



Fusion of BIM and SAR (BIMSAR) for Interactive Building Monitoring



Technische
Hochschule
Georg Agricola



VIVAWEST

Gefördert durch:

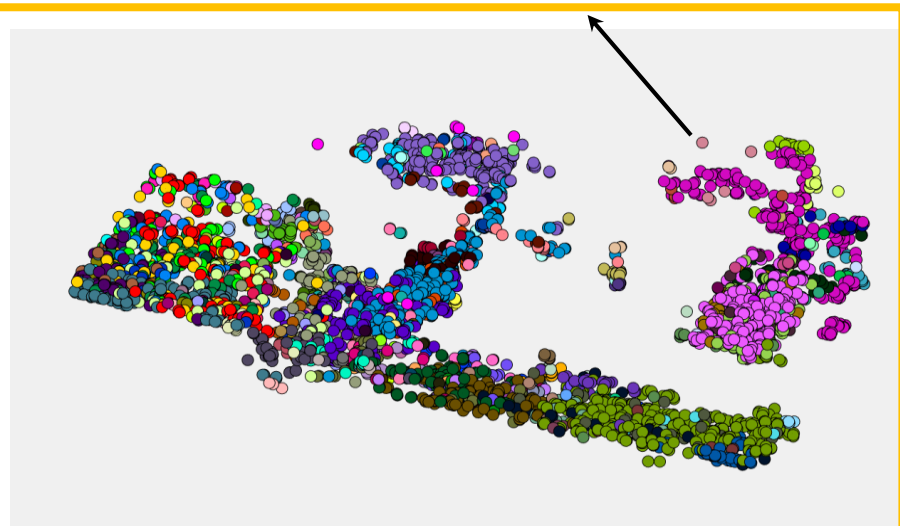
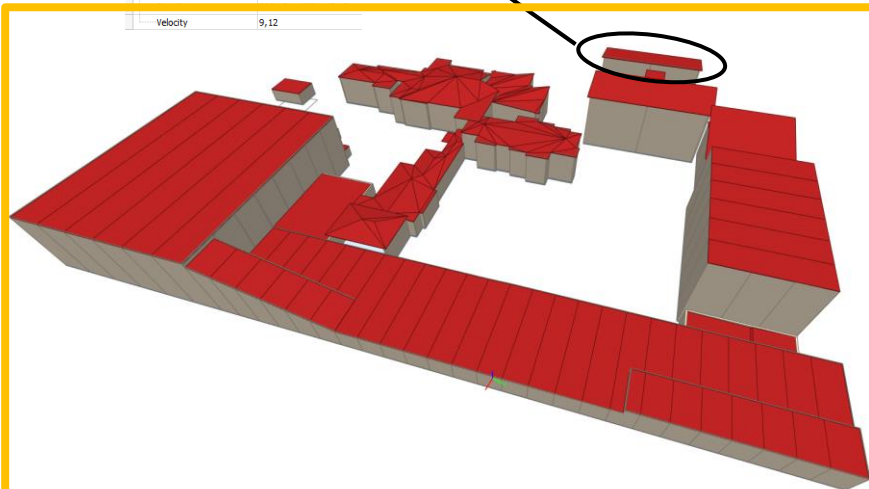
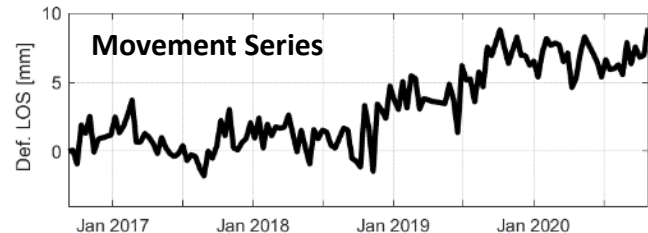


aufgrund eines Beschlusses
des Deutschen Bundestages



Goal: BIM + SAR for Interactive Building-Monitoring

| Pset_insar | |
|--------------------|---------------------|
| AcquisitionMode | Stripmap |
| d2021-01-16 | 0 |
| d2021-01-27 | 2,1 |
| d2021-02-07 | 3,9 |
| d2021-02-18 | 3,3 |
| d2021-03-01 | 4,02 |
| d2021-03-12 | 5,03 |
| d2021-03-23 | 4,7 |
| d2021-04-02 | 3,6 |
| d2021-04-13 | 2,3 |
| d2021-04-24 | 1,2 |
| EndDate | 2021-01-16T21:45:15 |
| MeasuresExist | Ja |
| Number of Measures | 42 |
| Satellite | TerraSAR-X |
| Velocity | 9,12 |



BIM Model

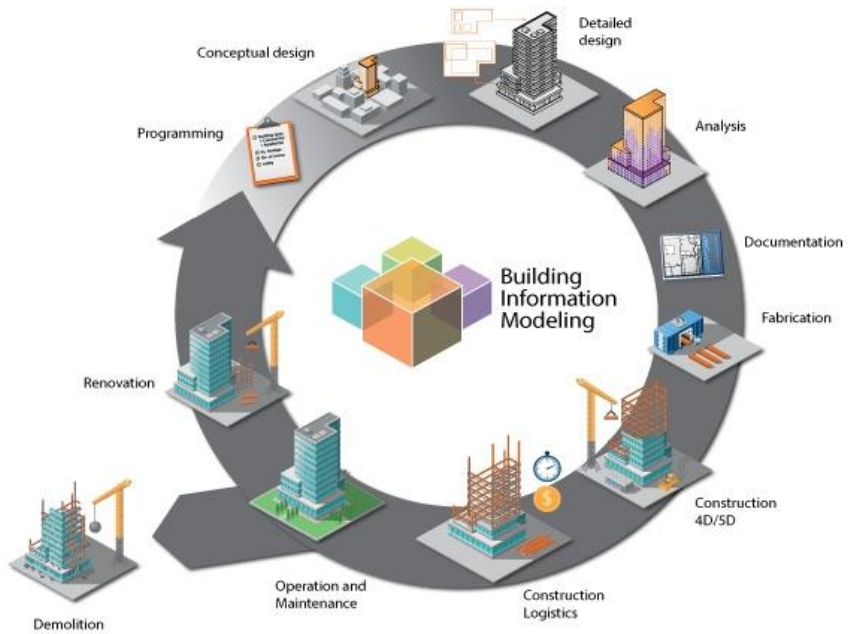
SAR-derived PS-Points



Content

- **BIM Model**
- **SAR Product**
- **Fusion: BIM + SAR**
- **Interactive Platform**
- **Conclusion and Outlook**

