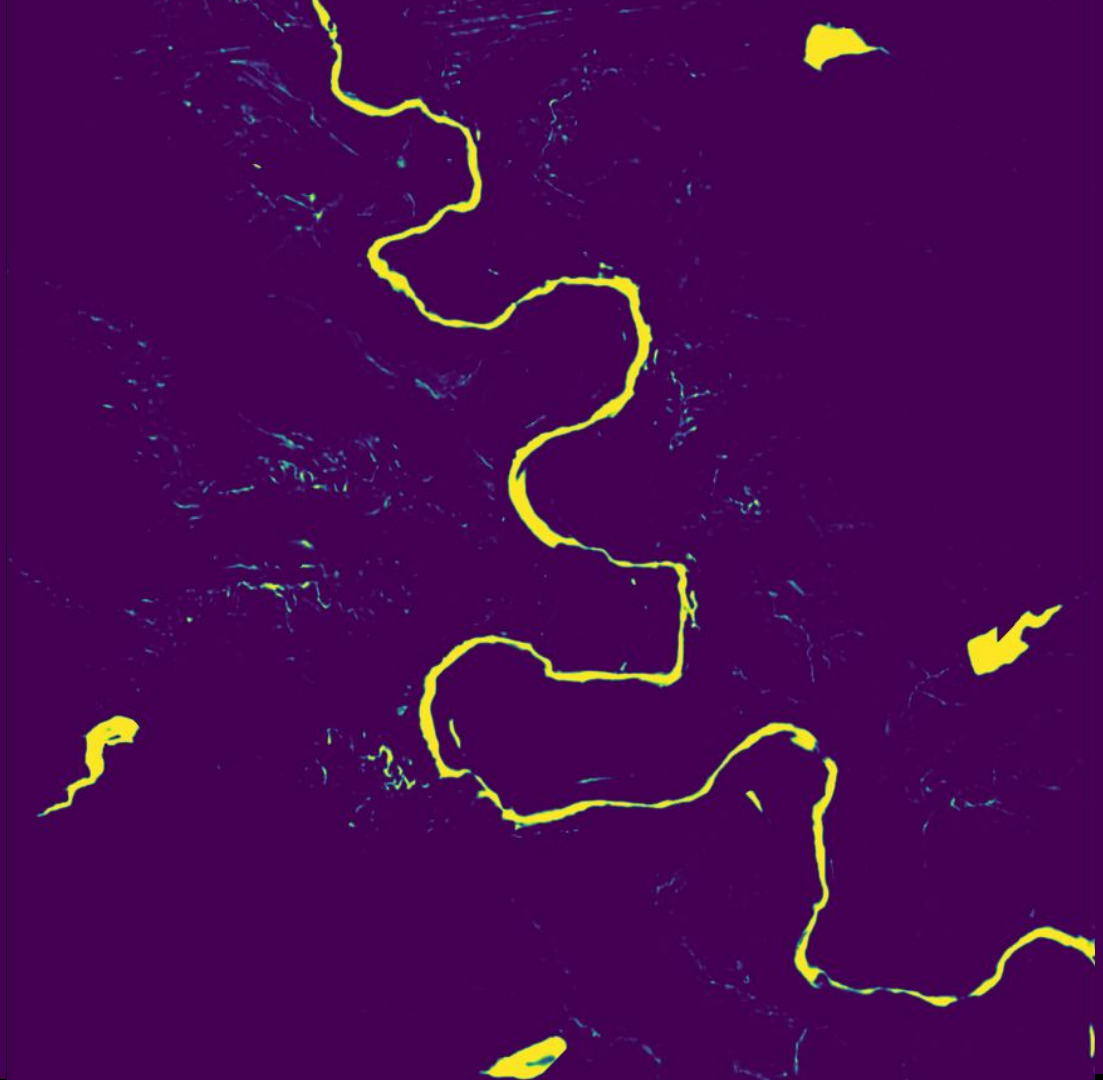
elevation

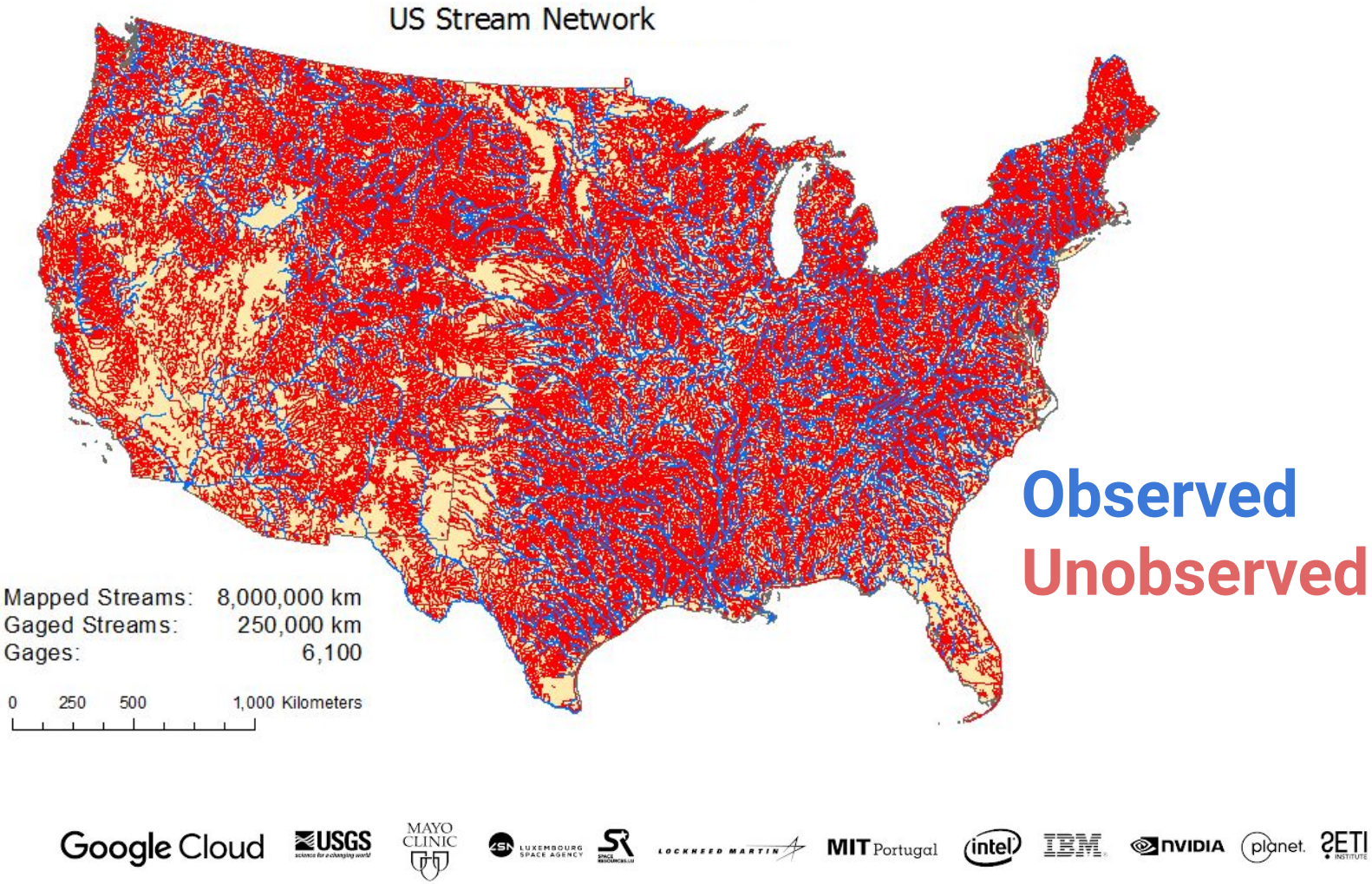
(LiDAR)



