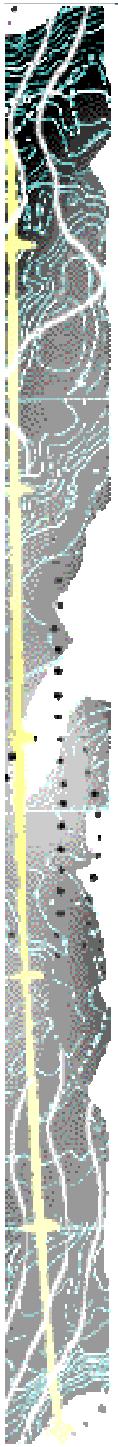

NATIONAAL GEOGRAFISCH INSTITUUT
INSTITUT GEOGRAPHIQUE NATIONAL

EuroSDR Image Matching Benchmark

RMA Results on the Datasets

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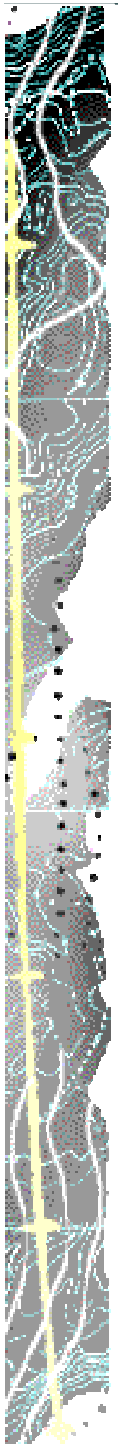
Vienna – 13-14 June 2013



RMA DSM Tool : Overview

Implementation of the classical 4 steps for DSM computation:

- Epipolar rectification :

  Data are transformed in epipolar geometry to simplify matching

-Disparity map computation

  Correlation method with successive window sizes (w = 3,5,7....)

  Global optimisation based MRF and using this stack of disparity map

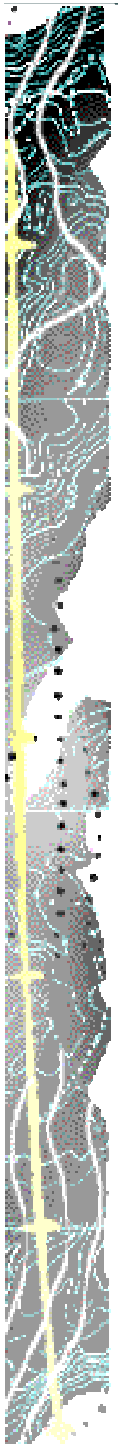
  Segmentation + median filter to remove outliers

- DSM reconstruction

  Thanks to data Interior and Exterior parameters

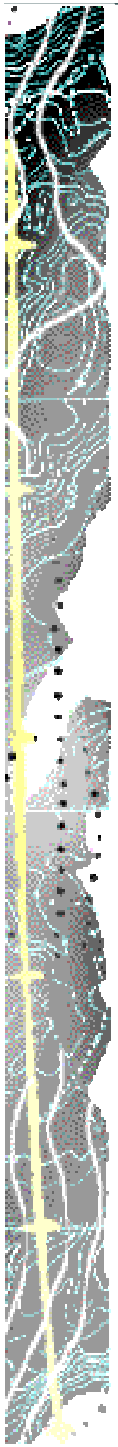
- Multi-view fusion

  All stereo views are fused by taking the median of the z values



RMA IT Environment

- Linux Cluster
  - Fedora
- 90+ CPUs
  - Intel – 2.4 GHz
  - 30+ nodes
  - 272 GB RAM (total)
    - largest block: 47GB
  - 1+ TB disk / node
- 1000 Mbit/s network



Implementation and processing conditions

- Parallel implementation with C/C++ OpenMPI

  The operating environment is a Linux cluster

- Two input parameters to set:
  - Initial disparity range
  - Minimum and Maximum correlation window sizes

