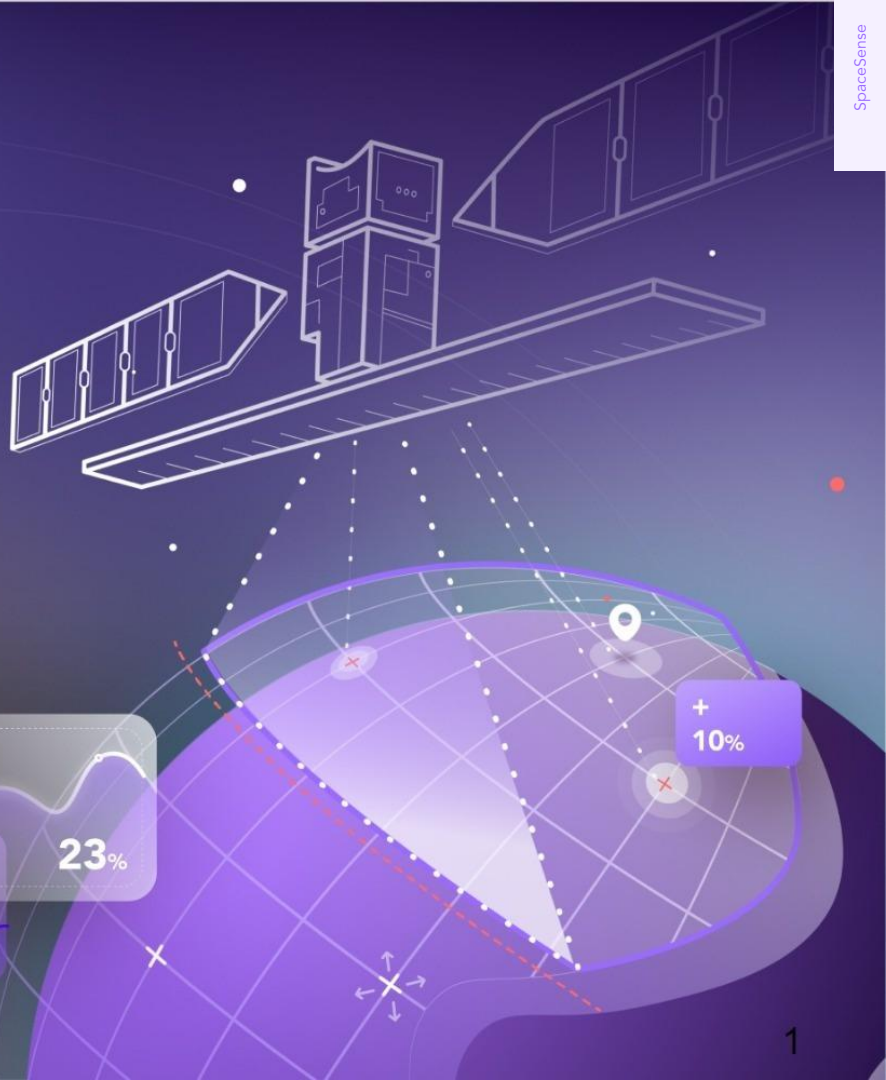
# Automating the creation of LULC datasets for semantic segmentation

Sambhav Singh Rohatgi
Anthony Mucia



# Motivation

- High quality, up to date, LULC maps are useful in climate applications (e.g. carbon cycle monitoring, urban development mapping, urban heat island impacts, land surface and climate modelling)
- Take advantage of existing high quality, large vector datasets for automated segmentation
- Bridge the gap between publicly available data (vector, satellite observations) to a dataset ready for ML training

# Learning objectives

- How does land cover and land use mapping help in tackling, monitoring, and adapting to climate change
- Understanding Earth Observation (EO) data and overcoming the challenges working with EO data
- Learn and perform steps and checks required in building a ML dataset for EO data
- Quickly prototype a segmentation model
- Knowledge and application of important geospatial libraries