400 m
300
200
100

neural net



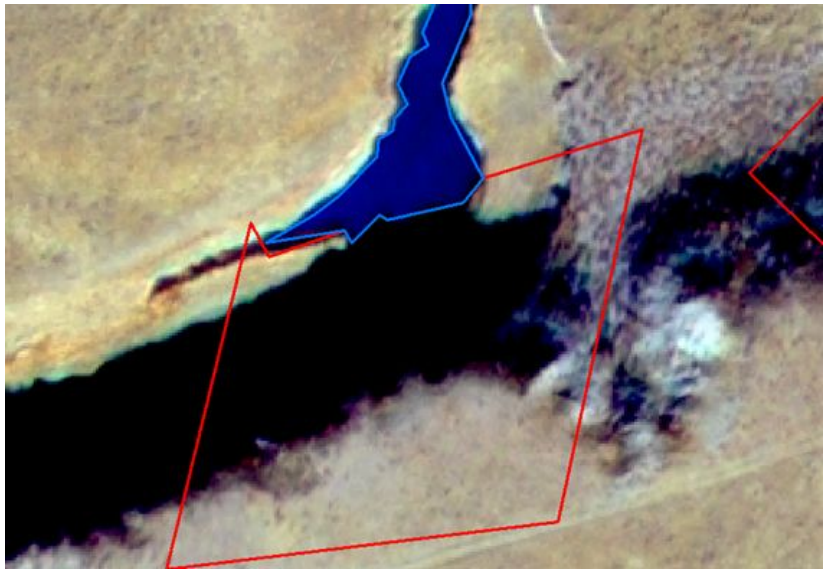


Labeling Errors: Terrain *shadows* mislabeled as water

Maxar WorldView Image

Reference Image (ESRI World Imagery)

Labeling Errors: Shadowed water labeled as “not water”



Maxar WorldView Image

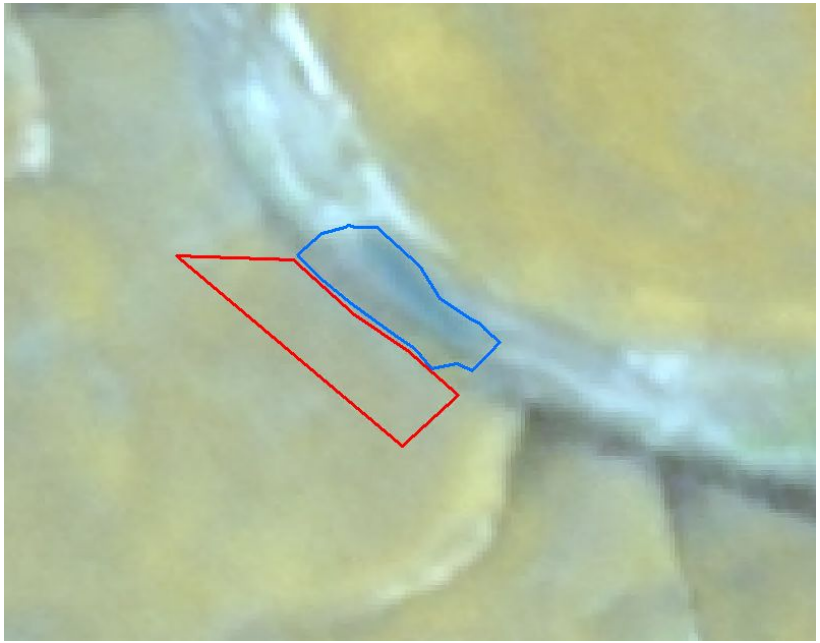
Reference Image (ESRI World Imagery)

Labeling Errors: Inaccurate water label boundaries

Maxar WorldView Image

Reference Image (ESRI World Imagery)

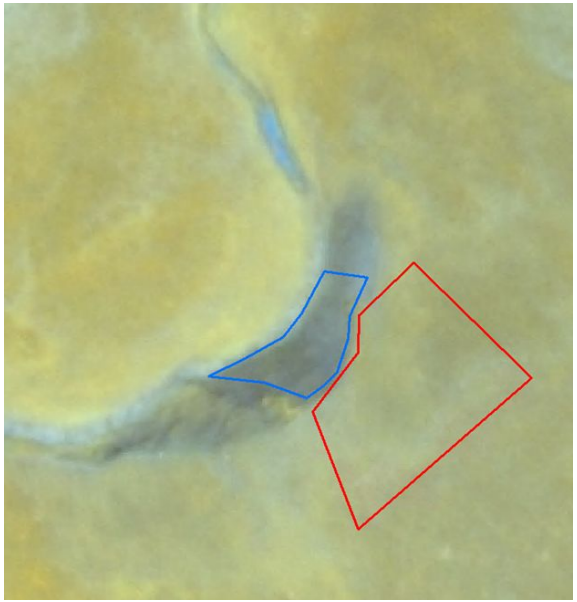
Labeling Errors: Inaccurate water label boundaries



Maxar WorldView Image

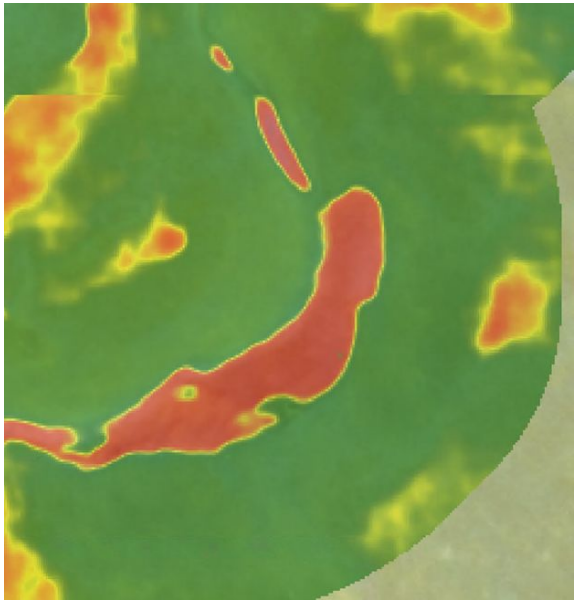
Reference Image (ESRI World Imagery)

Labeling errors yield **prediction errors**



Maxar WorldView Image

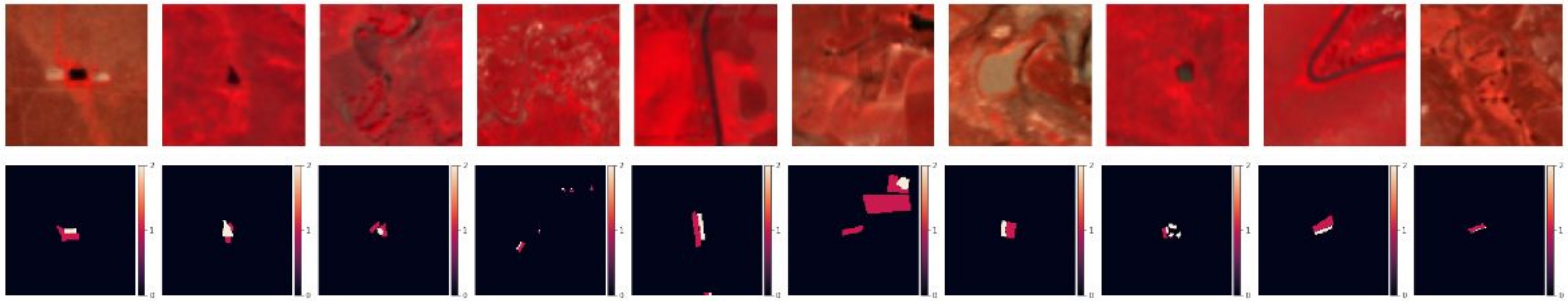
Reference Image (ESRI World Imagery)