BIM : Building Information Modeling



<https://bimmda.com/en/what-is-bim>

2D data exchange



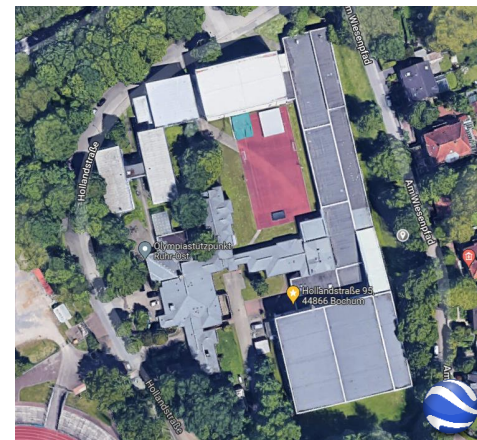
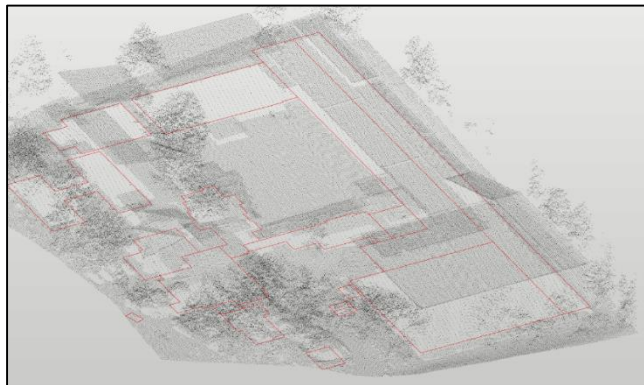
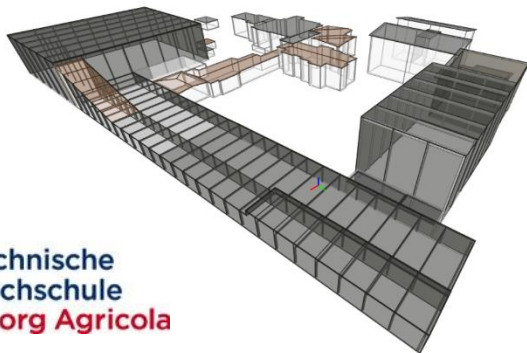
BIM interoperability



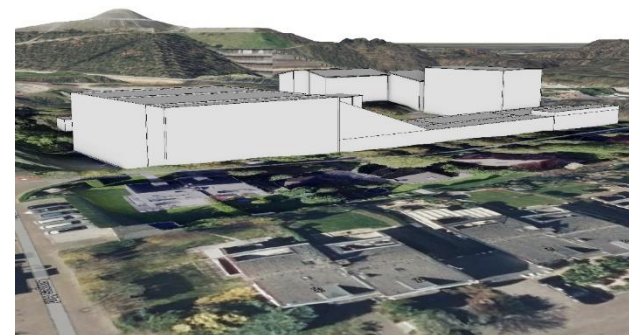
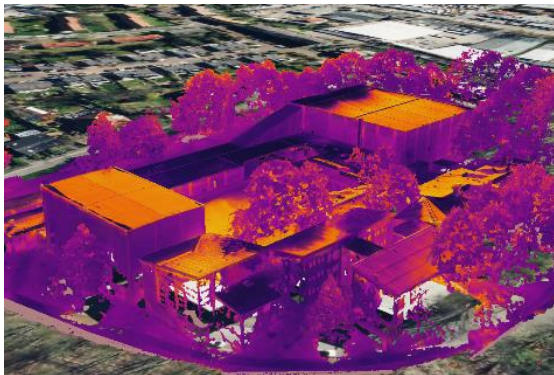
<https://bloggershrutidoshi.wordpress.com/2020/06/10/building-information-modeling-in-construction-industry/>