# Methodology

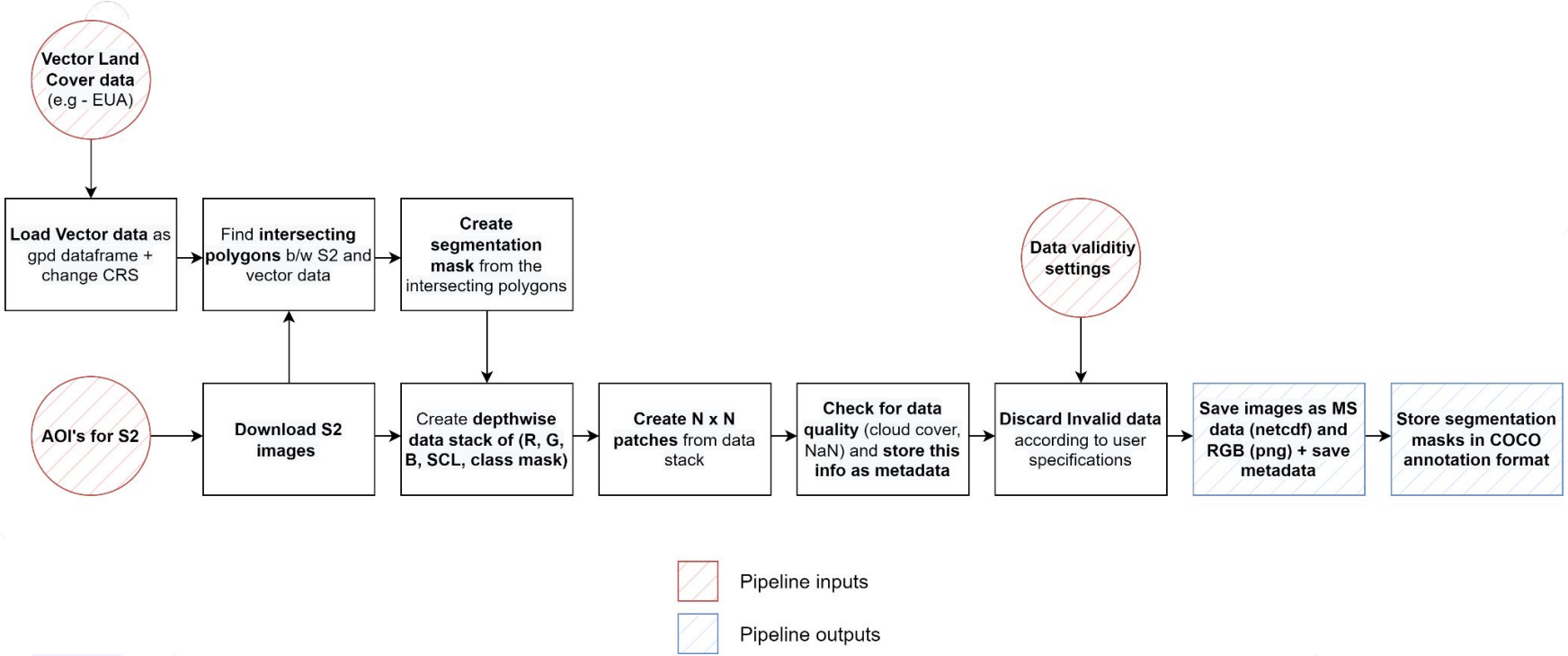



*Fig 1 - Flow Chart of the land use dataset creation pipeline*

