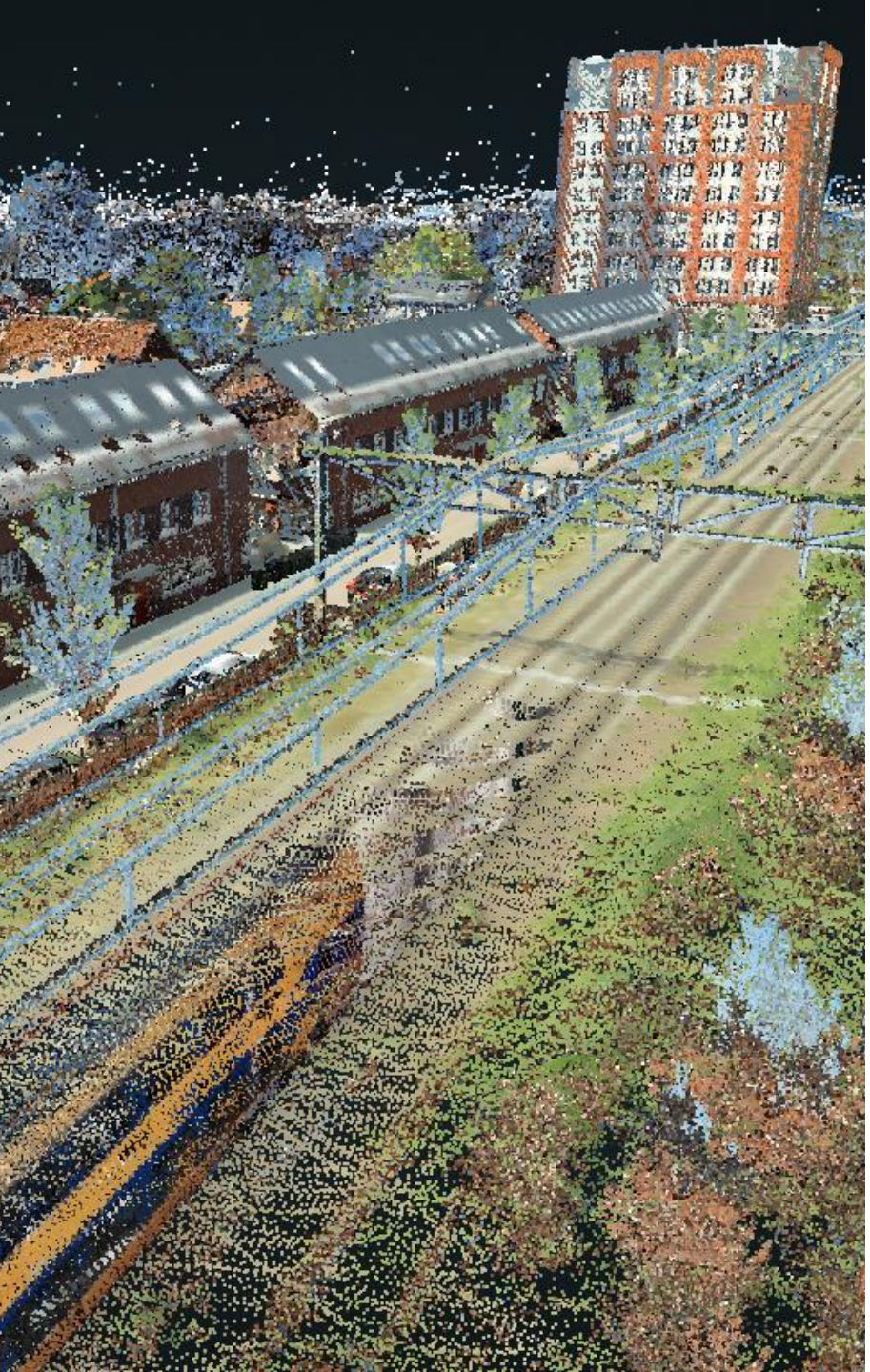


Virtual visit to Geodelta

Visit of Snellius to Geodelta

13 October 2020

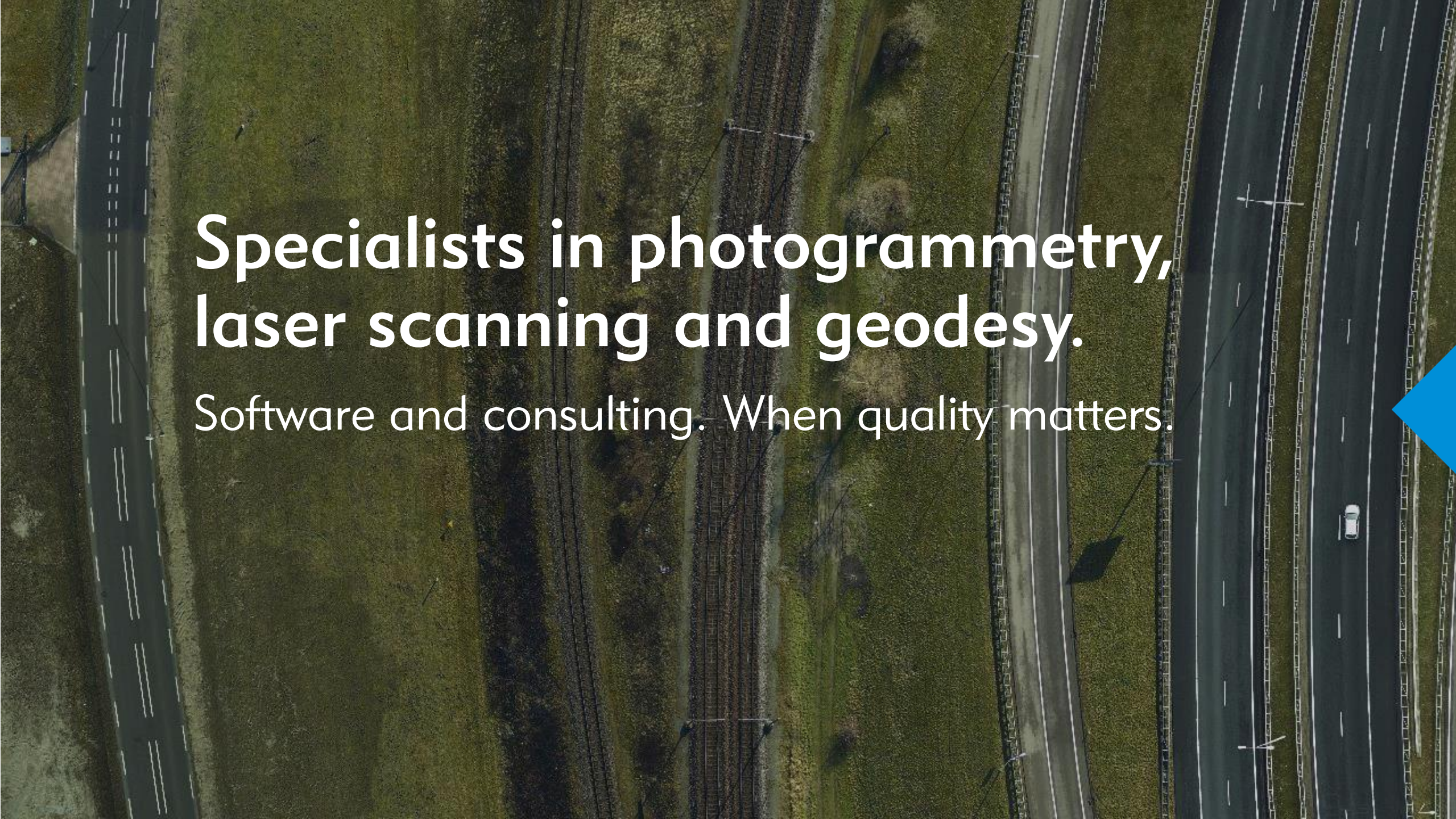
Snellius

GEODELTA

Agenda

1. Welcome and introduction
2. About Geodelta, our activities and a little bit of theory
3. Tour through the building
4. Demonstrations photogrammetry
5. Demonstrations laser scanning (AHN4)
6. Closing

Questions throughout!



Specialists in photogrammetry, laser scanning and geodesy.

Software and consulting. When quality matters.

Our clients carry great responsibility. They manage critical infrastructure, maintain cities or deliver parts for the aerospace industry.

The margin for error is getting smaller, and as it does so, the requirements for spatial measurements are getting stricter.

GEODELTA

Based in Delft

- Over 30 years of experience… but with a fresh start in 2018.
- Team of seven employees, background in Geodesy or Computer Science.
- Fully independent.