Generate BIM from scratch - Olympiastützpunkt Westfalen/Bochum

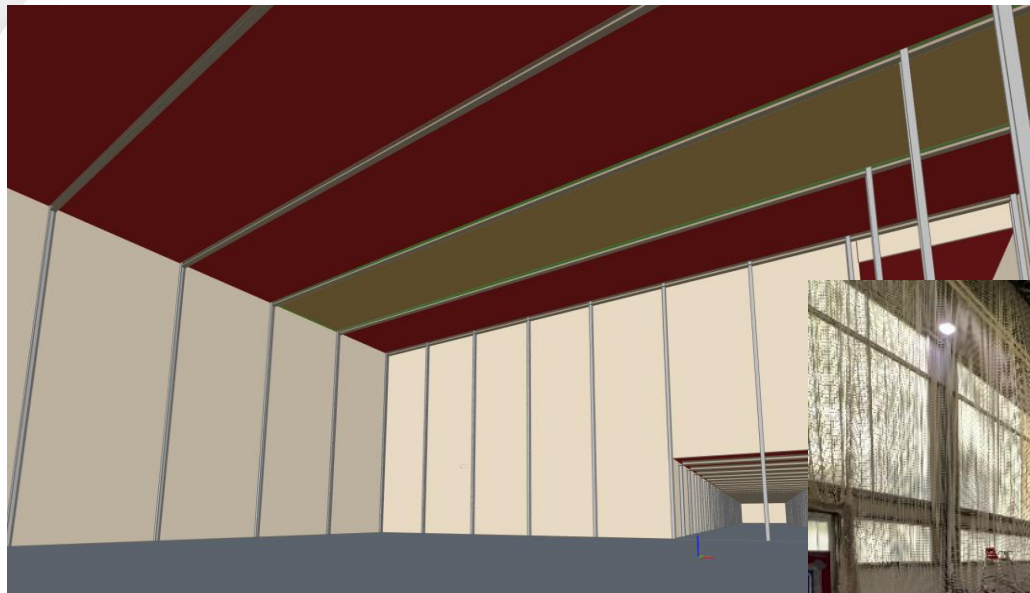


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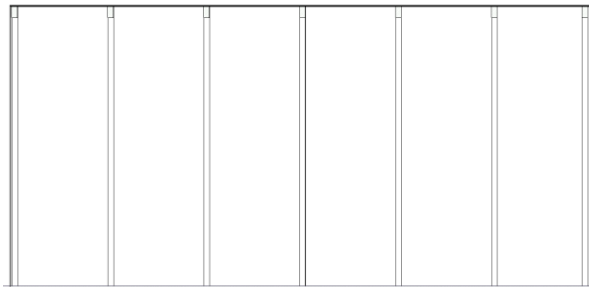
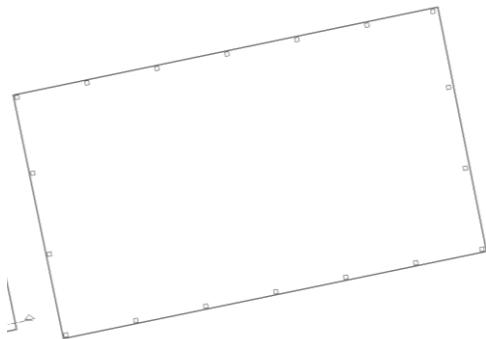


In-situ Inspection and Survey





Construction with Autodesk Revit and City2BIM



Georeferencing

Postal Address

Address lines:

Postal Code: Town:

Region: Country:

Geographic site coordinates

Latitude [°]: Deg DMS

Longitude [°]: True North [°]:

Projected coordinates

Eastings [m]: Northings [m]:

Scale: Grid North [°]:

EPSG-Code (CRS):

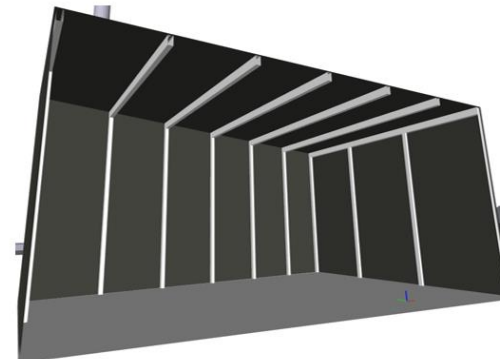
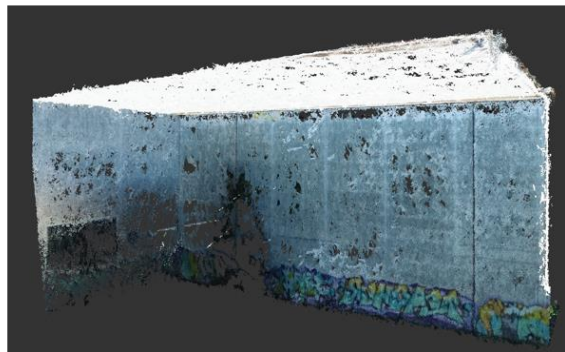
Elevation

Orthometric Height [m]: Vertical Datum:

UTM transformation

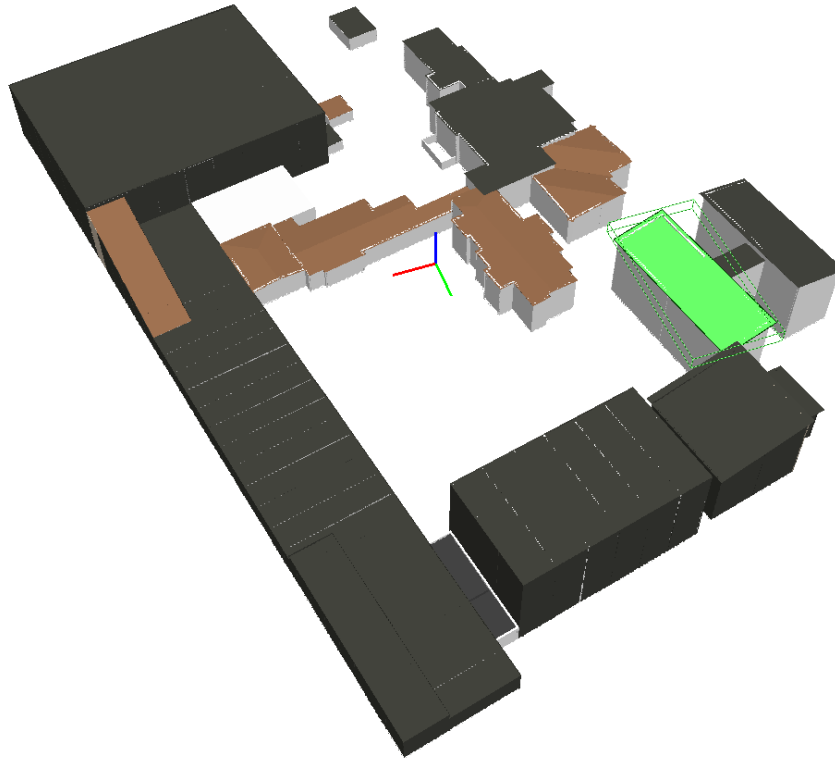
Site (Lat/Lon) to Projection (UTM)