  These parameters are automatically adjusted

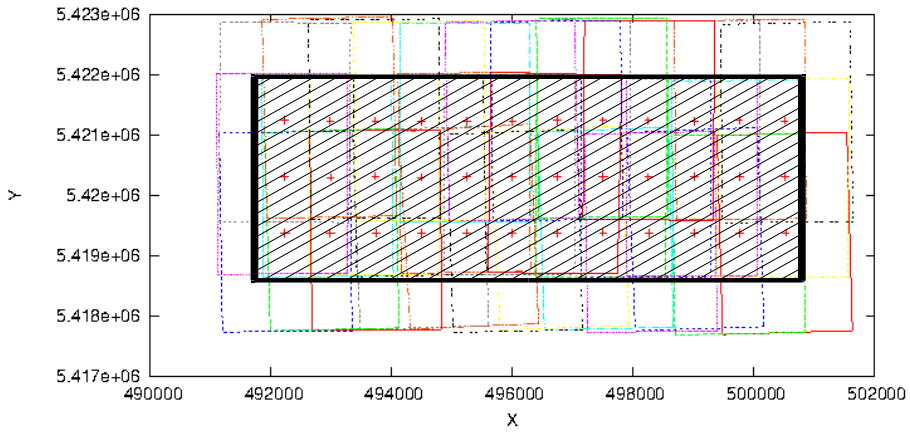
- Processing times
  - Muenchen : +/-1100s / stereo couple ; about +/- 5h total
  - Veihingen : +/- 500s / stereo couple ; about +/- 5h total

Results

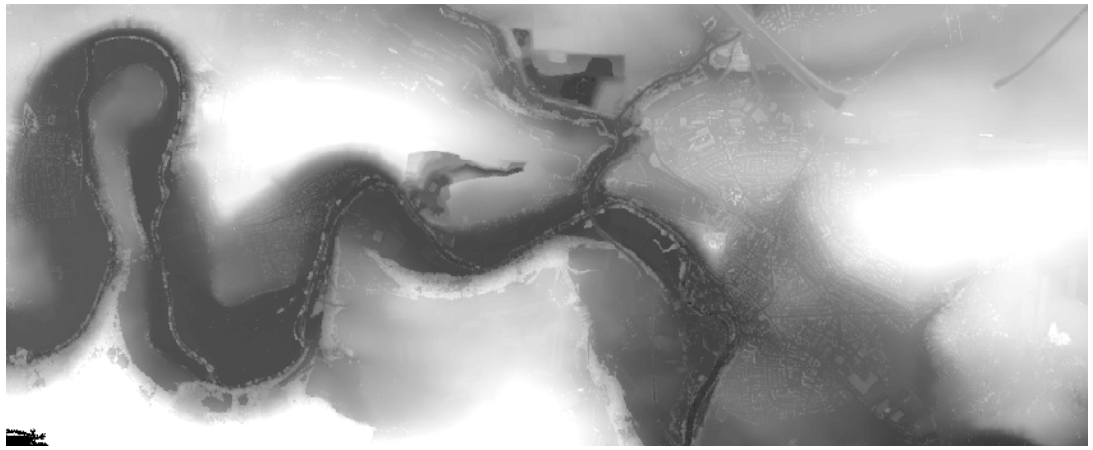
Vaihingen/Enz

UltraCam-X – 36 images - GSD 20cm - 8 bit RGB – 60/60 overlap

Test Area: 37500x15000

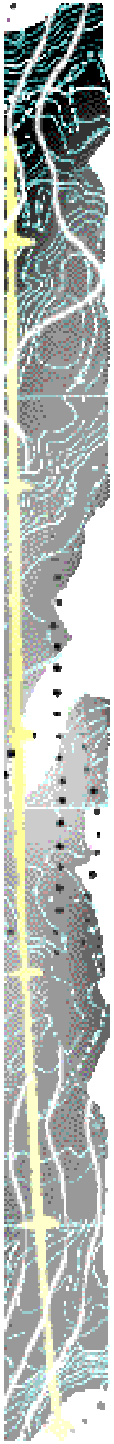


Vaihingen DSM:

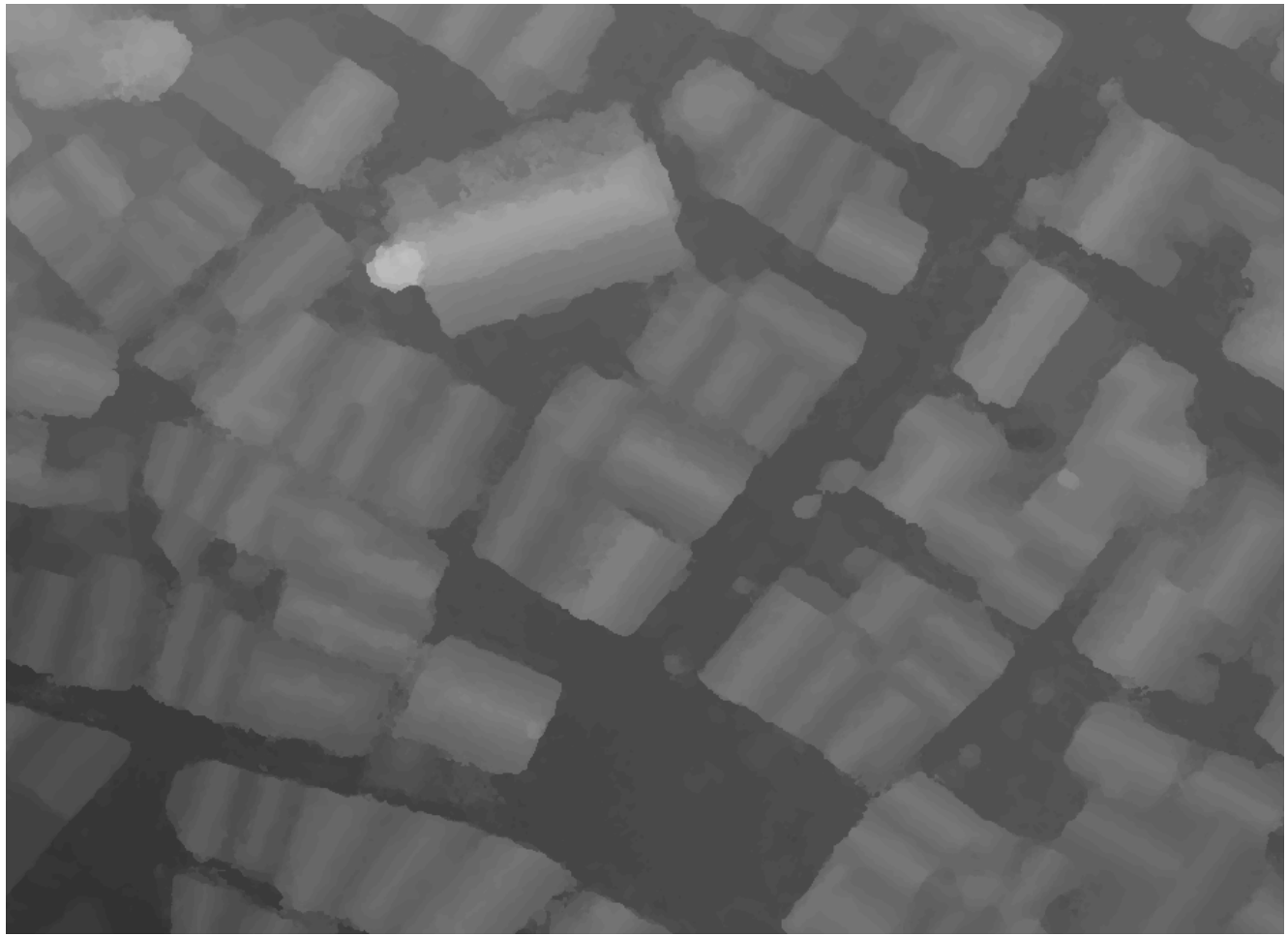


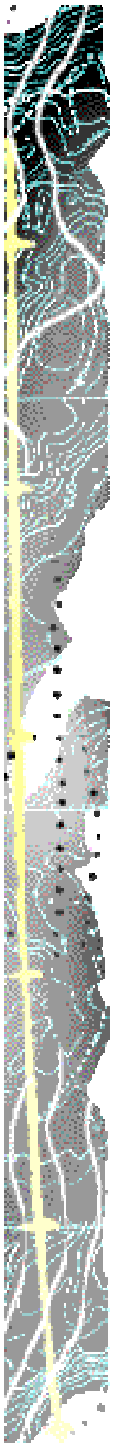
The result is obtained by combining DSMs from all views

Processing time was about 5hours with the cluster (90 CPUs)

