living planet symposium | VIENNA 23–27 June 2025

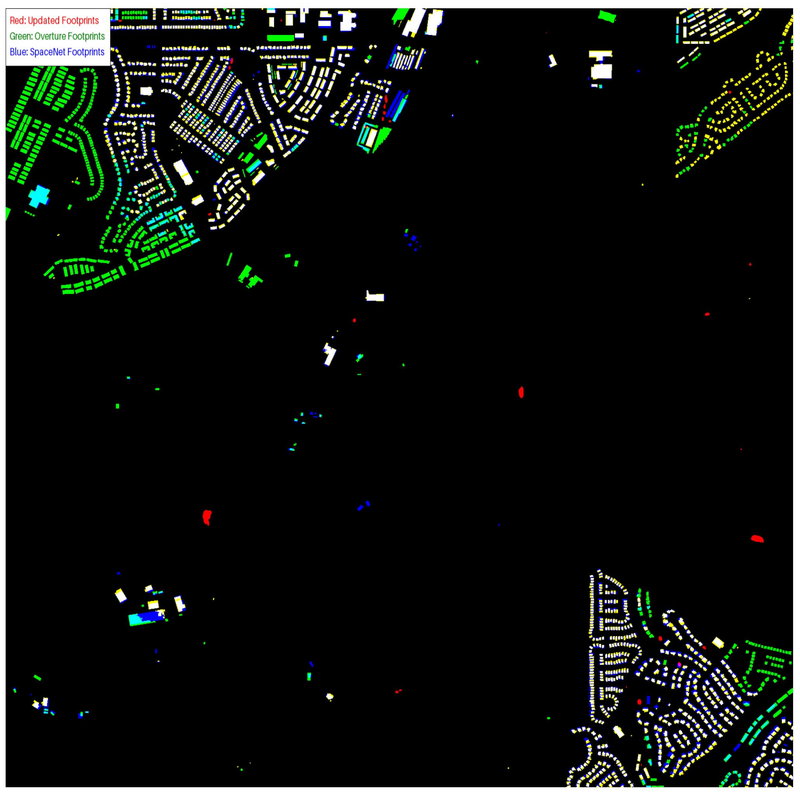
# Temporal Disaggregation of Building Footprints

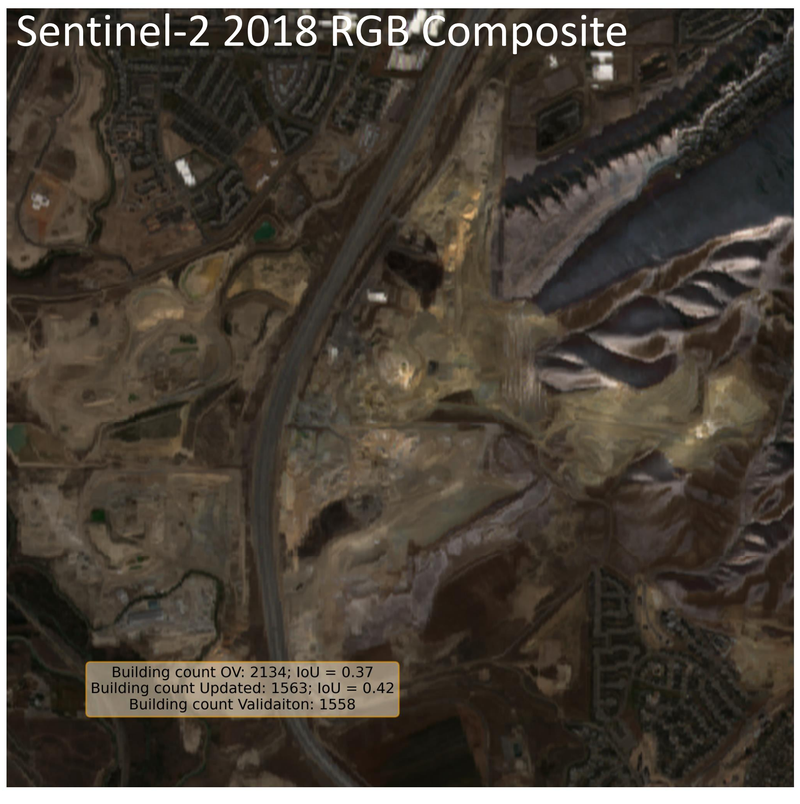
**Manuel Huber[1], Christian Geiß[1], Michael Schmitt[2], Hannes Taubenböck[1]**

1 German Aerospace Center (DLR), German Remote Sensing Data Center (DFD), Geo-Risks and Civil Security, Oberpfaffenhofen, 82234, Bavaria, Germany