Projection (UTM) to Site (Lat/Lon)





BIM Olympiastützpunkt Ruhr-Ost



Industry Foundation Classes (IFC) Format
International Standard ISO 16739-1:2018



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TerraSAR-X Images

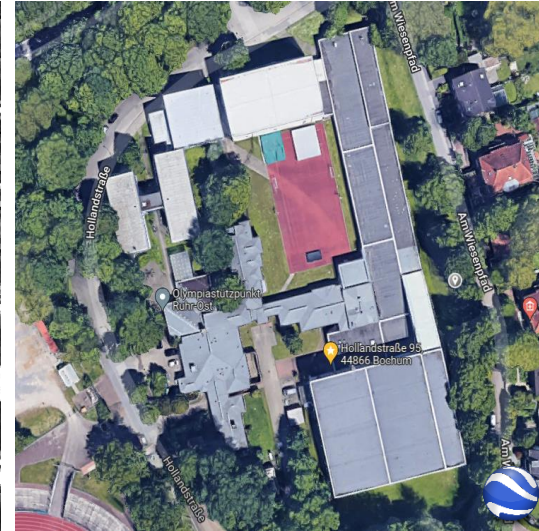
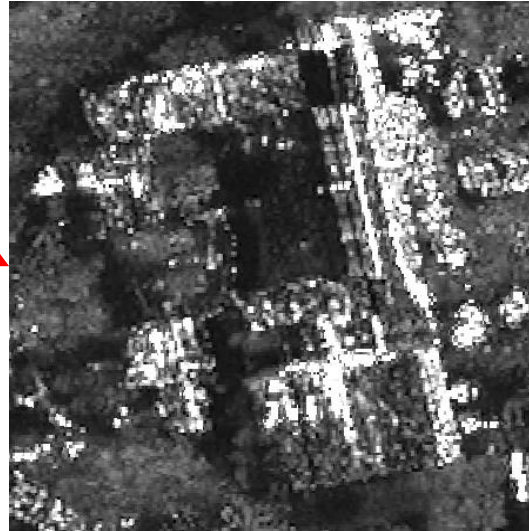


28 images

Time period: Jan 2018 – October 2019

HR SpotLight 300 MHz ($\approx 0.6 \text{ m} \times \approx 1 \text{ m}$)

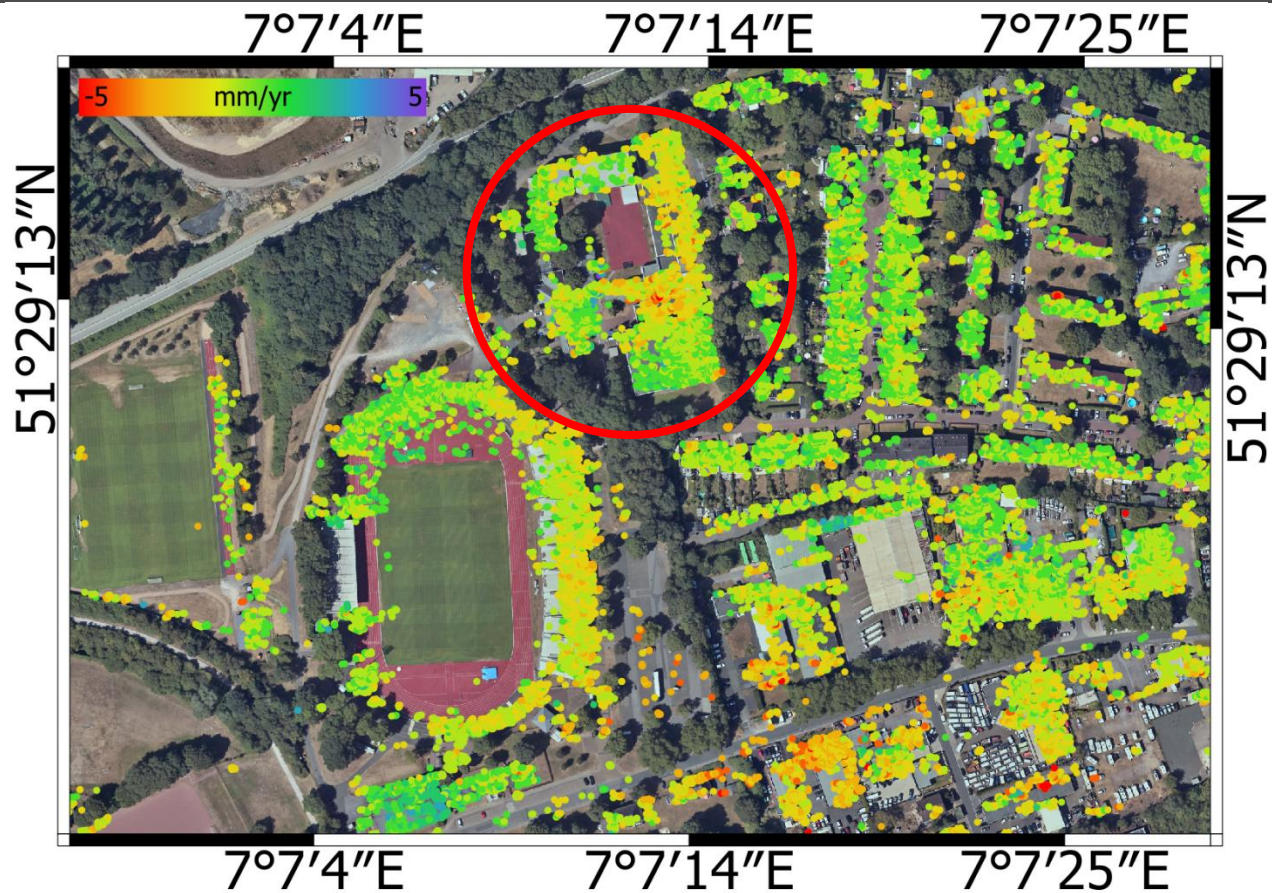
HH-Polarization



(DLR-Project MTH3793)