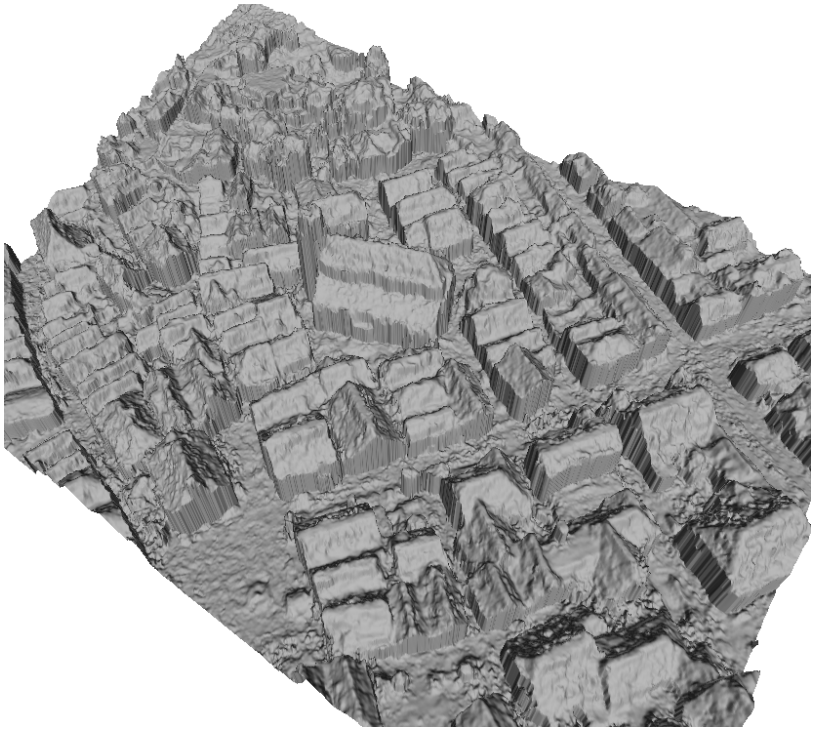


Zoom on Vaihingen DSM

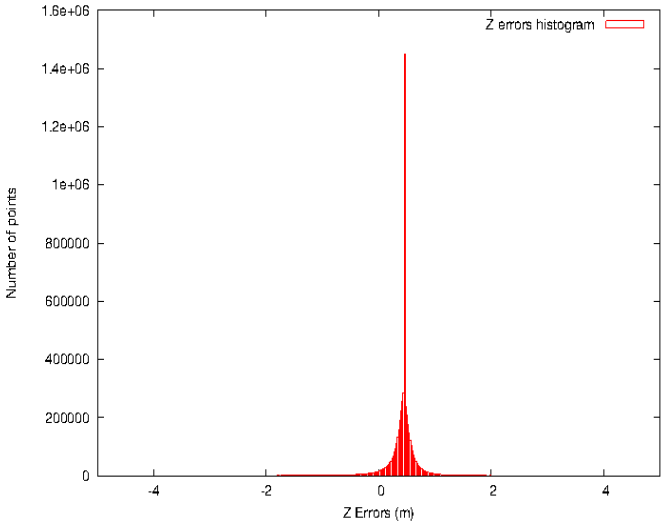




View in 3D shading



Vaihingen RMA Result vs EuroSDR Median DSM



Diff Min-Max [-172.46 , 34.30]
NbPts : 5618371
RMS : 1.60

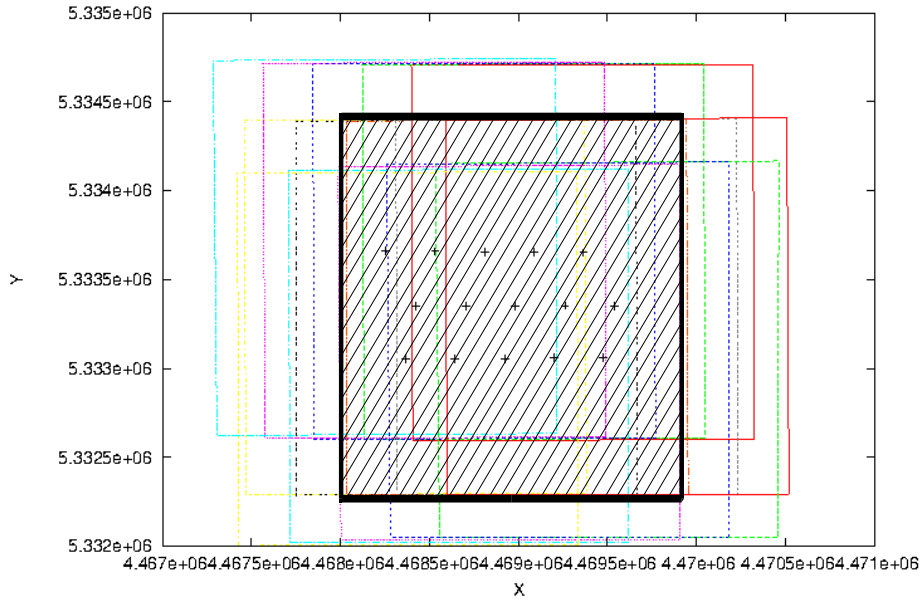
Interval [-5 , 5]
NbPts : 5558247 (98 %)
RMS : 0.55