# Download Sentinel-2 Image

*Fig 3 - Sentinel 2 image for our AOI*

# Load Vector Data and AOI

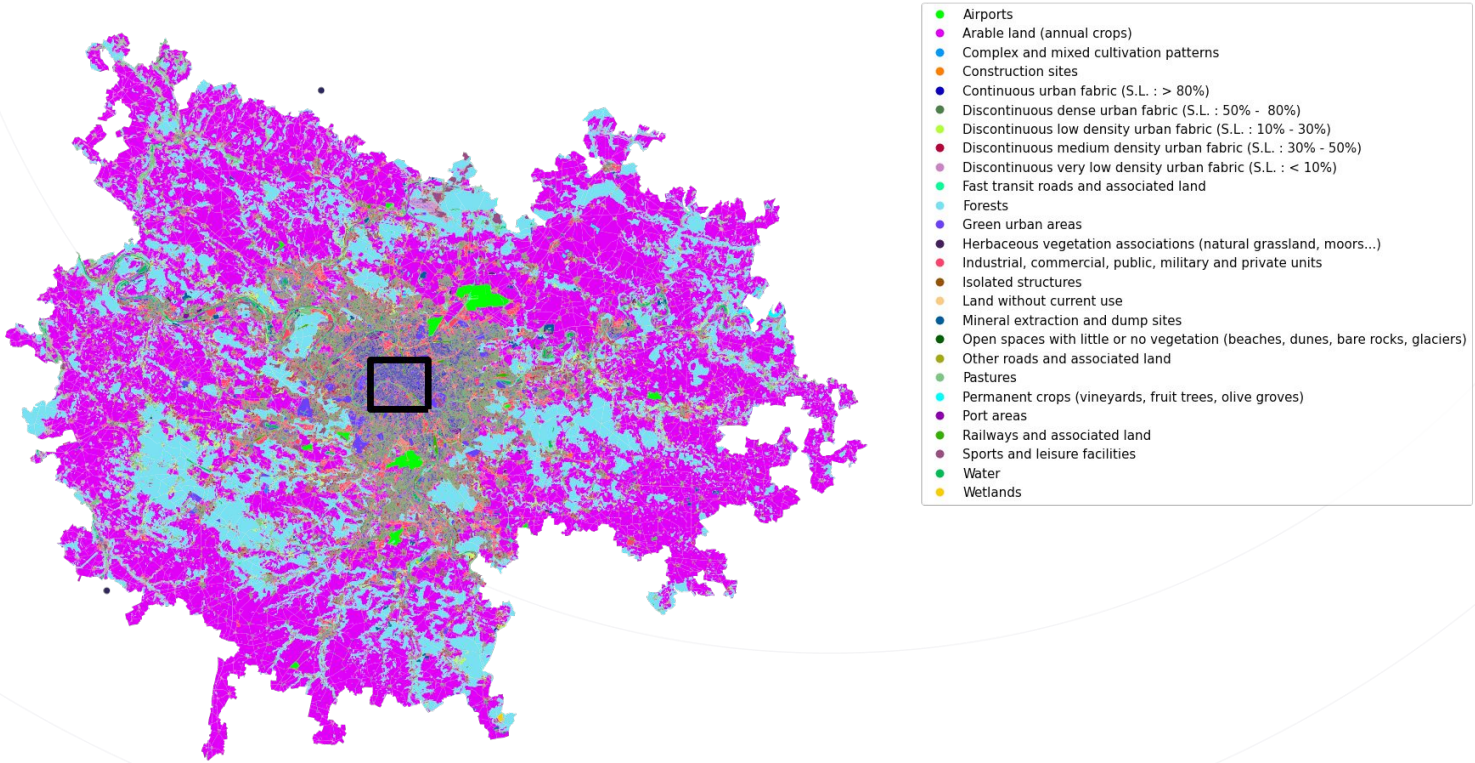



*Fig 2 - European Urban