PSI Map



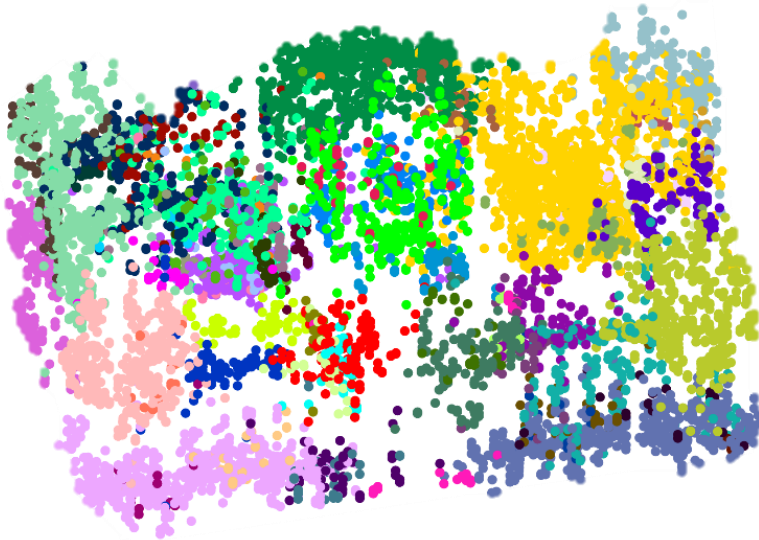


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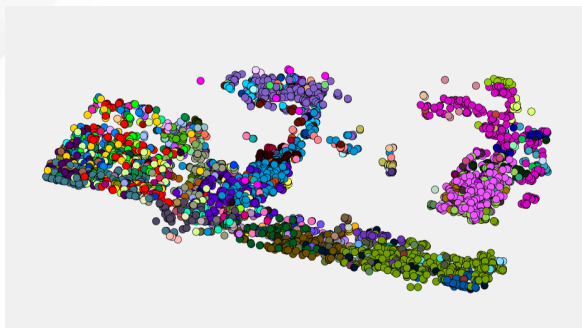


Assignment of PS-points into Substructures

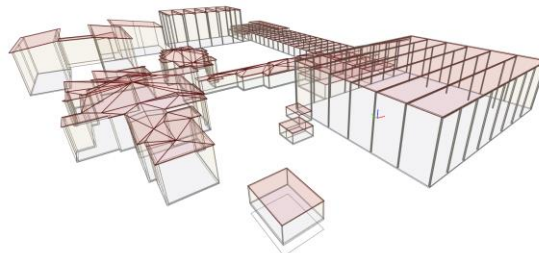


Schneider, P. J. & Soergel, U. [2021] Clustering Persistent Scatterer Points Based on a Hybrid Distance Metric. In: Pattern Recognition. DAGM GCPR 2021. Lecture Notes in Computer Science, vol 13024. Springer.