Results

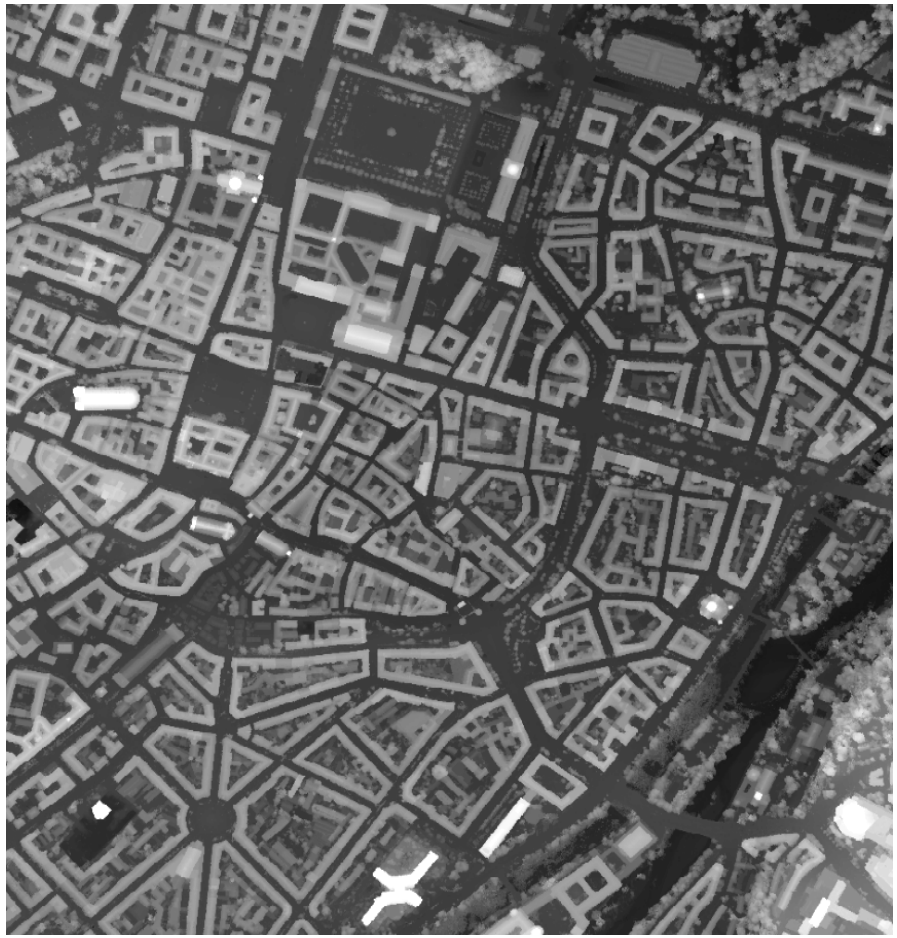
Munchen

DMC – 15 images - GSD 10cm - 16 bit Pan – 80/80 overlap

Test Area: 15000x17000

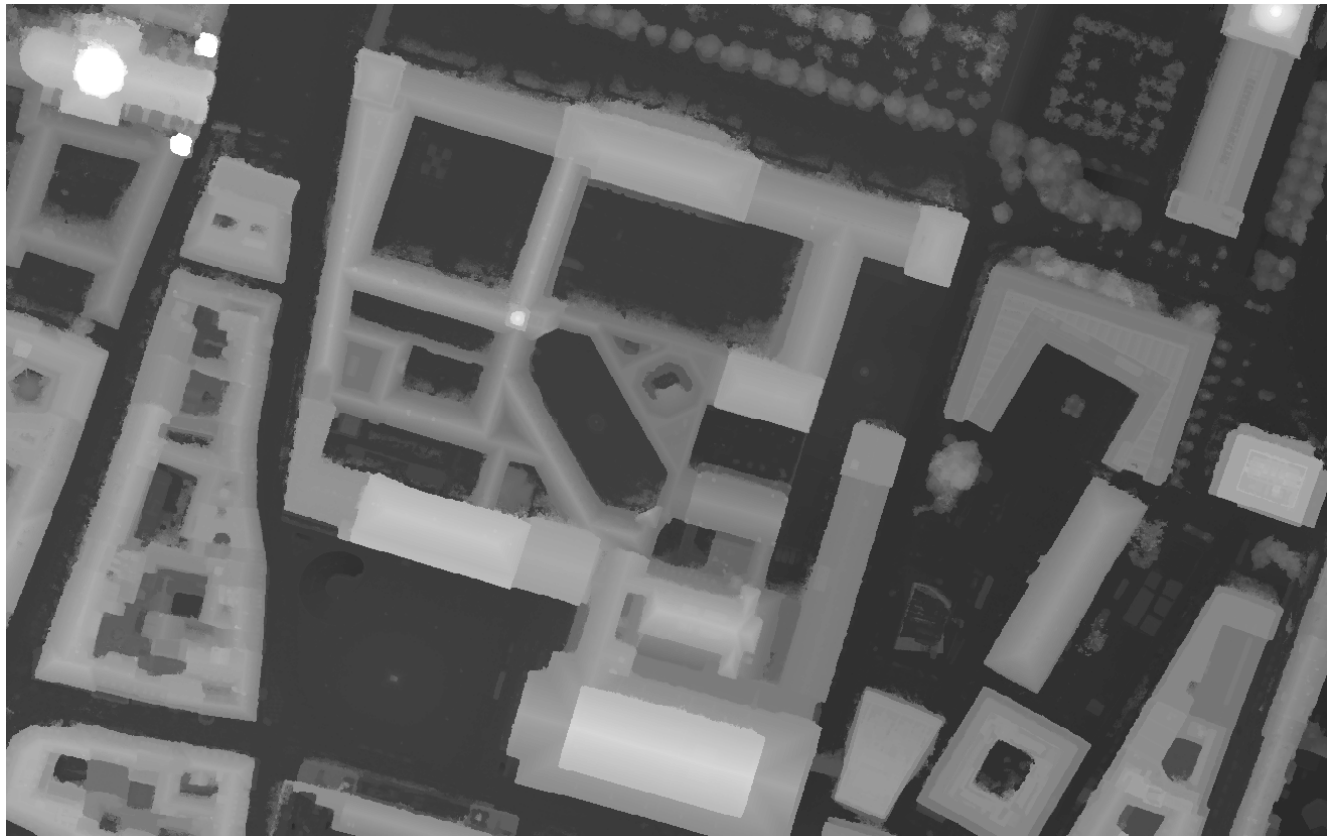


Munchen DSM:

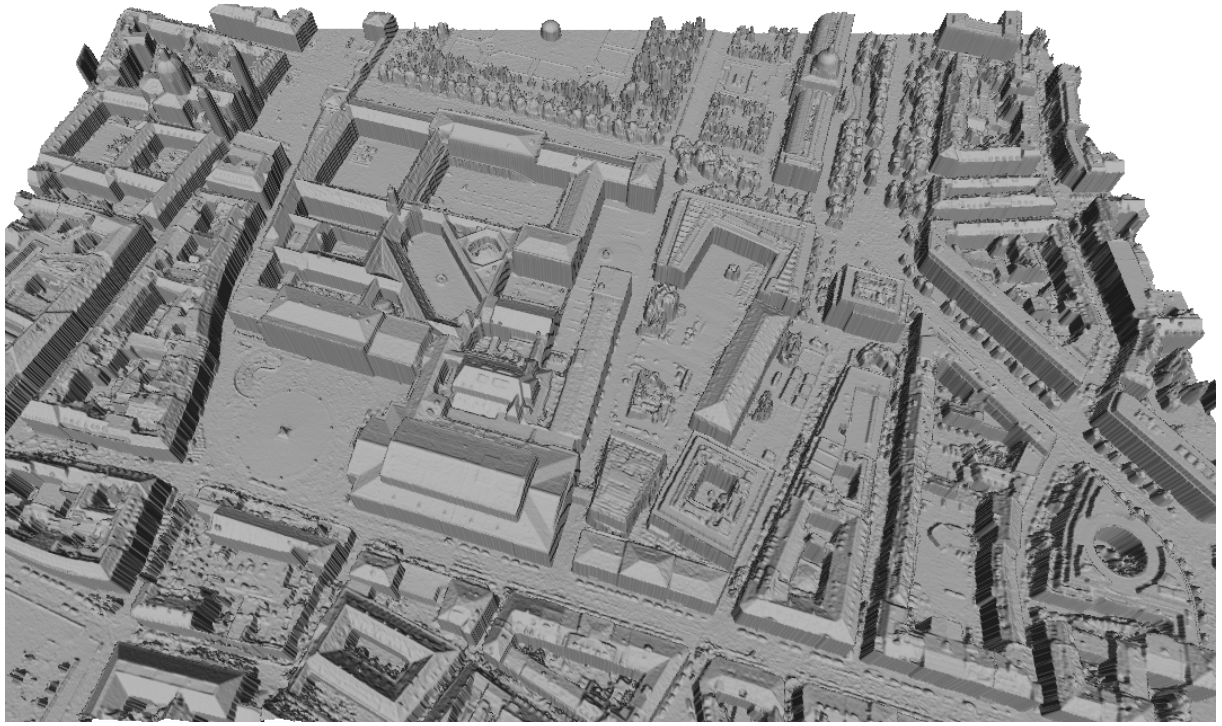


- The result is obtained by combining DSMs from all views
- Processing time was about 5hours with the cluster (90 CPUs)

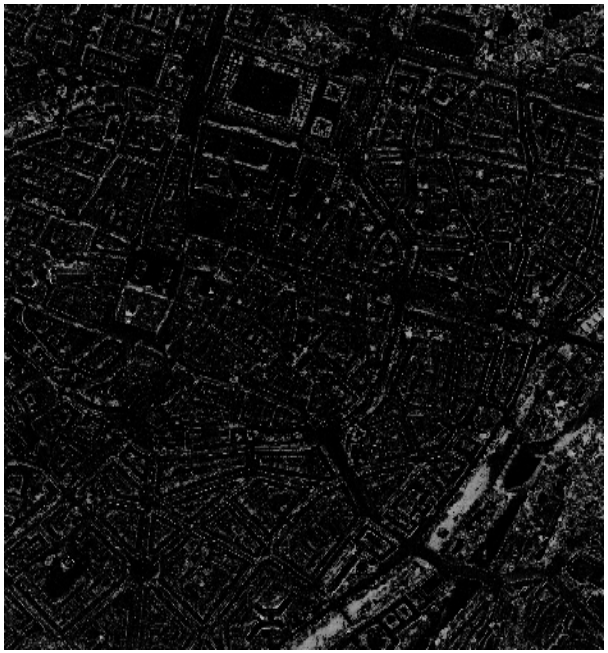
Zoom on Munchen DSM

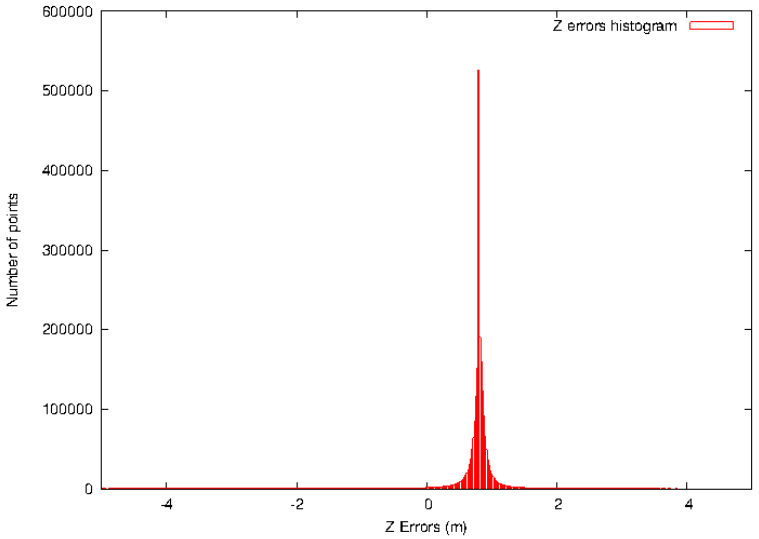


View in 3D shading



Munchen RMA Result vs EuroSDR Median DSM





Diff Min-Max [-78.81 , 61.34]
NbPts : 2550000
RMS : 2.26

Interval [-5 , 5]
NbPts : 2429863 (95 %)
RMS : 0.84