Atlas 2018 for Paris + our AOI (black)*

# Find Overlaps

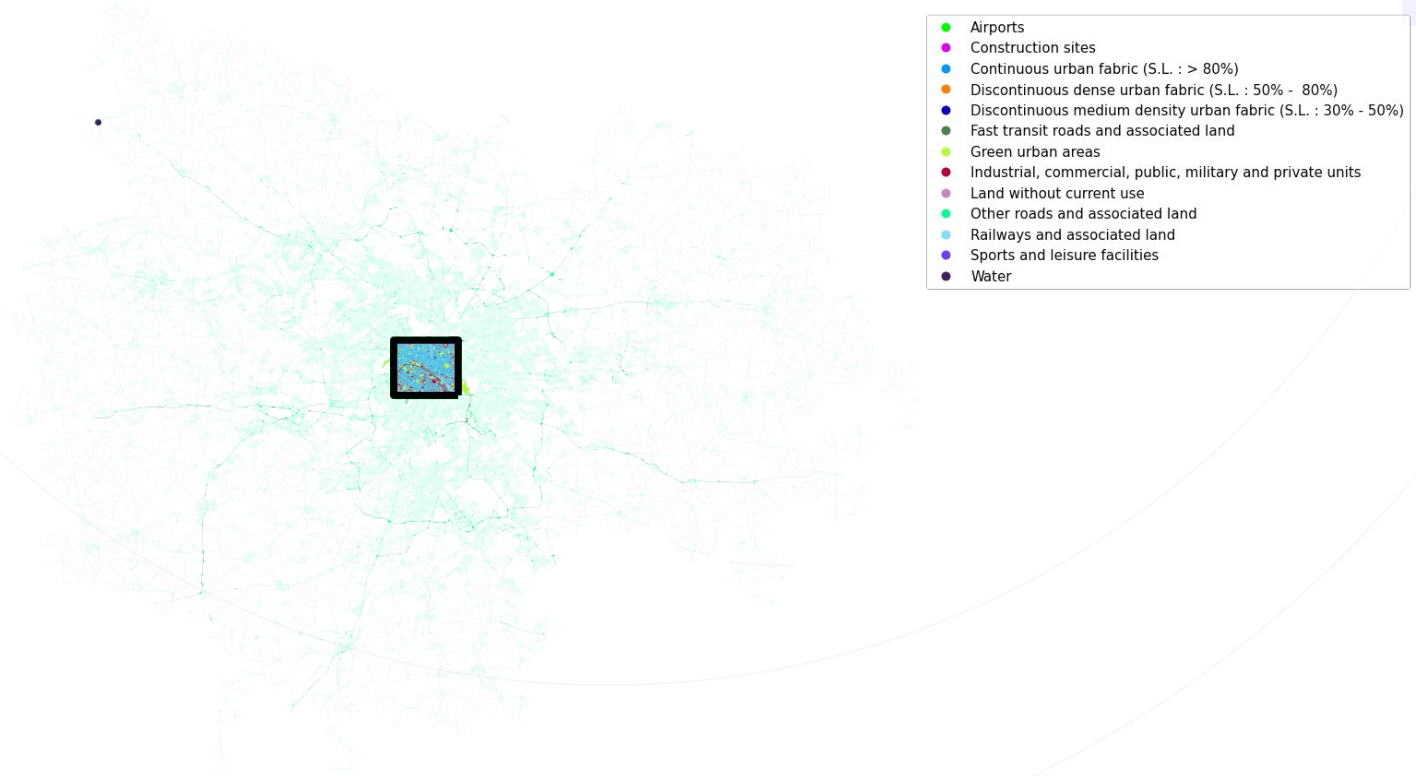



*Fig 4 - All polygons that overlap with our AOI*