2 Department of Aerospace Engineering, University of the BundeswehrMunich, Neubiberg, 85577, Germany

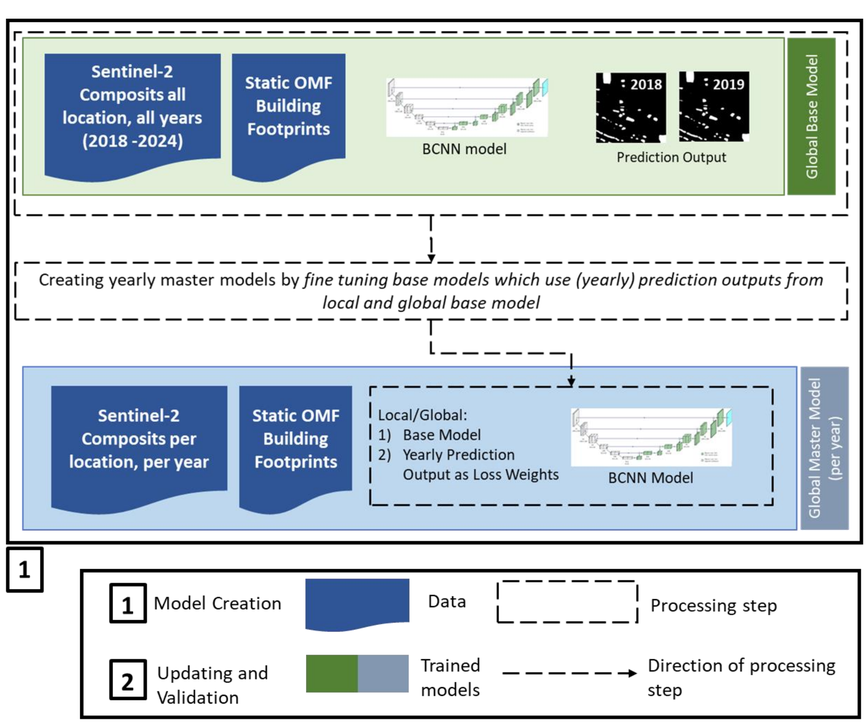
## Introduction

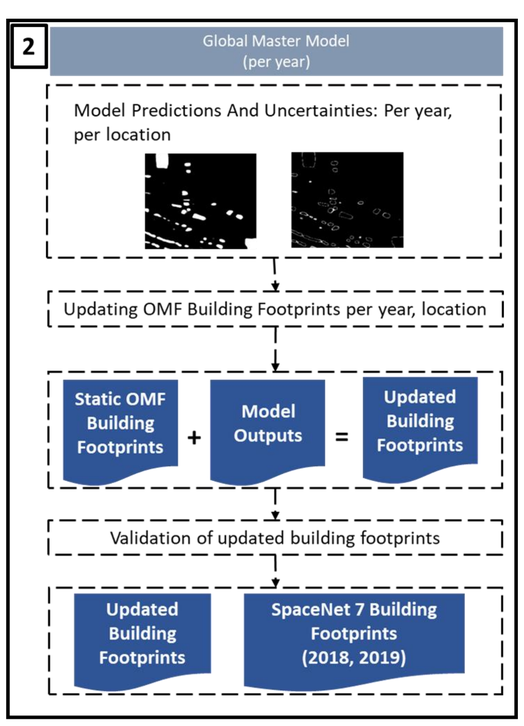


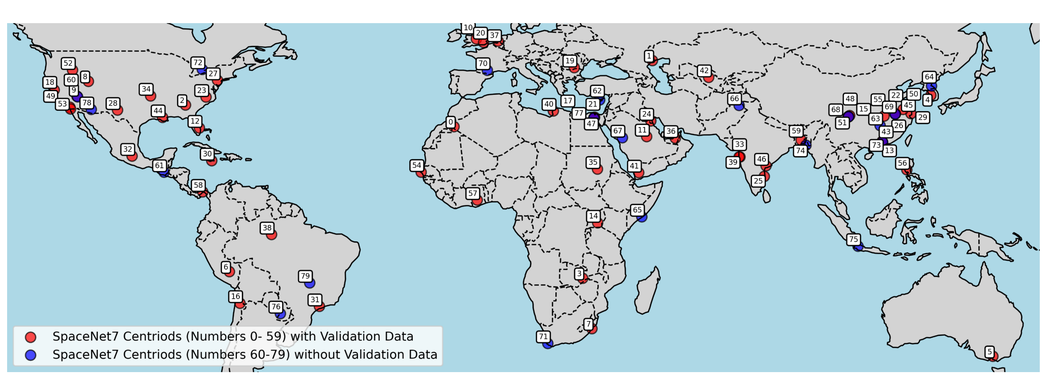




High-resolution building footprint datasets from sources like Overture Maps (OV), Google, Meta and OSM**, lack temporal information**, limiting their use for dynamic monitoring tasks. This study addresses this gap by proposing a method to temporally disaggregate static building footprints using Sentinel-2 imagery. A Bayesian U-Net (BCNN) segmentation model is employed to assign year-specific labels while also estimating prediction uncertainty. The approach enables time-aware, uncertainty-informed building maps at scale.