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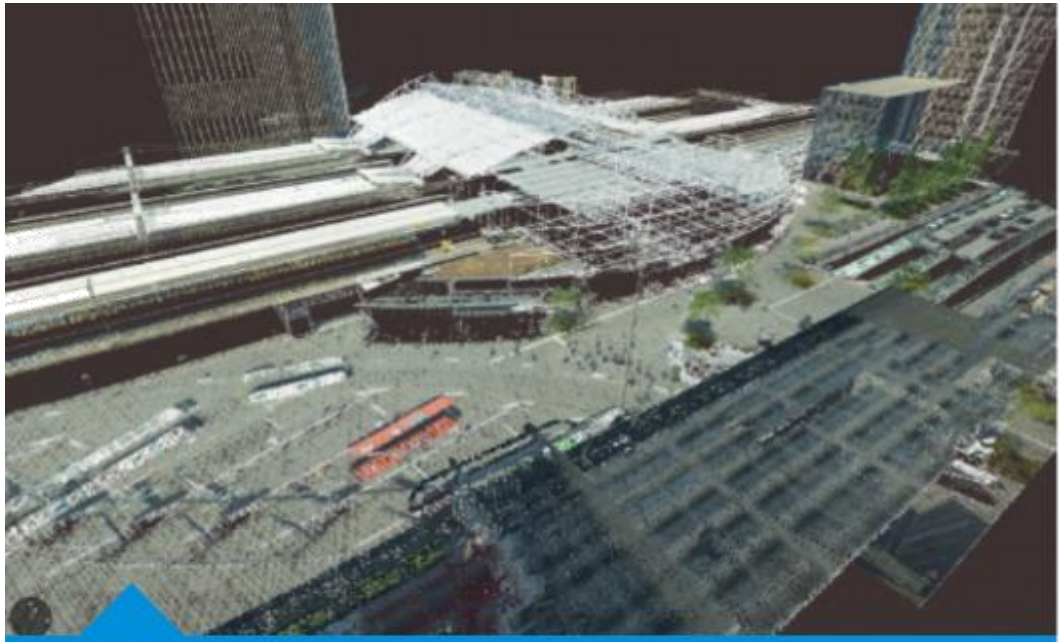