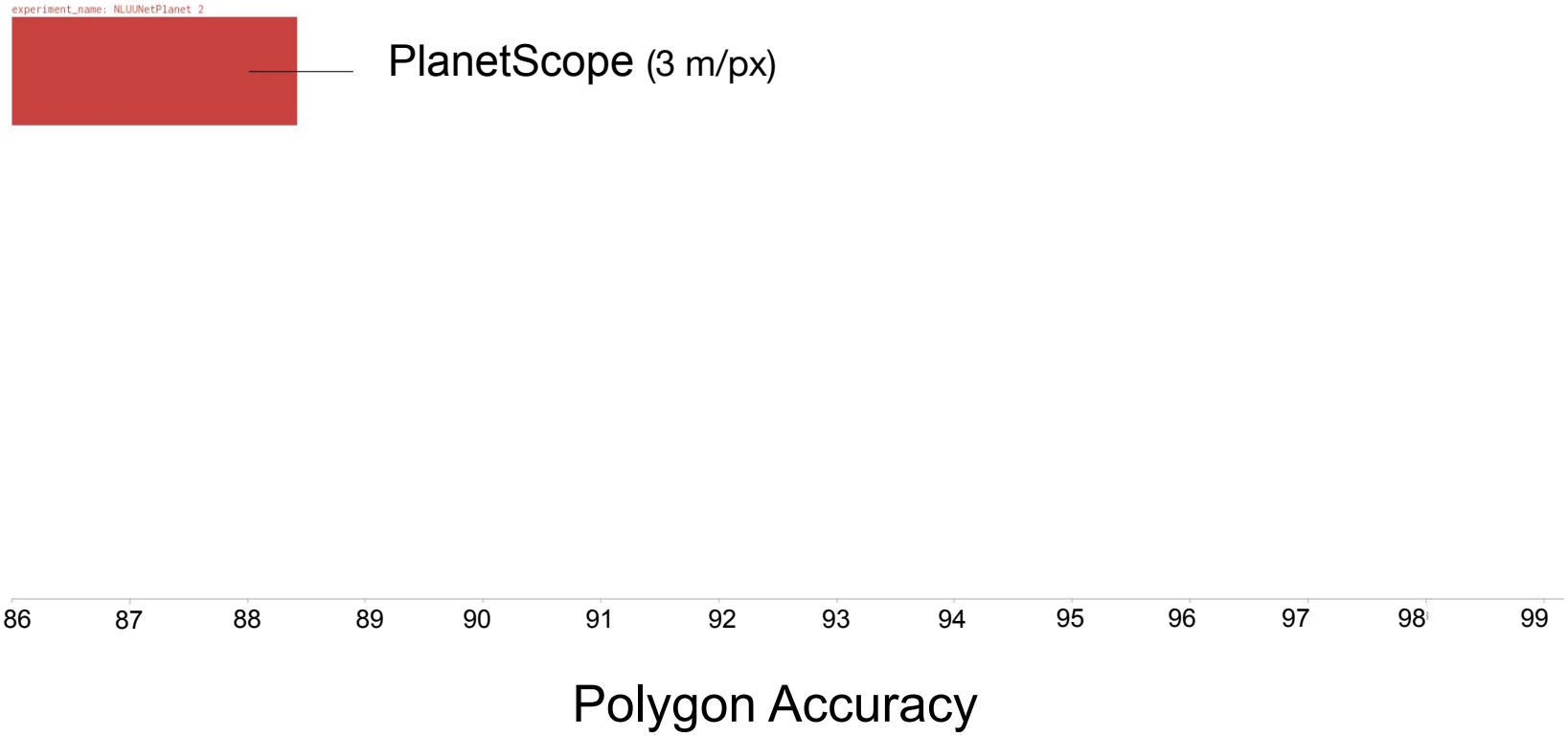
Maxar model prediction

PlanetScope

label



Segmentation networks with different products



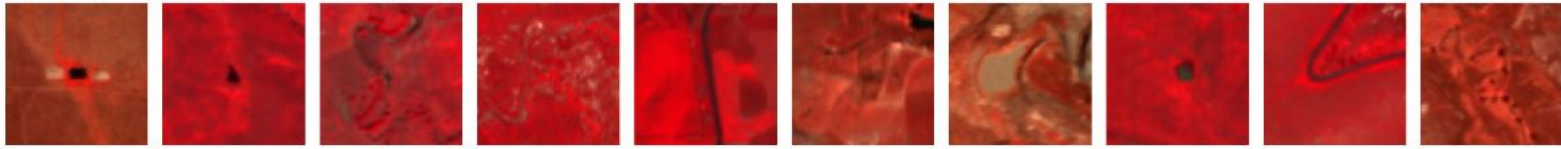
PlanetScope

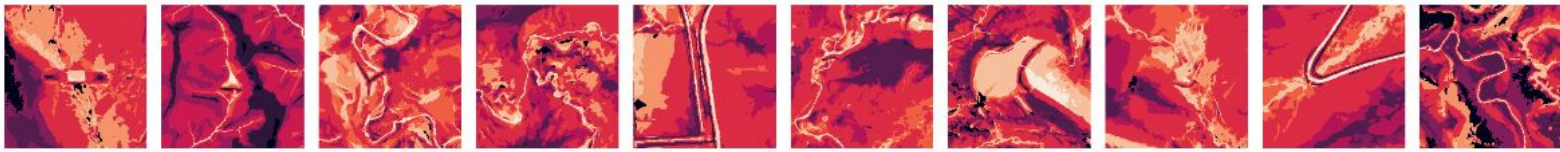
LiDAR derivatives