# Find Intersects

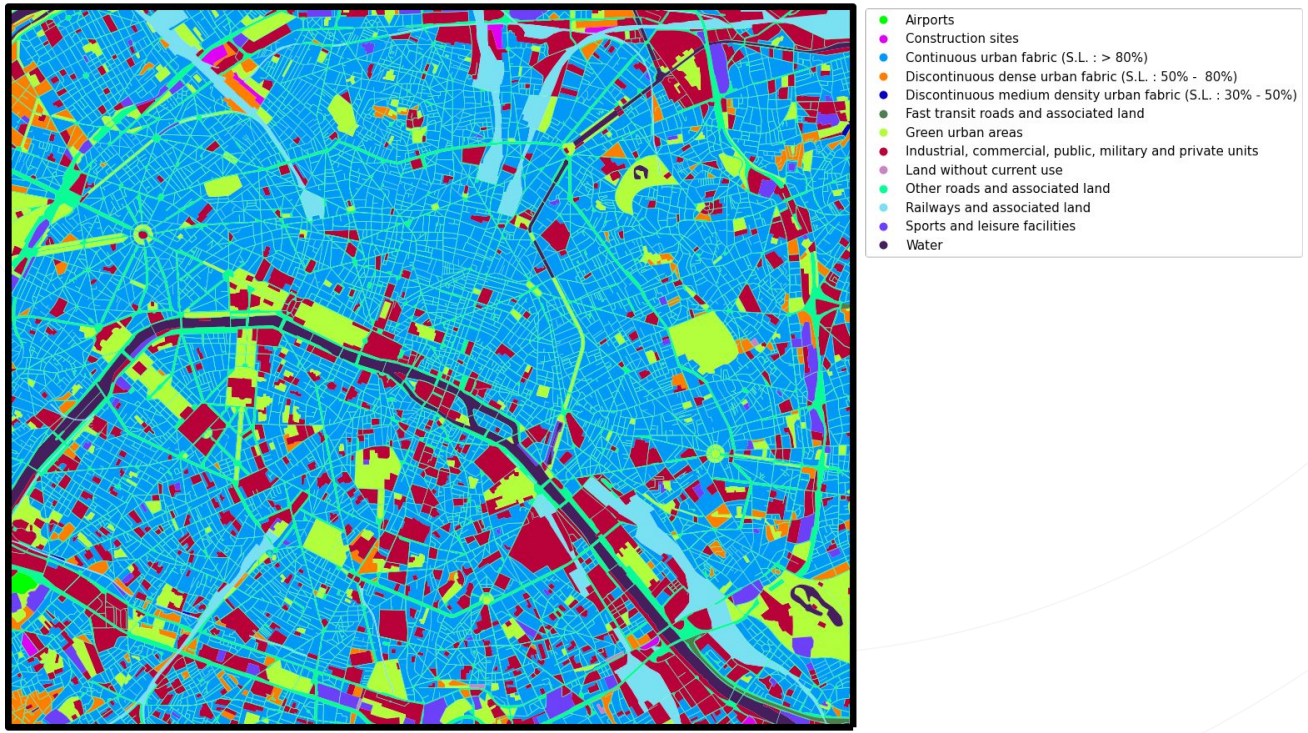



*Fig 5 - All of the polygons intersecting and within the bounds of the AOI*