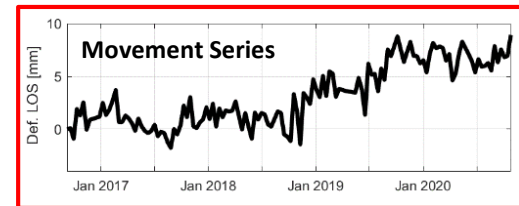
PS-Points



BIM Model



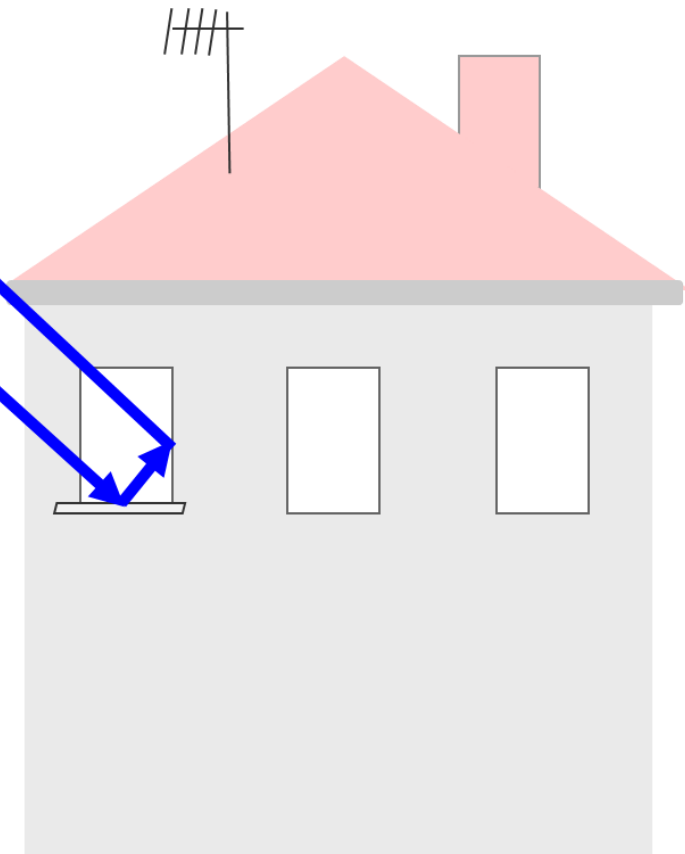
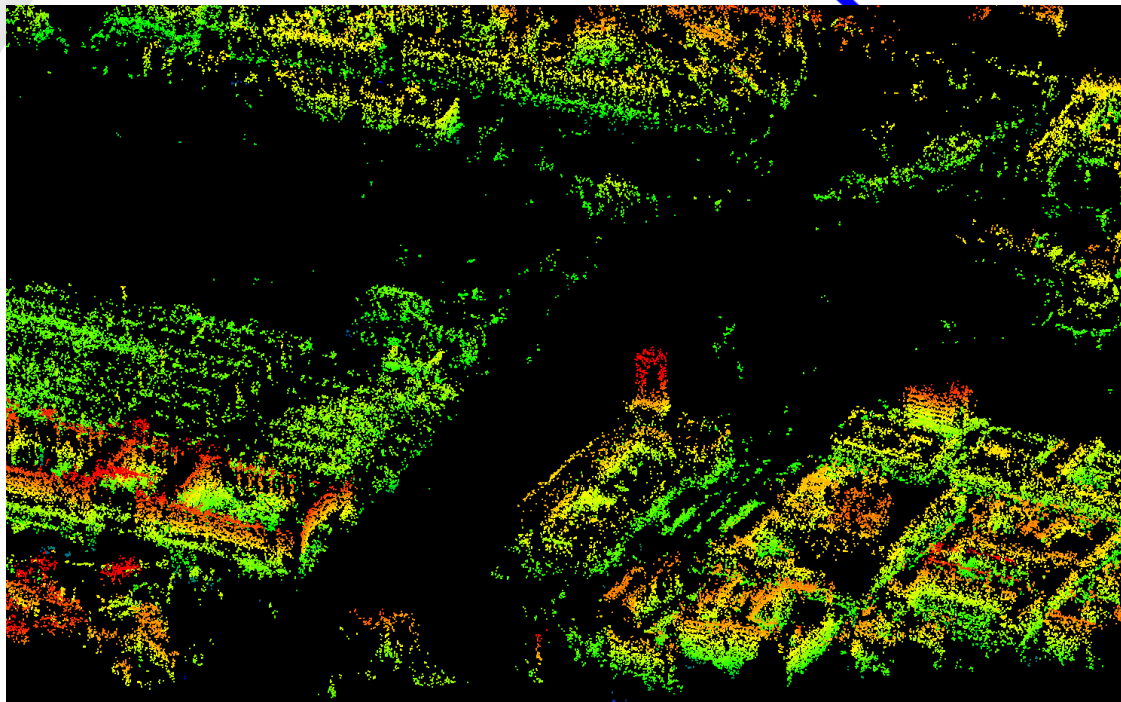
Fused BIM Model



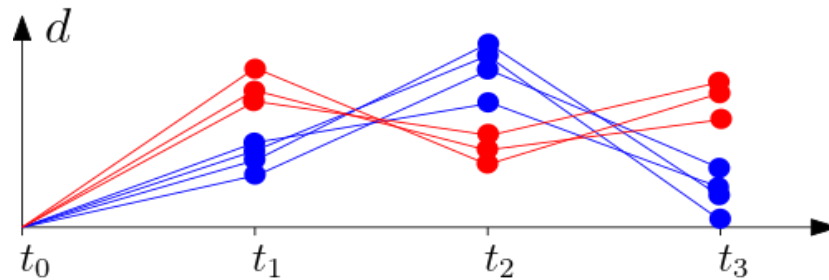
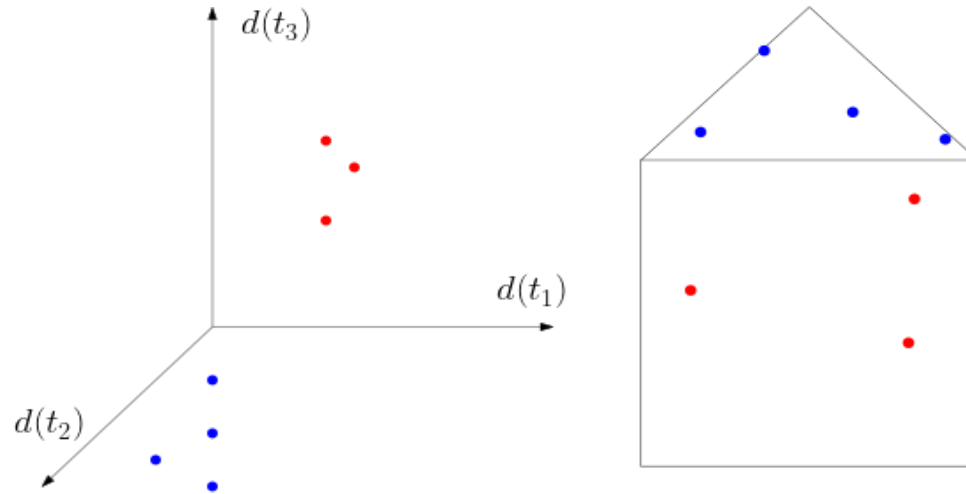
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PS-points on Building