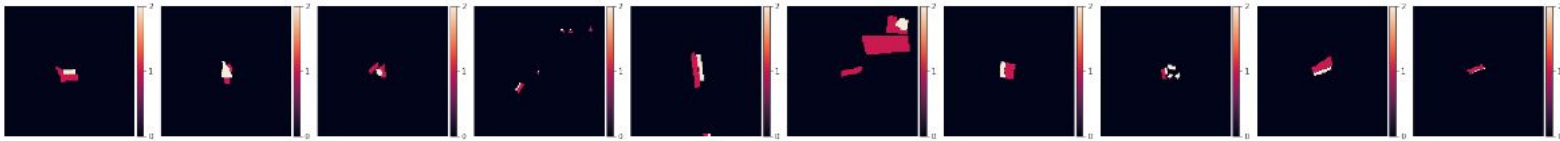
DEM

geomorphons

label







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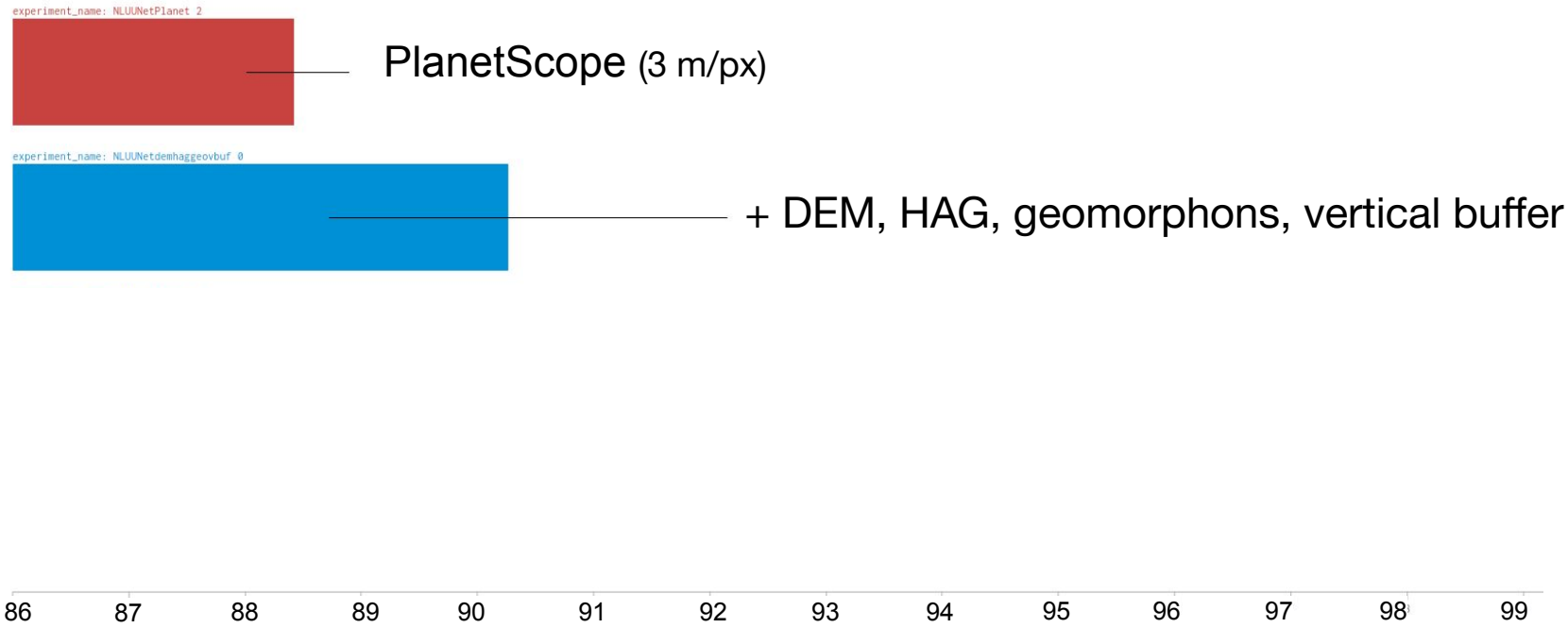
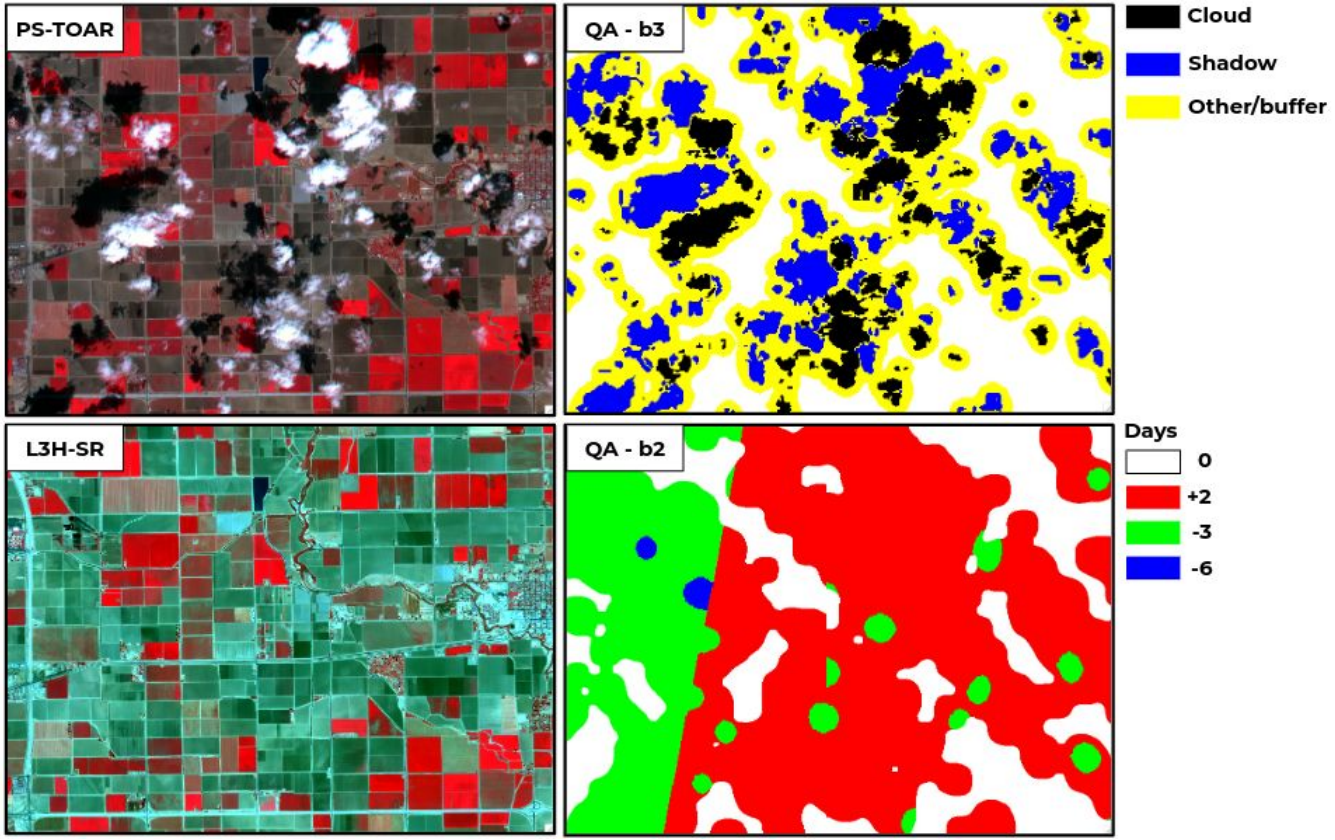
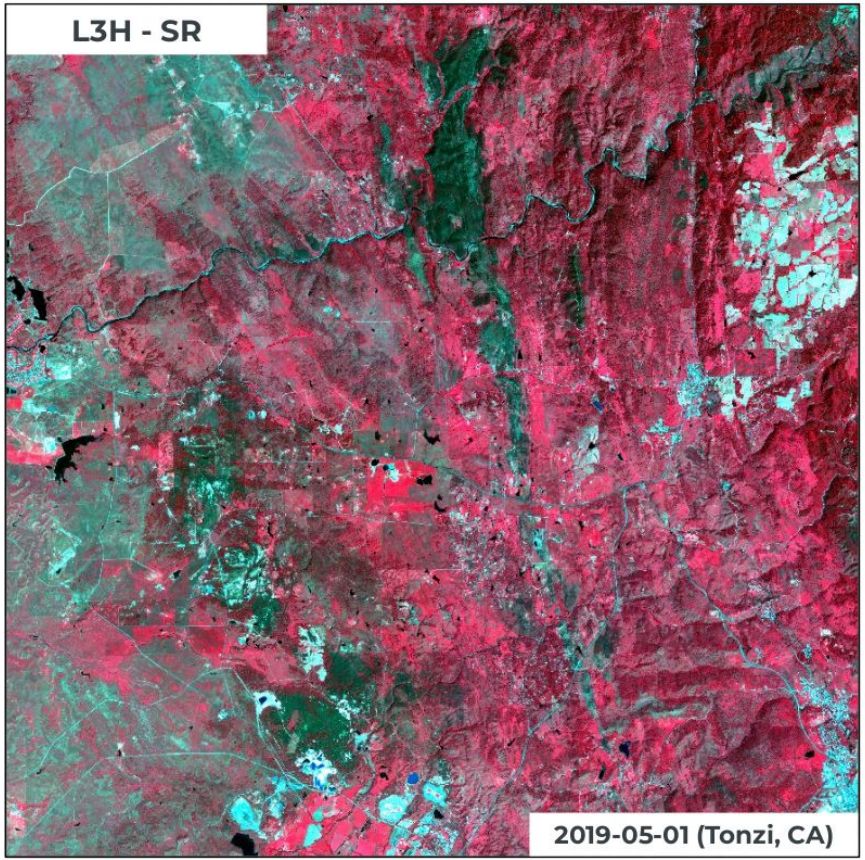
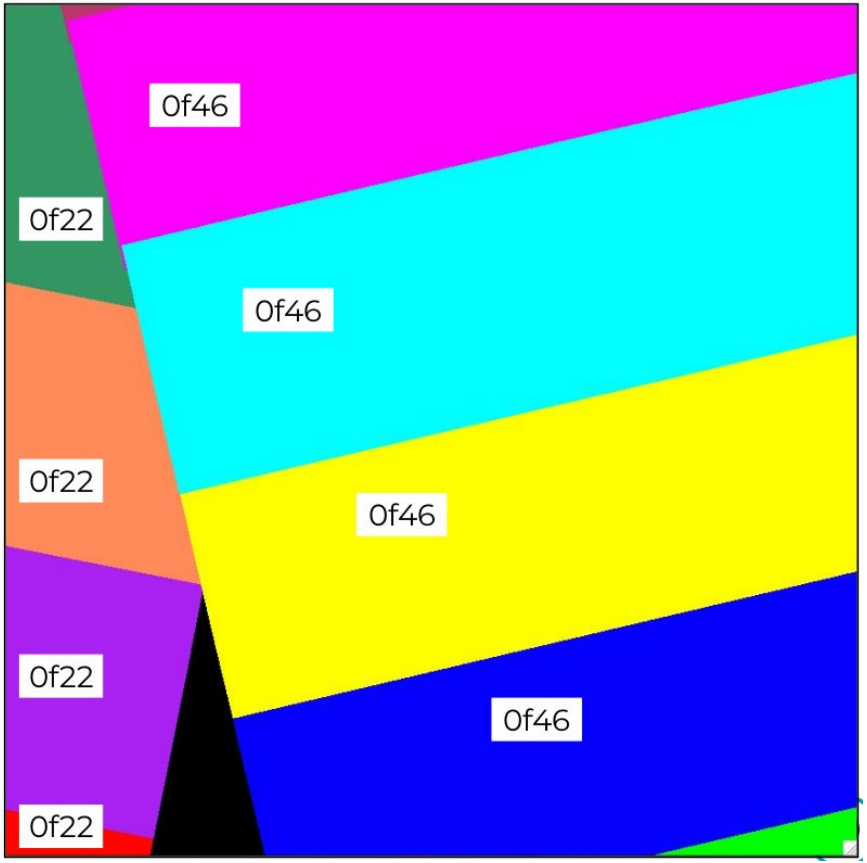