Software

Inspired by consultancy

Consulting

Based on our own software

GEODELTA

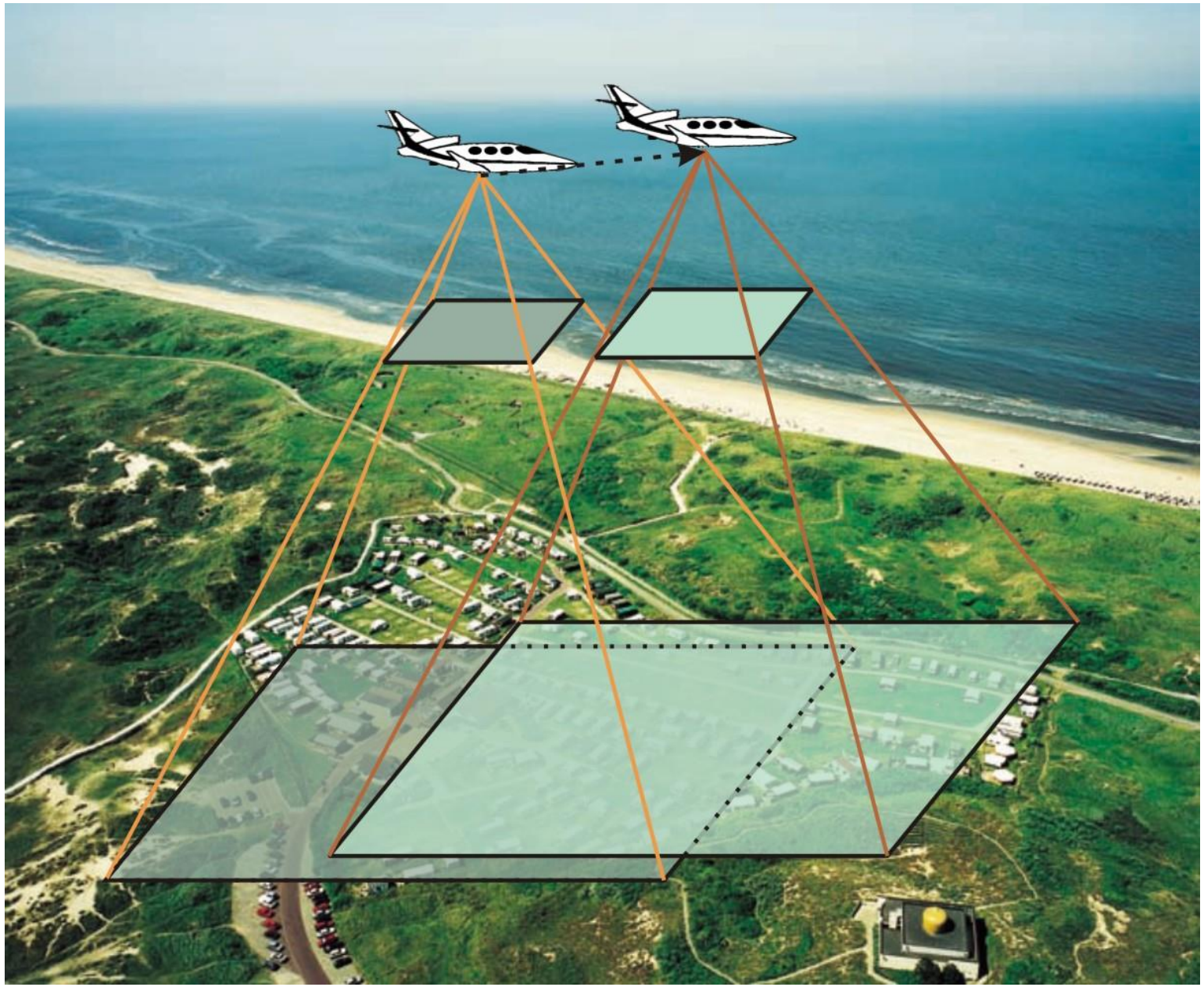
Software

EyeBase

Raida

GEODELTA

EyeBase



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EyeBase

- Mapping from stereo images.
- Used for maintenance of large scale topographic maps (BGT and BAG).
- Fully three dimensional.
- Simple to use.

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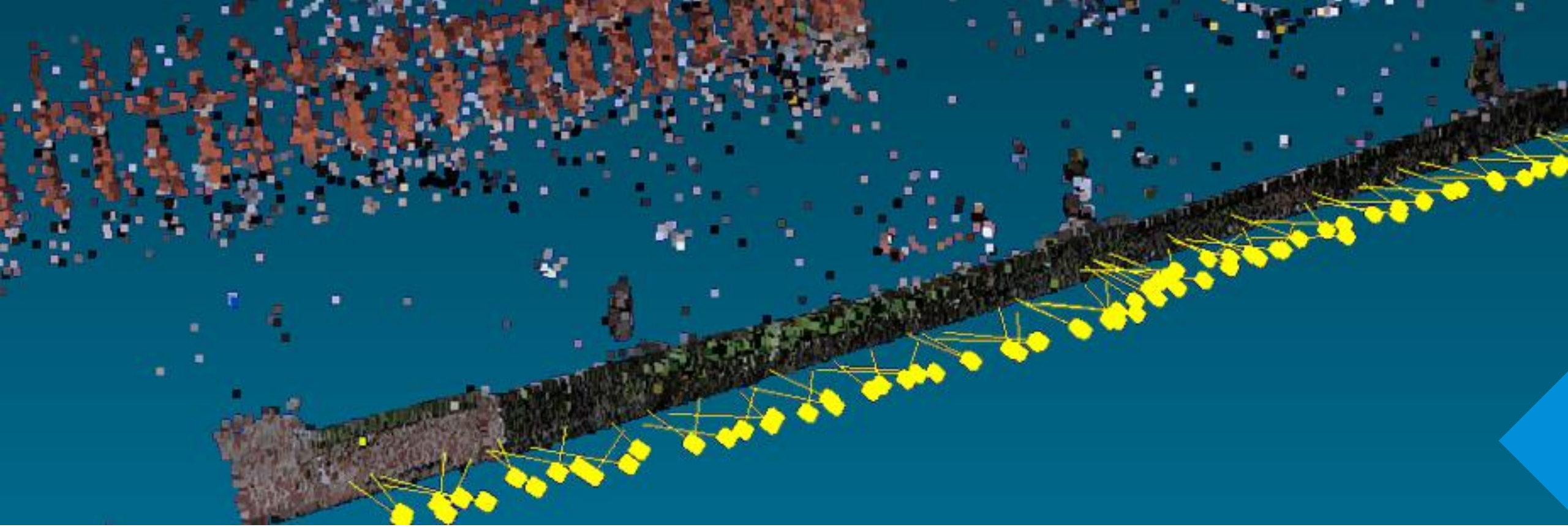

Raida

- Automatic 3D reconstruction from images.
- Drones and close range photogrammetry.
- Used for mapping where reliability matters (deformations, forensics, inspection).

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Consulting

- Independent geodetic quality checks.
- We write specifications for geo-data.
- We check if delivered data is conforming the specifications.
- All checks are based on in-house developed software.

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We’re not good in pretty pictures

We’d rather focus on geometrical quality

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What is quality?