# Rasterize Polygons to create Segmentation Mask

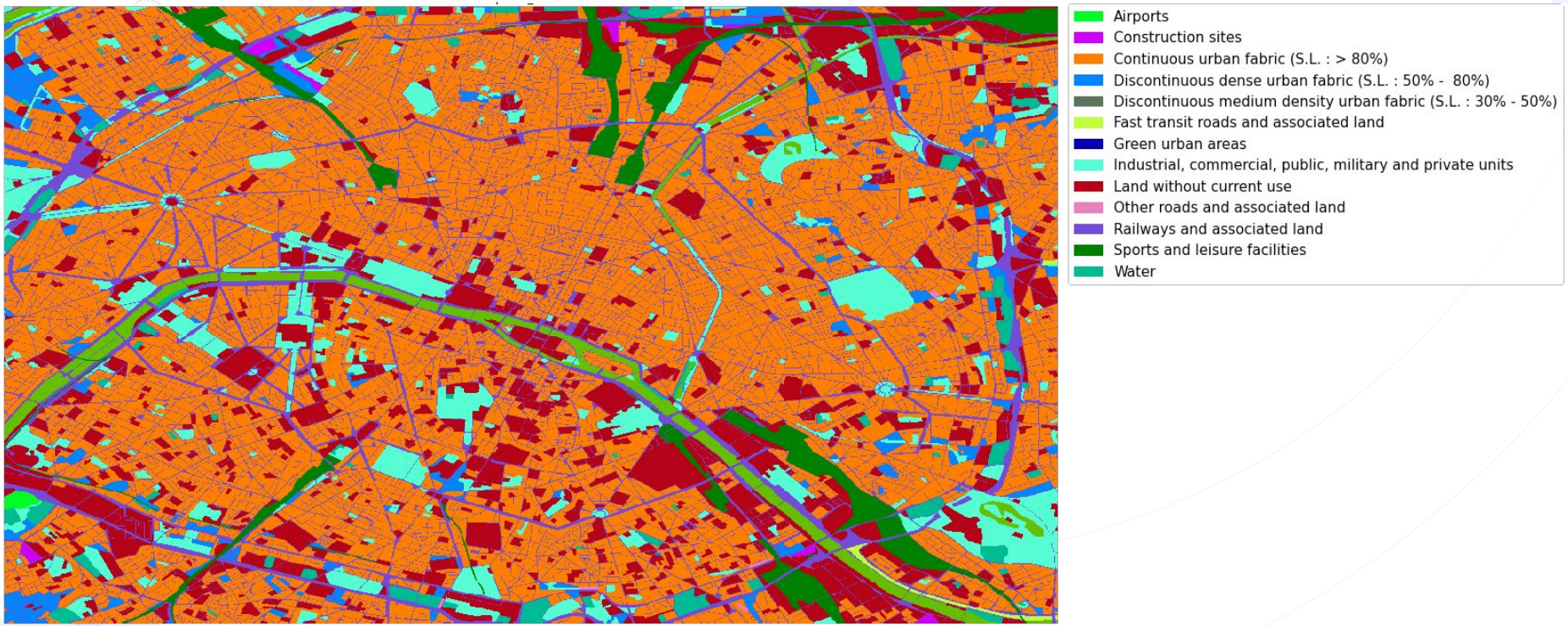



*Fig 6 - Rasterzied polygons (10 m spatial resolution)*