PlanetFusion PlanetScope products

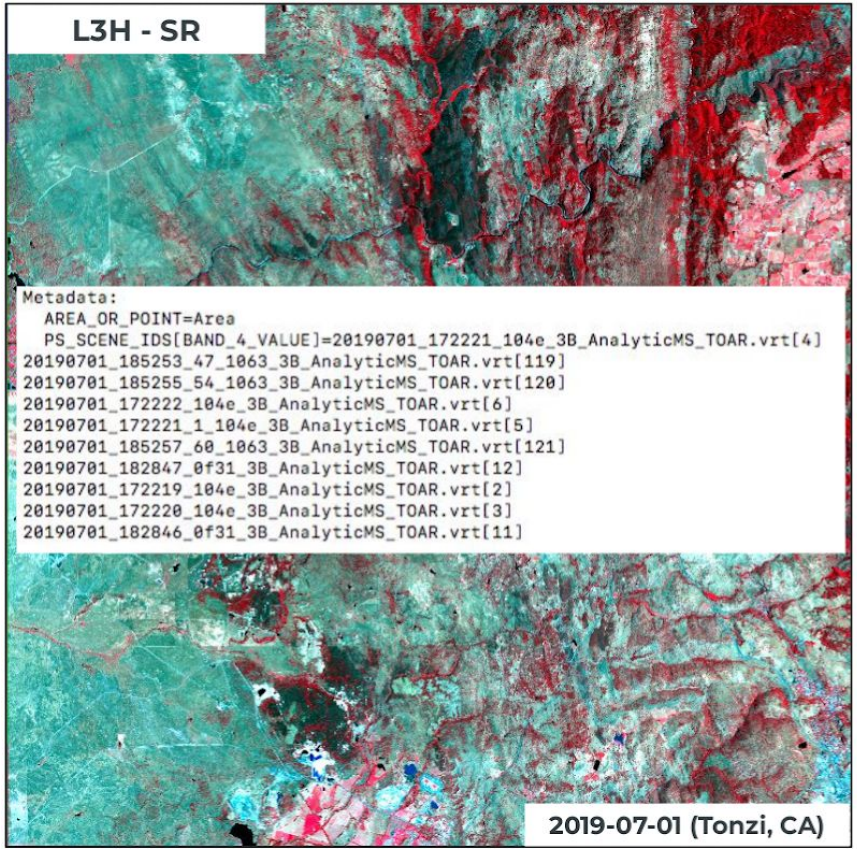


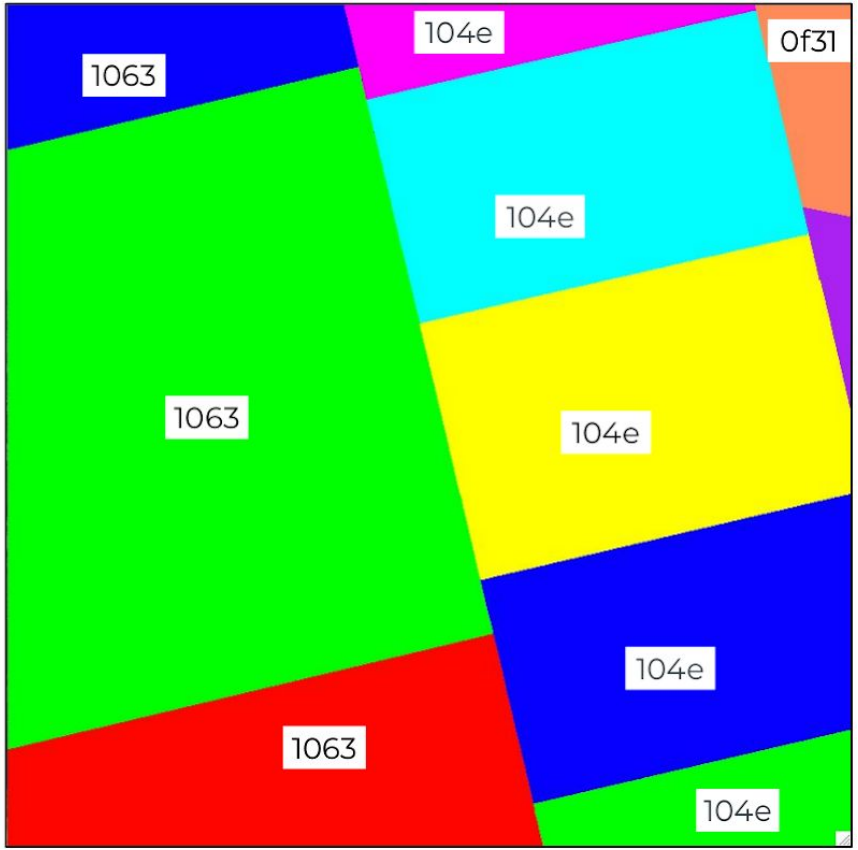
PlanetFusion is a harmonized composite of different acquisitions



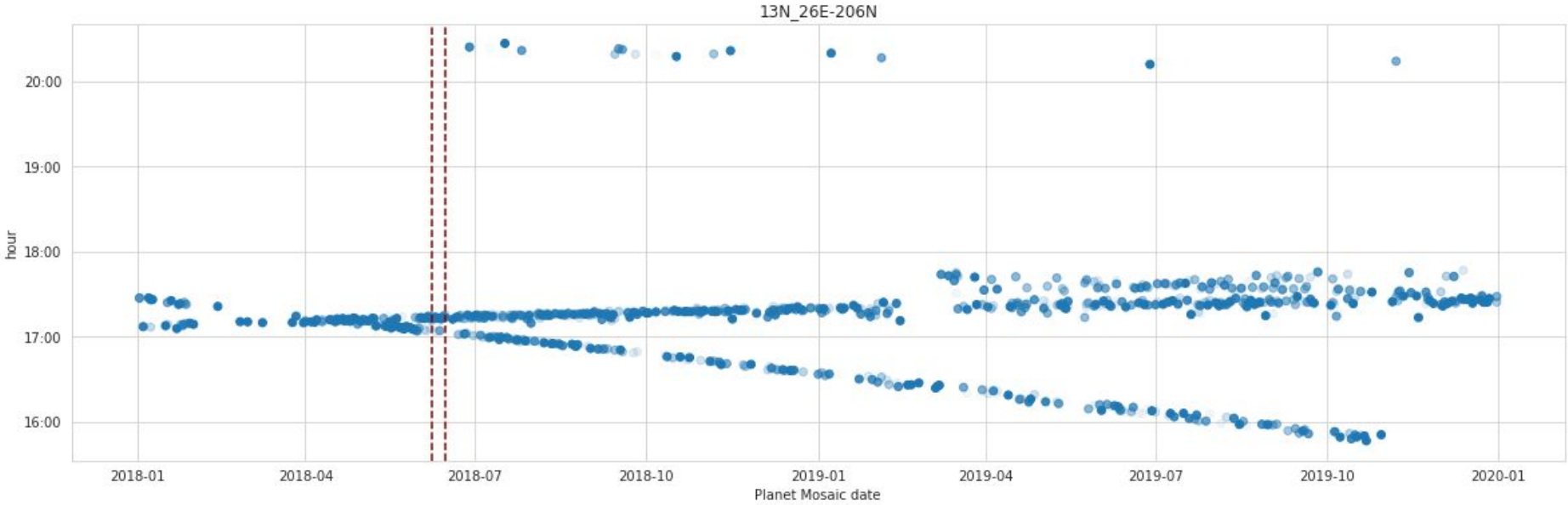


L3H traceability (L3H-QA band and tags)