WE OFFER 3 KINDS OF SERVICES

GOOD-CHEAP-FAST

BUT YOU CAN PICK ONLY TWO

GOOD & CHEAP WON'T BE FAST

FAST & GOOD WON'T BE CHEAP

CHEAP & FAST WON'T BE GOOD

What is quality?

- Up-to-dateness (temporal quality)
- Completeness
- (Semantic) correctness
- Density

- Accuracy

What is the area of this paper?

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Accuracy

- Random errors
  - Stochastic behaviour
- Systematic errors
- Blunders

Noise

Standard deviation

Model errors

Redundancy

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WINMAU
SNIPER
The Force Behind Darts
BDO
BDO

Redundancy and testing

De tweede formule voor $\underline{V}_q$ als $q = b$ wordt gevonden als de volgende relaties uit het B-model worden benut:

$$\begin{aligned} \underline{t} &= B^T \underline{\hat{e}} \\ \underline{\hat{e}} &= Q_y B Q_t^{-1} \underline{t} \\ Q_{\hat{e}} &= Q_y B Q_t^{-1} B^T Q_y \end{aligned} \tag{6.68}$$

Eerst schrijven we $\underline{t}$ in de formule voor $\underline{V}_q$ uit:

$$\begin{aligned} \underline{V}_b &= \underline{t}^T Q_t^{-1} \underline{t} = \\ &= \underline{\hat{e}}^T B Q_t^{-1} B^T \underline{\hat{e}} = \\ &= \underline{\hat{e}}^T Q_{\hat{r}} \underline{\hat{e}} = \\ &= \underline{\hat{e}}^T Q_y^{-1} Q_{\hat{e}} Q_y^{-1} \underline{\hat{e}} \end{aligned} \tag{6.69}$$

Nu geldt echter

$$\begin{aligned} Q_{\hat{e}} Q_y^{-1} \underline{\hat{e}} &= Q_y B Q_t^{-1} B^T Q_y Q_y^{-1} \underline{\hat{e}} \\ &= Q_y B Q_t^{-1} B^T \underline{\hat{e}} = \\ &= Q_y B Q_t^{-1} \underline{t} = \\ &= \underline{\hat{e}} \end{aligned} \tag{6.70}$$

Dit ingevuld levert de gewenste formule:

$$\underline{V}_b = \underline{\hat{e}}^T Q_y^{-1} \underline{\hat{e}} \tag{6.71}$$

Om de derde uitdrukking voor $\underline{V}_b$ te krijgen, beginnen met vergelijking (6.15):

$$\underline{\hat{r}} = Q_y^{-1} \underline{\hat{e}}. \tag{6.72}$$

Hieruit volgt, dat $\underline{\hat{e}} = Q_y \underline{\hat{r}}$ en dat wordt ingevuld in vergelijking (6.71):

$$\underline{V}_b = \underline{\hat{e}}^T Q_y^{-1} \underline{\hat{e}} = \underline{\hat{r}}^T Q_y Q_y^{-1} Q_y \underline{\hat{r}} = \underline{\hat{r}}^T Q_y \underline{\hat{r}}. \tag{6.73}$$