# Create NxN Patches and Check Data Quality

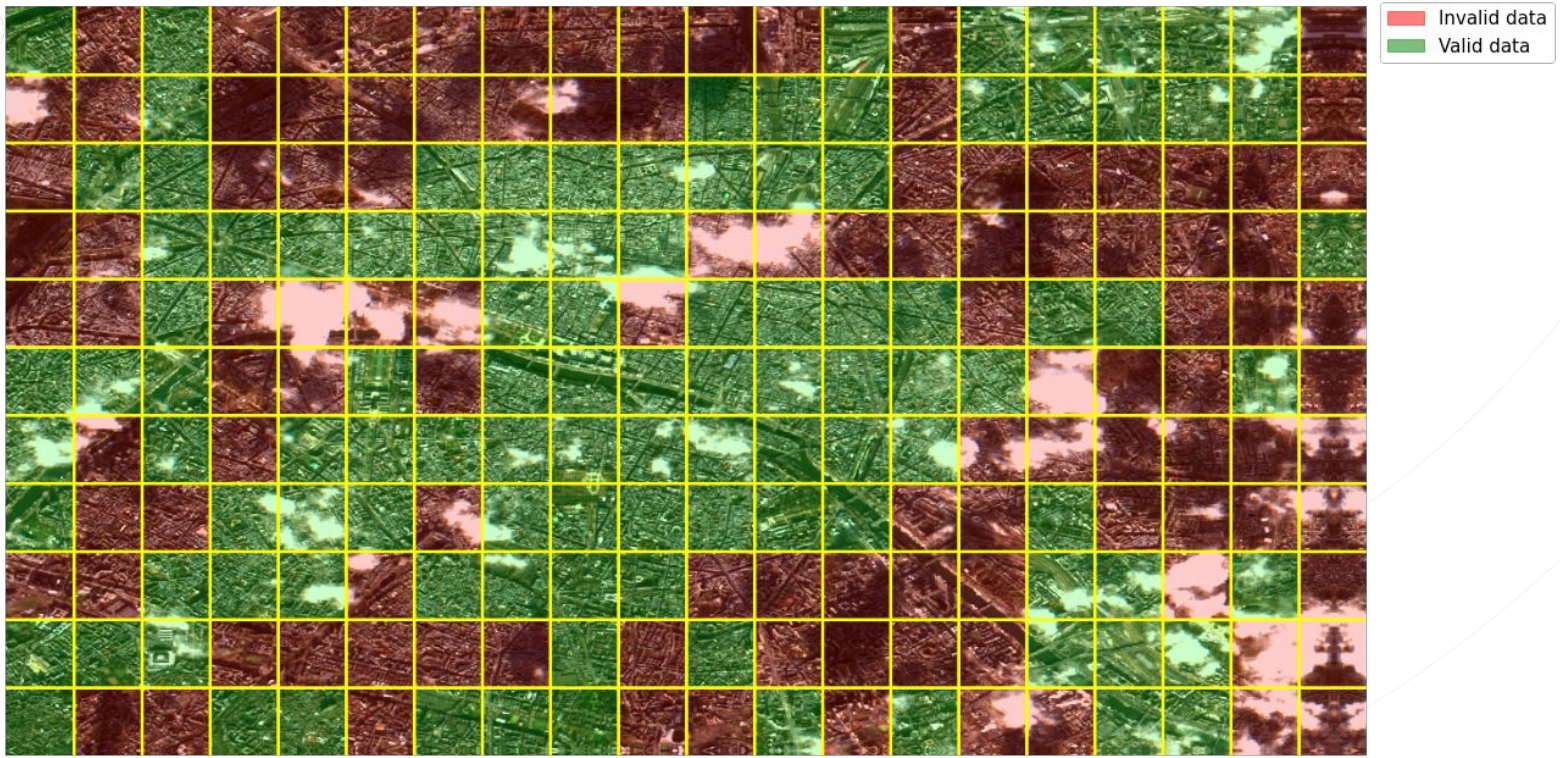
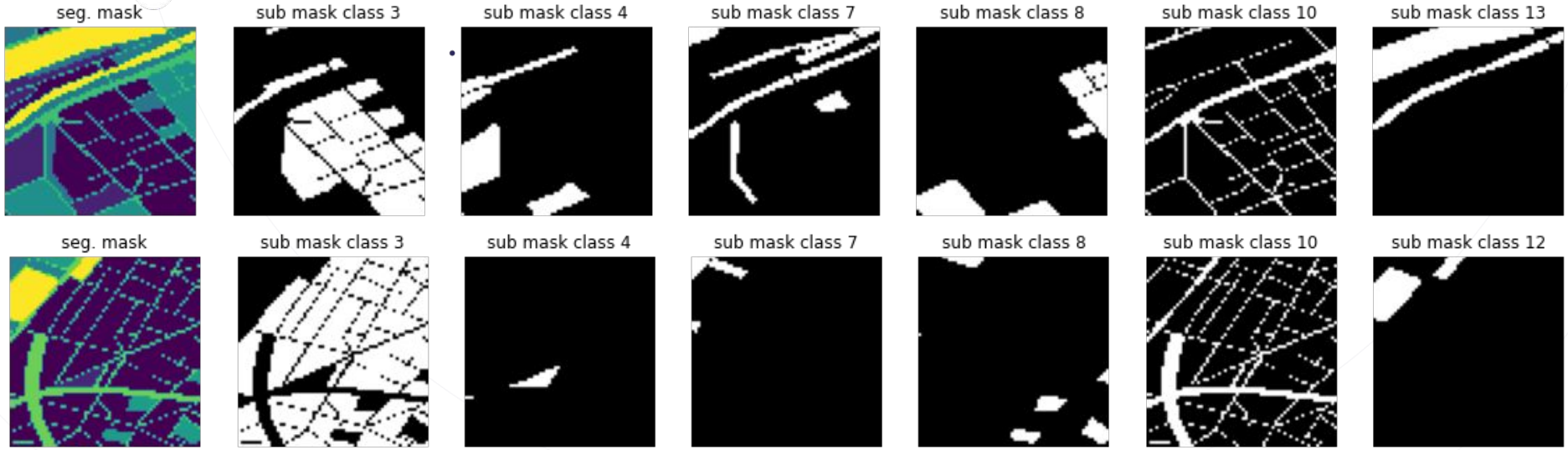