PlanetScope acquisition time (tile 26E-206N)



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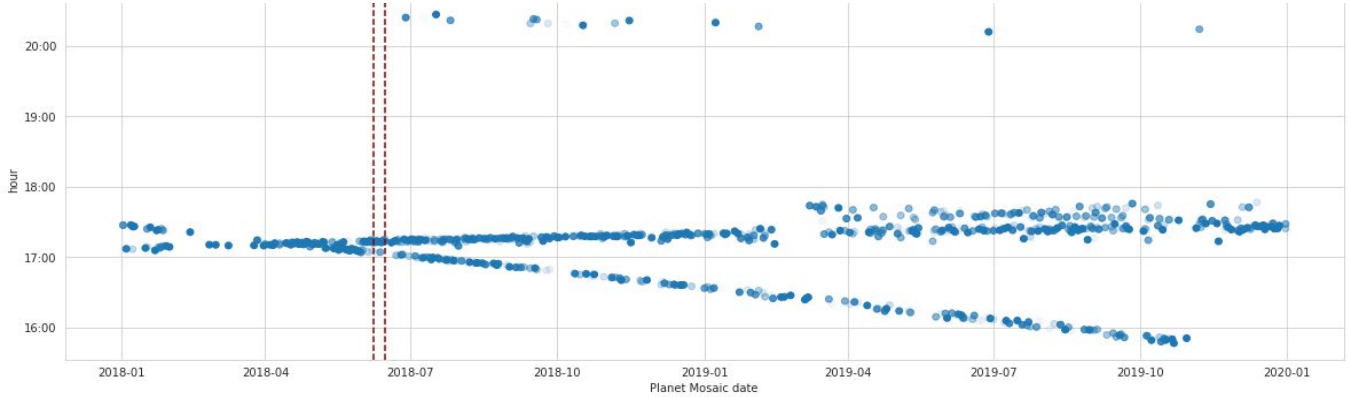
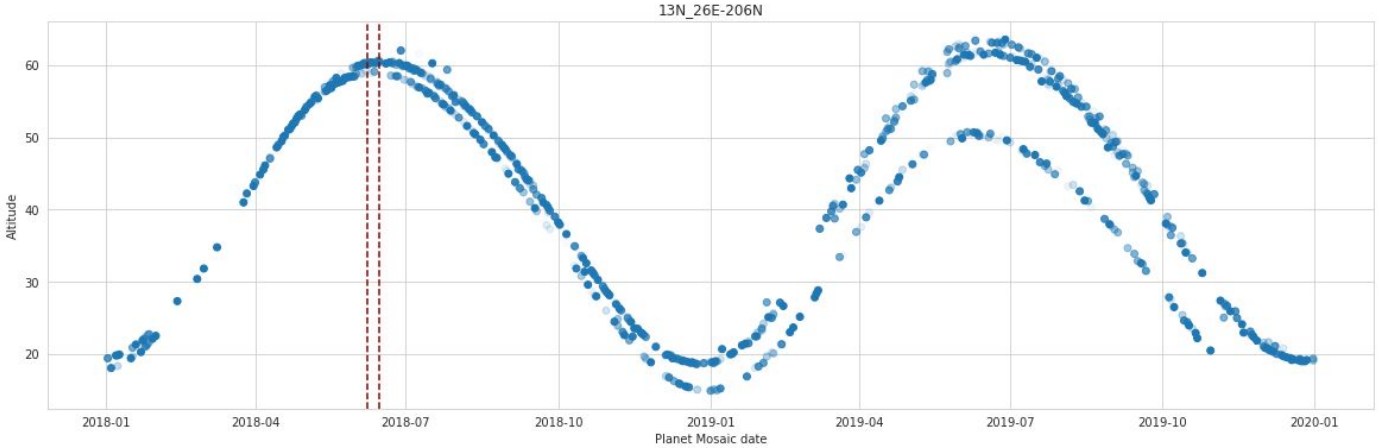
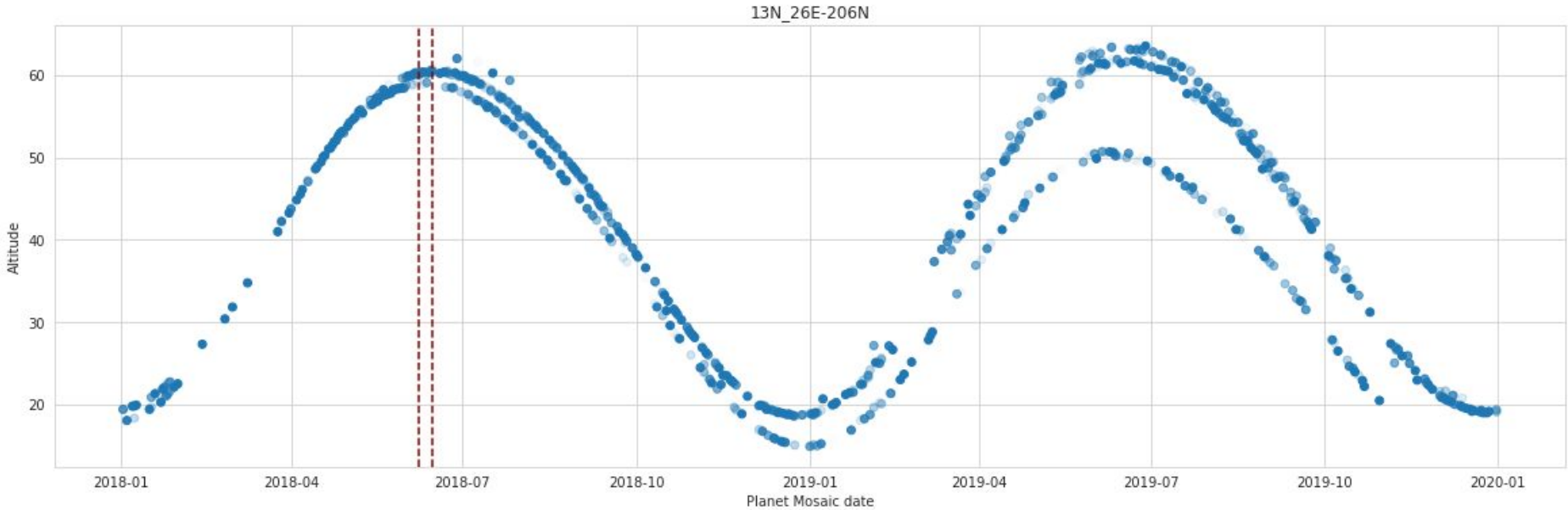


Opacity is proportional to number of pixels of that date used in the composite



PlanetScope sun altitude angle (tile 26E-206N)



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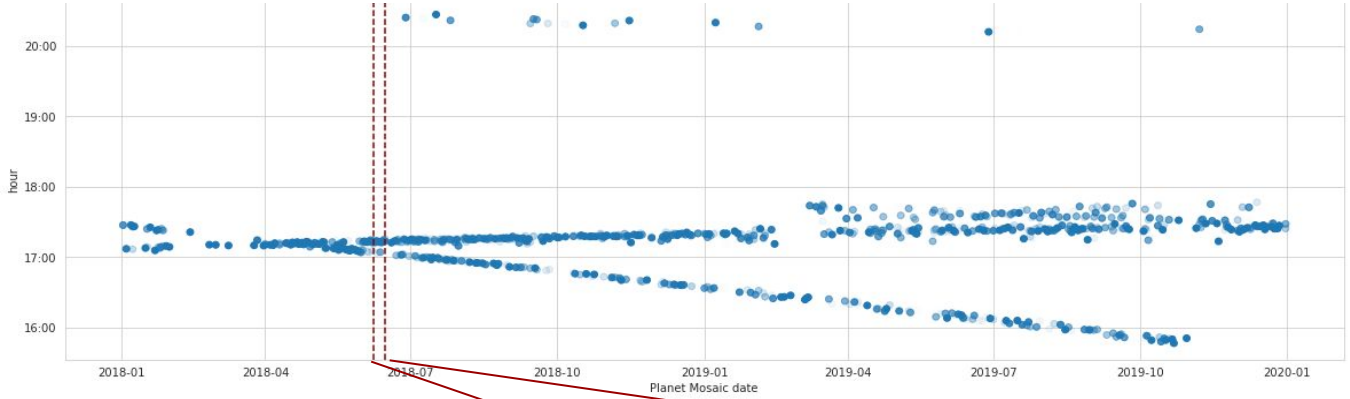