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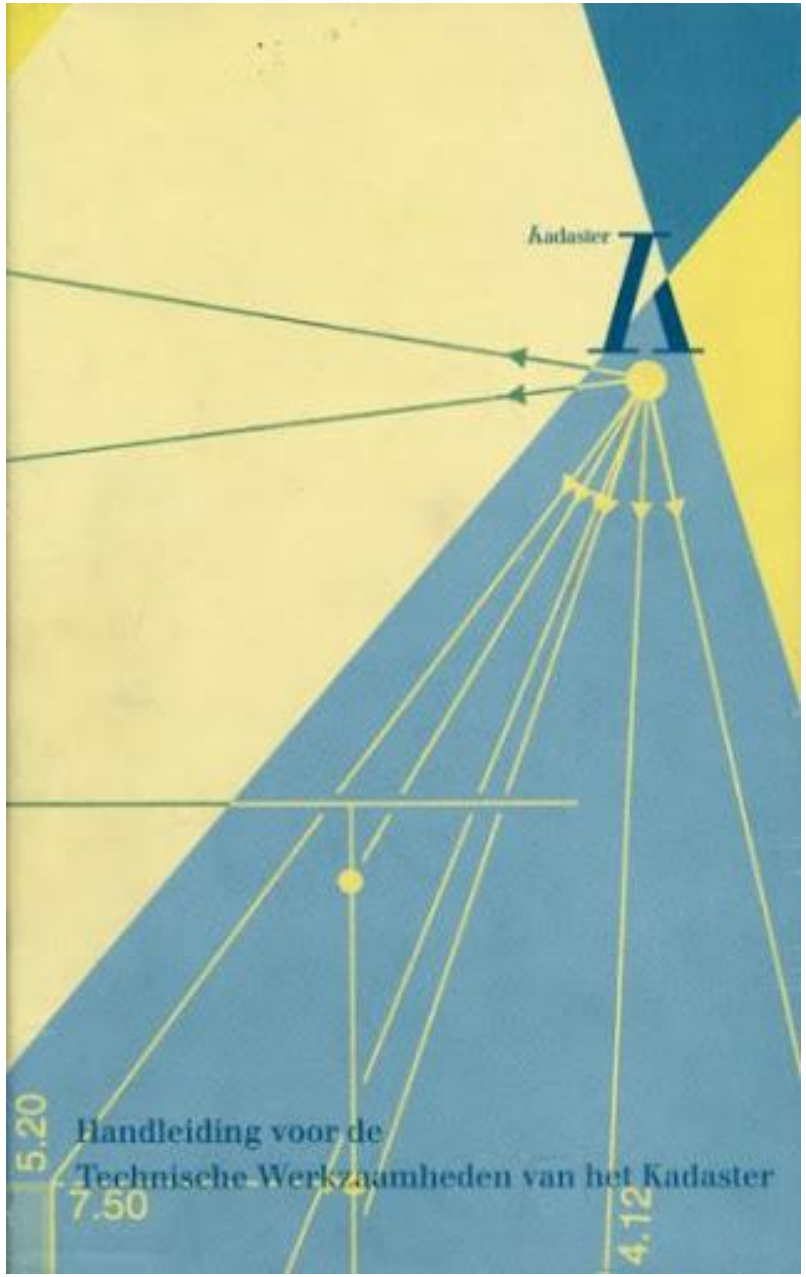
Quality control



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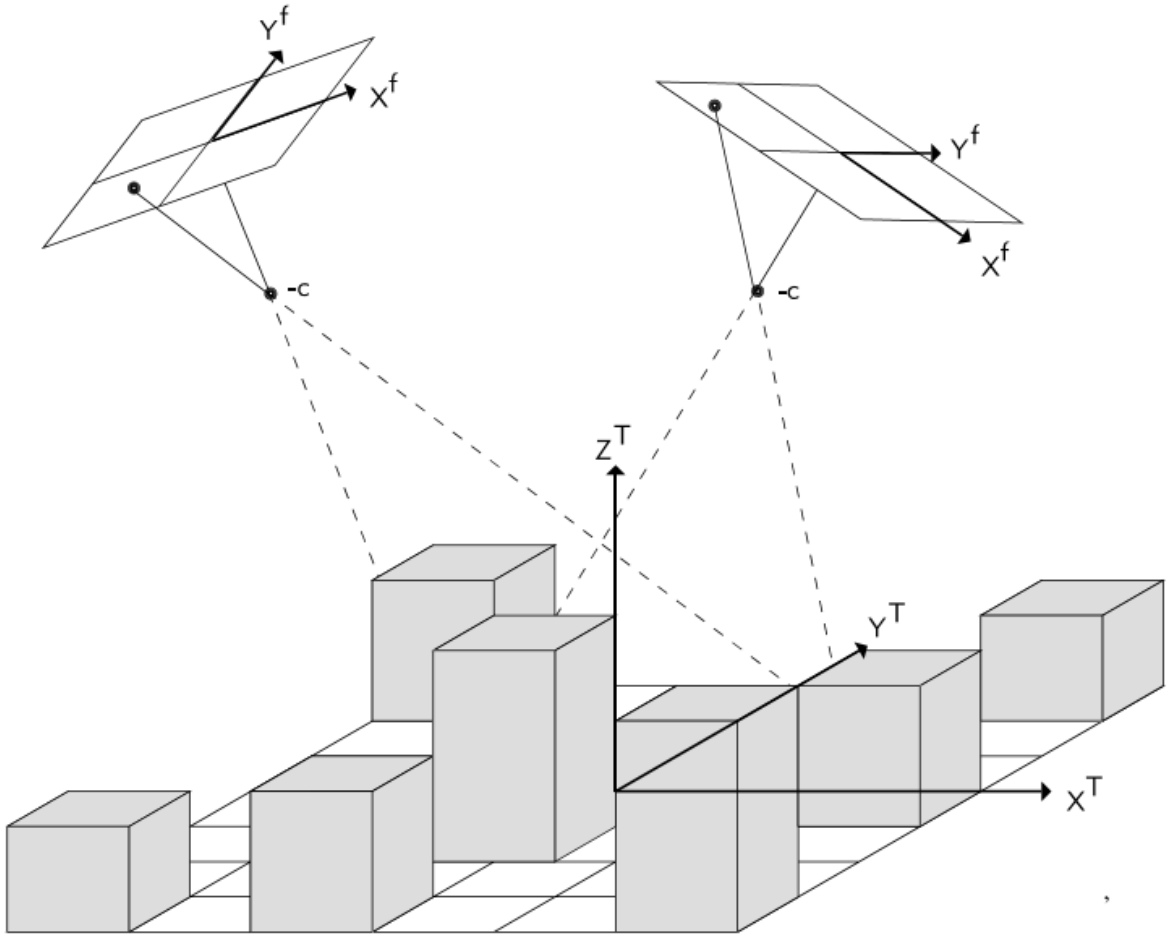
Photogrammetry