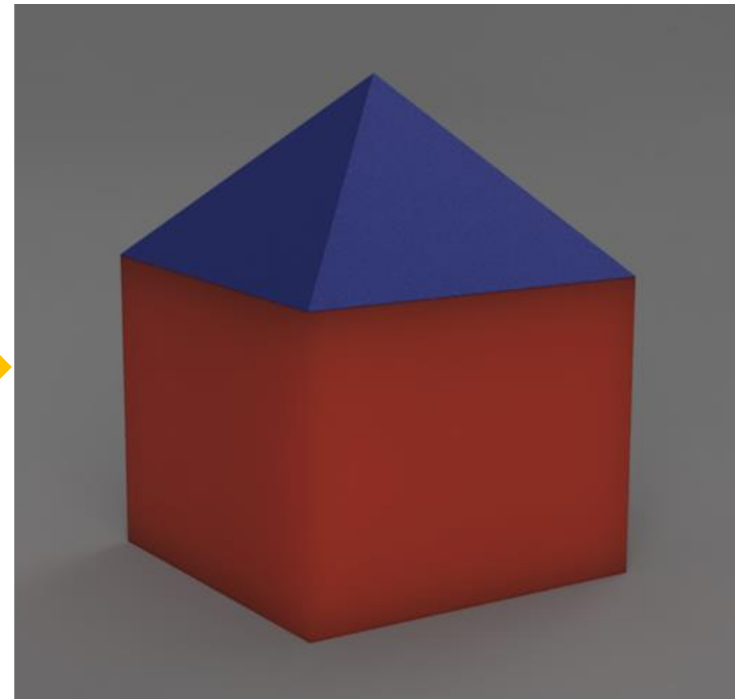
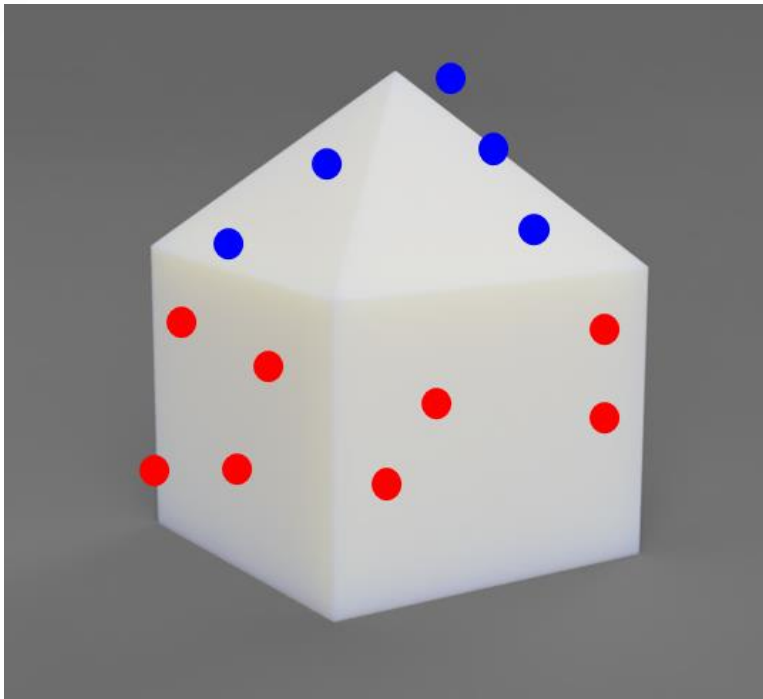


Clustering of PS-points



Schneider, P. J. & Soergel, U. [2021] Clustering Persistent Scatterer Points Based on a Hybrid Distance Metric. In: Pattern Recognition. DAGM GCPR 2021. Lecture Notes in Computer Science, vol 13024. Springer.