## Method

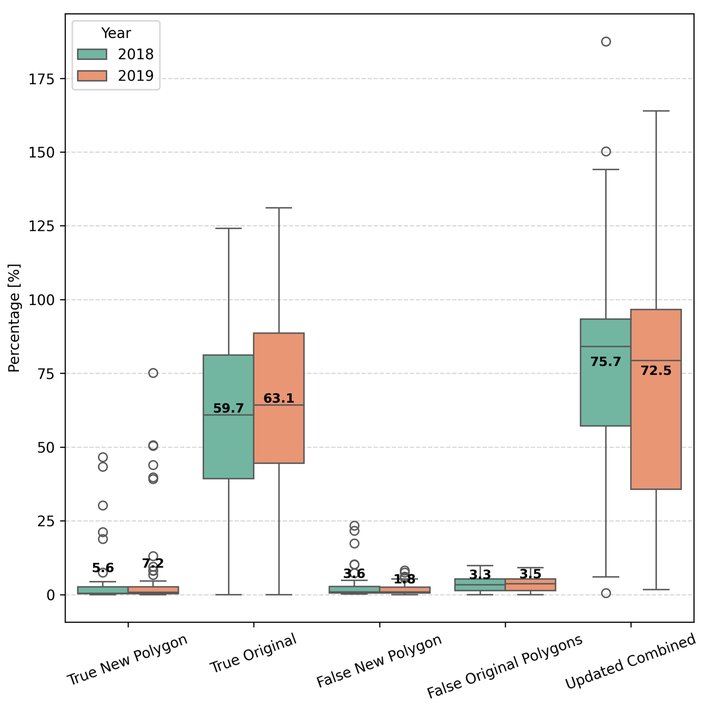


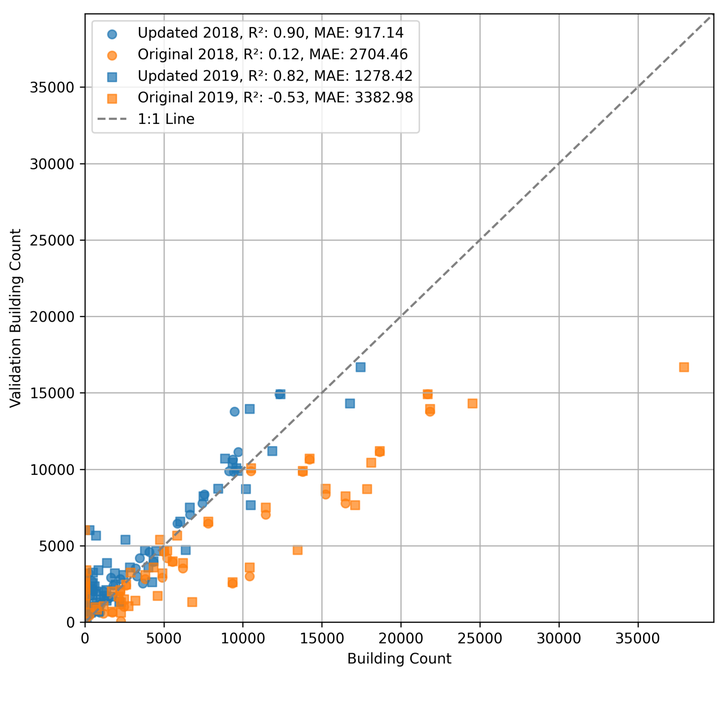



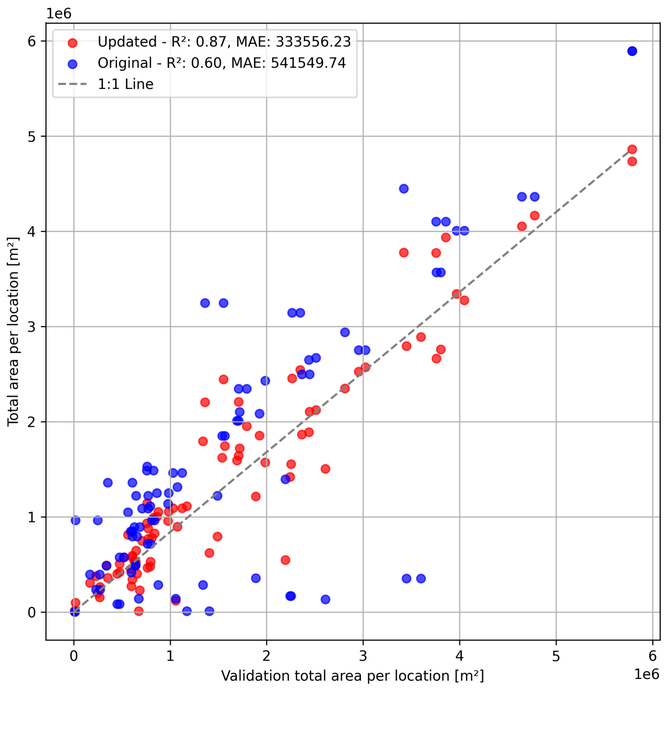




- SpaceNet7 as validation data (temporal, annual)
- Overture Maps Foundation as training data (static)
- Sentinel-2 as input images (temporal, annual)
  - 80 Training, 50 Validation Locations
  - 10 Testing Locations
- BCNN as model architecture

## Results




✓ **+53% improvement** in building count accuracy

✓ **+69% improvement** in built-up area accuracy

✓ Enables **uncertainty-aware, timestamped building maps**

✓ Demonstrates **strong generalization through domain-specific model adaptation**

DLR