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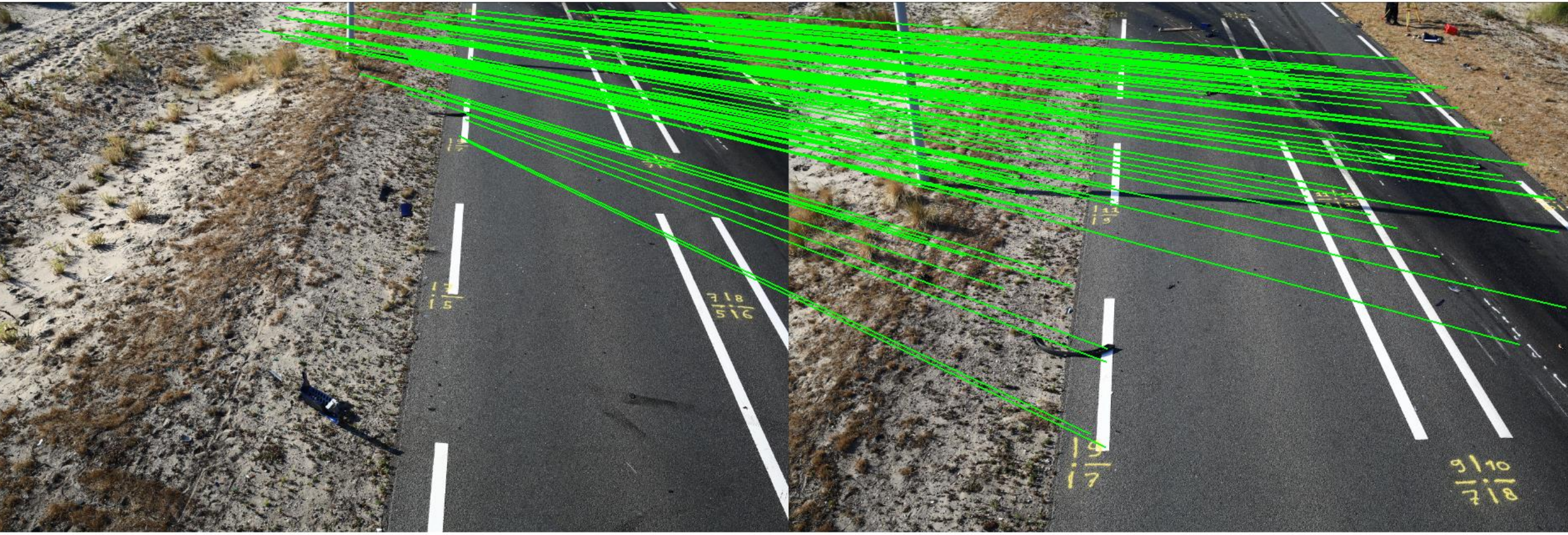
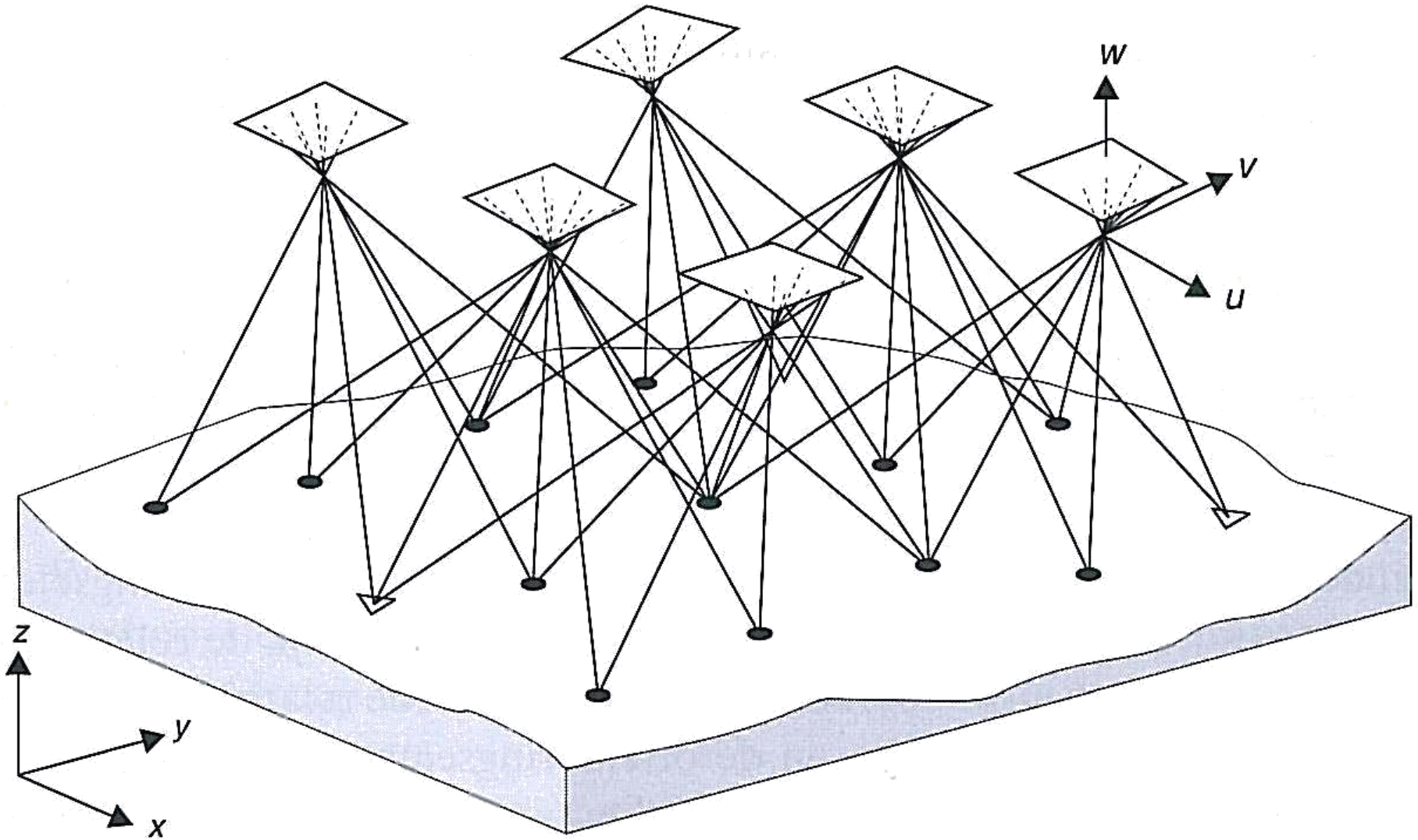