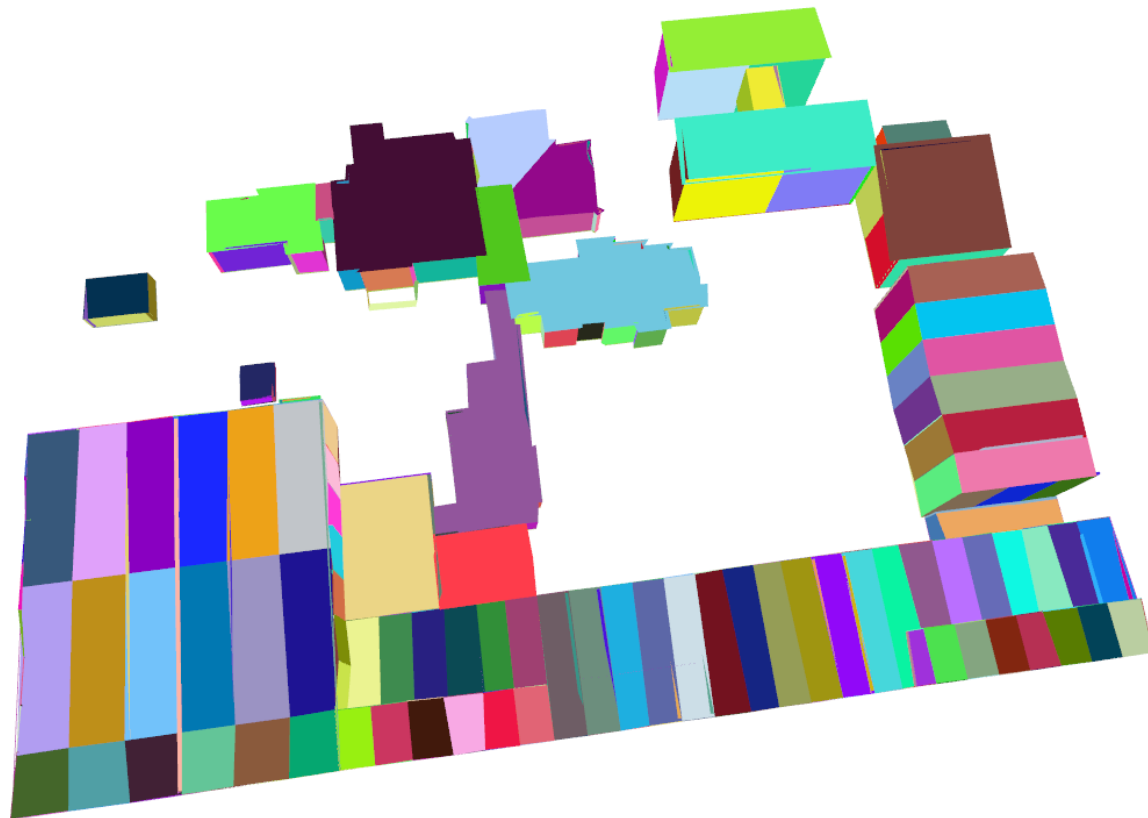
Fusion of PS-Clusters and BIM Model



Schneider, P. J. & Soergel, U. [2021] Clustering Persistent Scatterer Points Based on a Hybrid Distance Metric. In: Pattern Recognition. DAGM GCPR 2021. Lecture Notes in Computer Science, vol 13024. Springer.



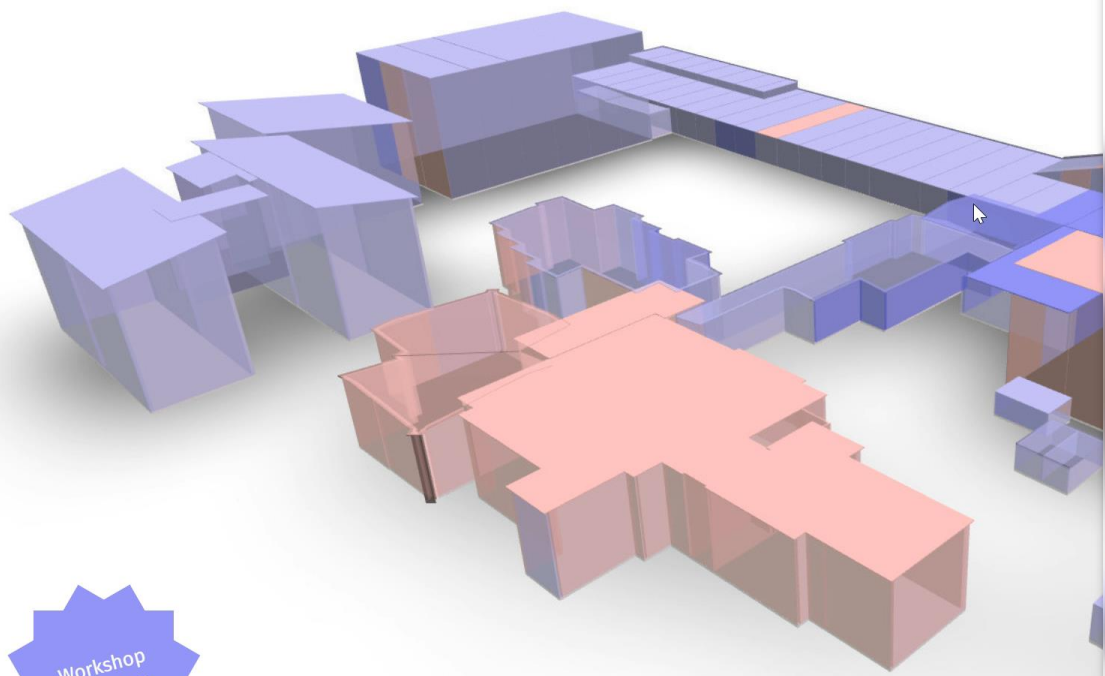
Fused BIM Model





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Workshop
24.10.2022

BIM-SAR

Projekt

Organisation

BIM-SAR-Plattform

BIM-City

Gefördert durch:



aufgrund eines Beschlusses
des Deutschen Bundestages

Datenschutz · Impressum





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Conclusion and Outlook

- Challenge: create IFC-format BIM model
- Automatic fusion of BIM & SAR
- Prototype of interactive platform
- City-level monitoring



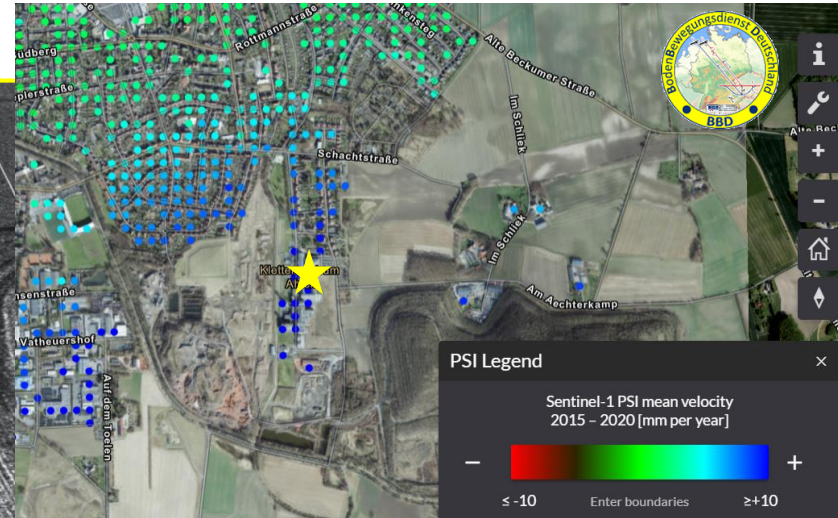
Zeche Westfalen, Ahlen

26 images

Time period: Jan 2021 – June 2023

Staring SpotLight 300 MHz ($\approx 0.6 \text{ m} \times \approx 0.25 \text{ m}$)

HH-Polarization



(DLR-Project MTH3793)



EFTAS.GeoIT
PRECISELY FOR YOUR WORLD

BIMSAR:

<https://bimsar.eftas.services/>

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