*Fig 7 - Image chunks and their data quality*

# Save Dataset and Annotations




3 = Continuous urban fabric (S.L. : > 80%)
4 = Discontinuous dense urban fabric (S.L. : 50% - 80%)
7 = Green urban areas
8 = Industrial, commercial, public, military and private units
10 = Other roads and associated land
12 = Sports and leisure facilities
13 = Water

*Fig 8 - Multiclass and individual segmentation masks*

# Train Model and Generate Predictions

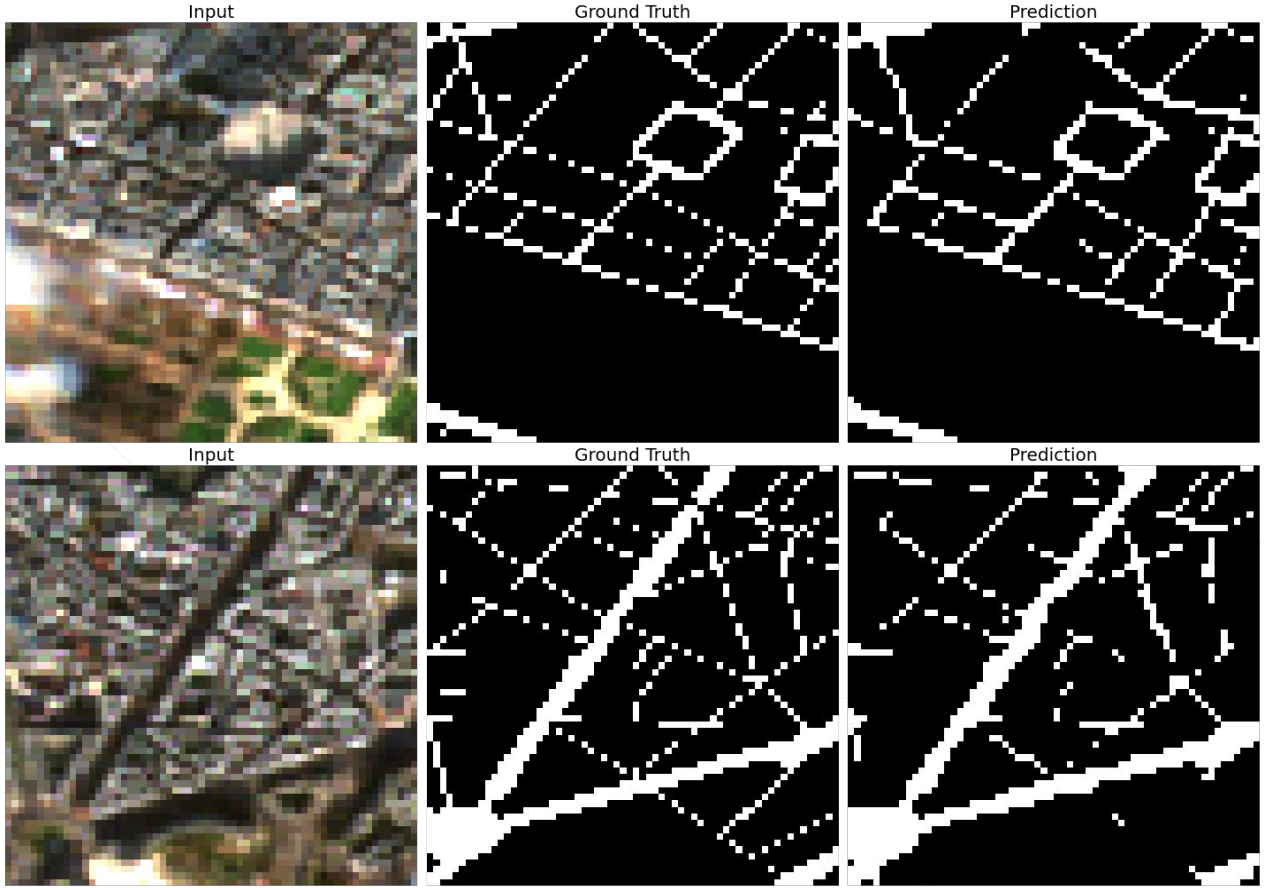



*Fig 9 - Model predictions for roads*