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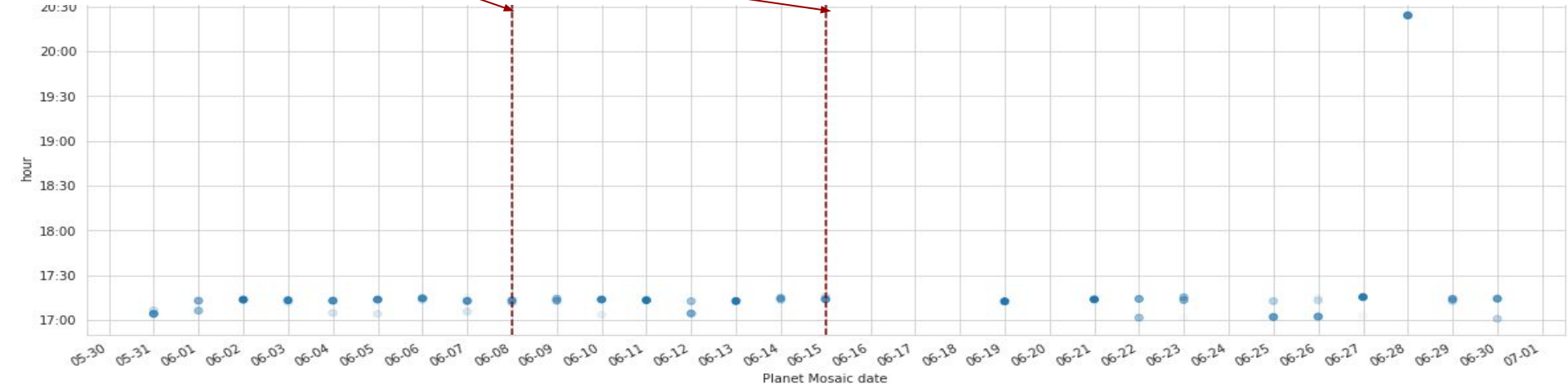

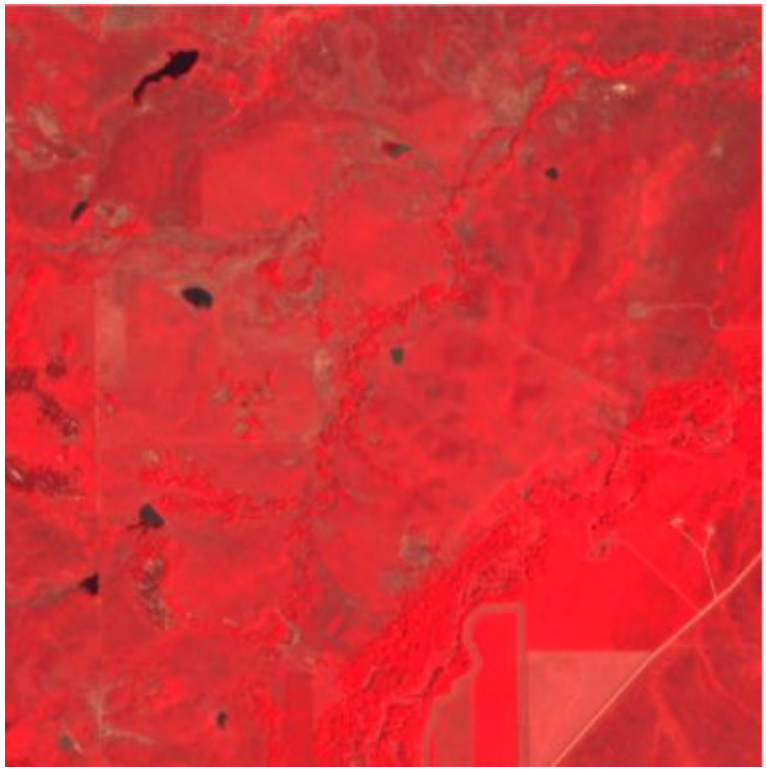

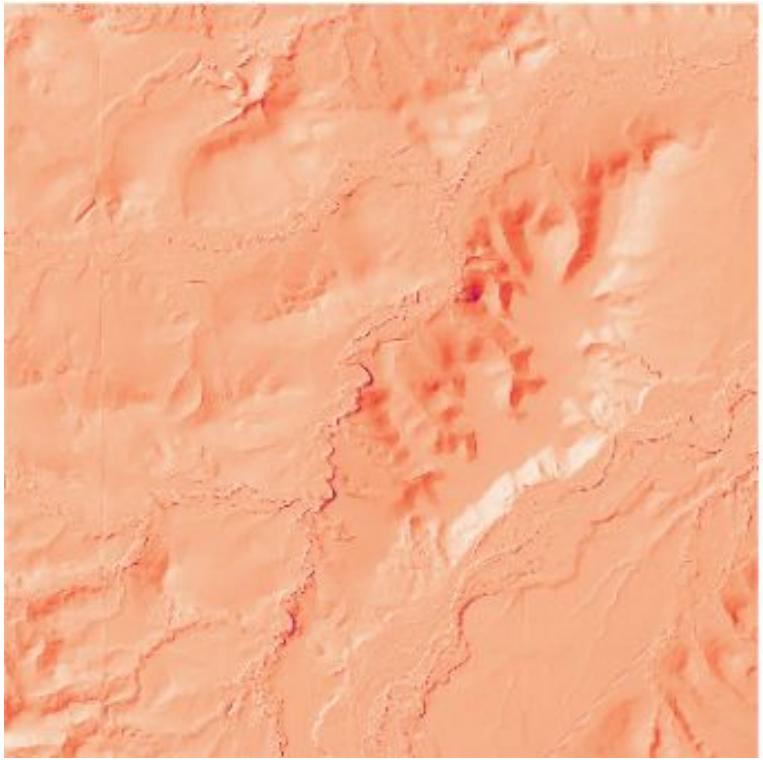

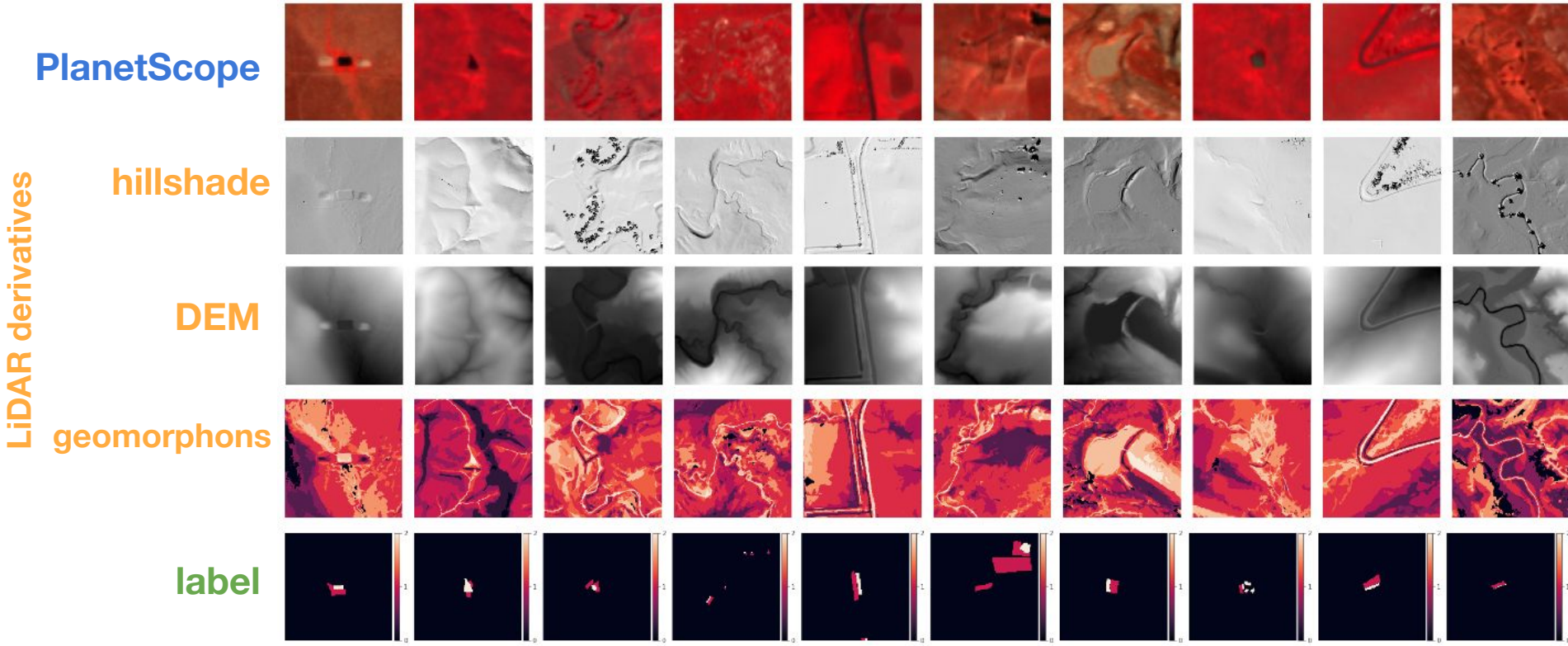
PlanetScope
LiDAR derivatives
hillshade
DEM
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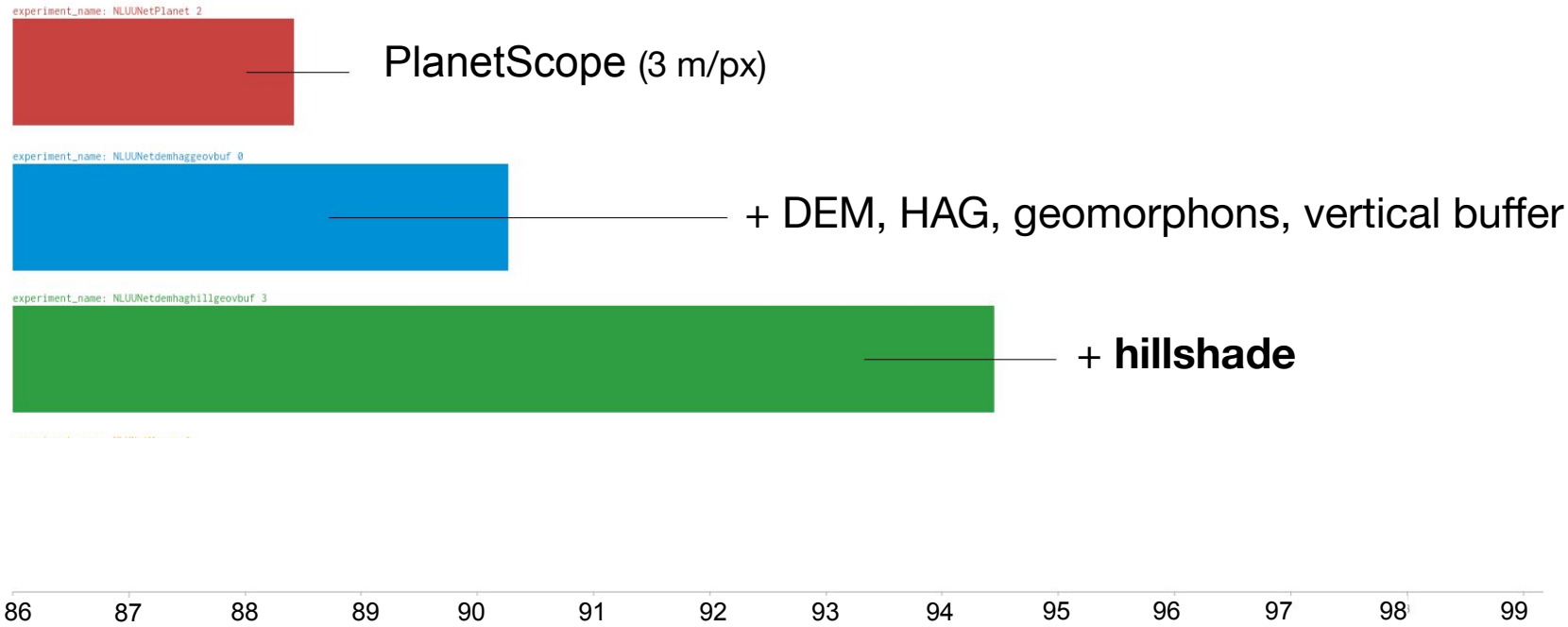

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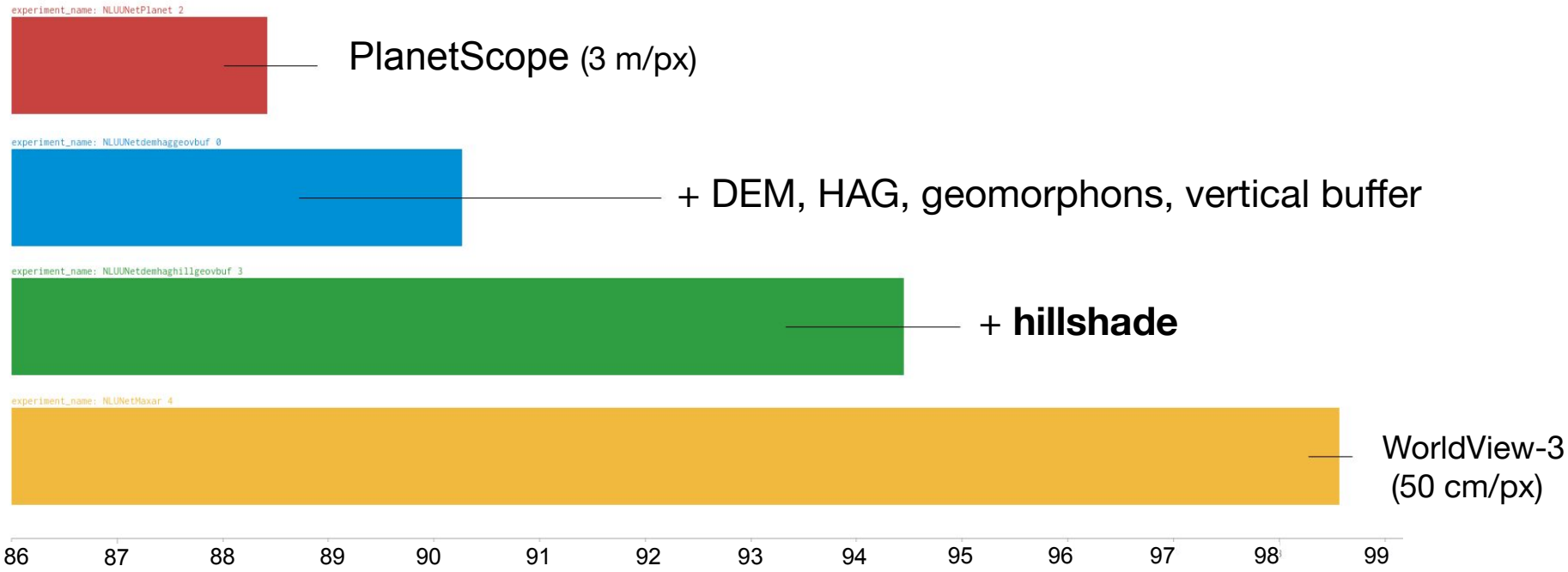

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Multi-headed UNet