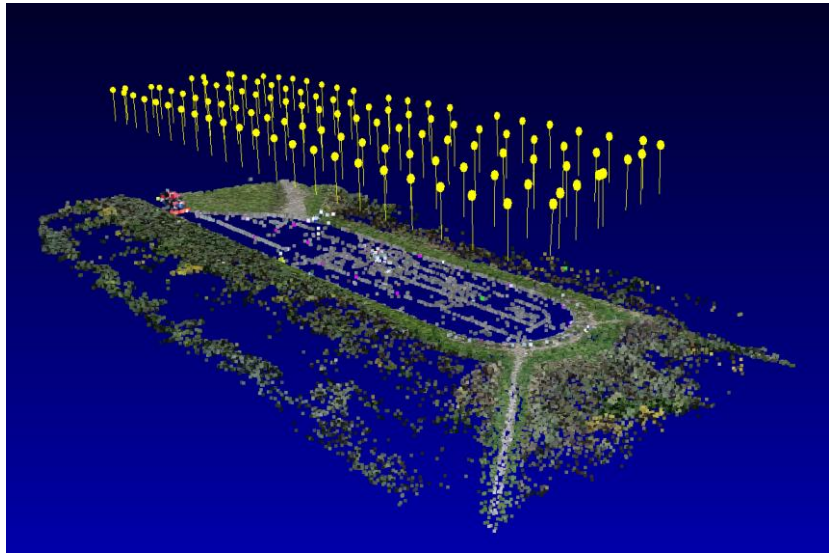
- Photogrammetry relies on overlap.
- Tie points are detected between the images.
- Redundancy is inherent to the method.

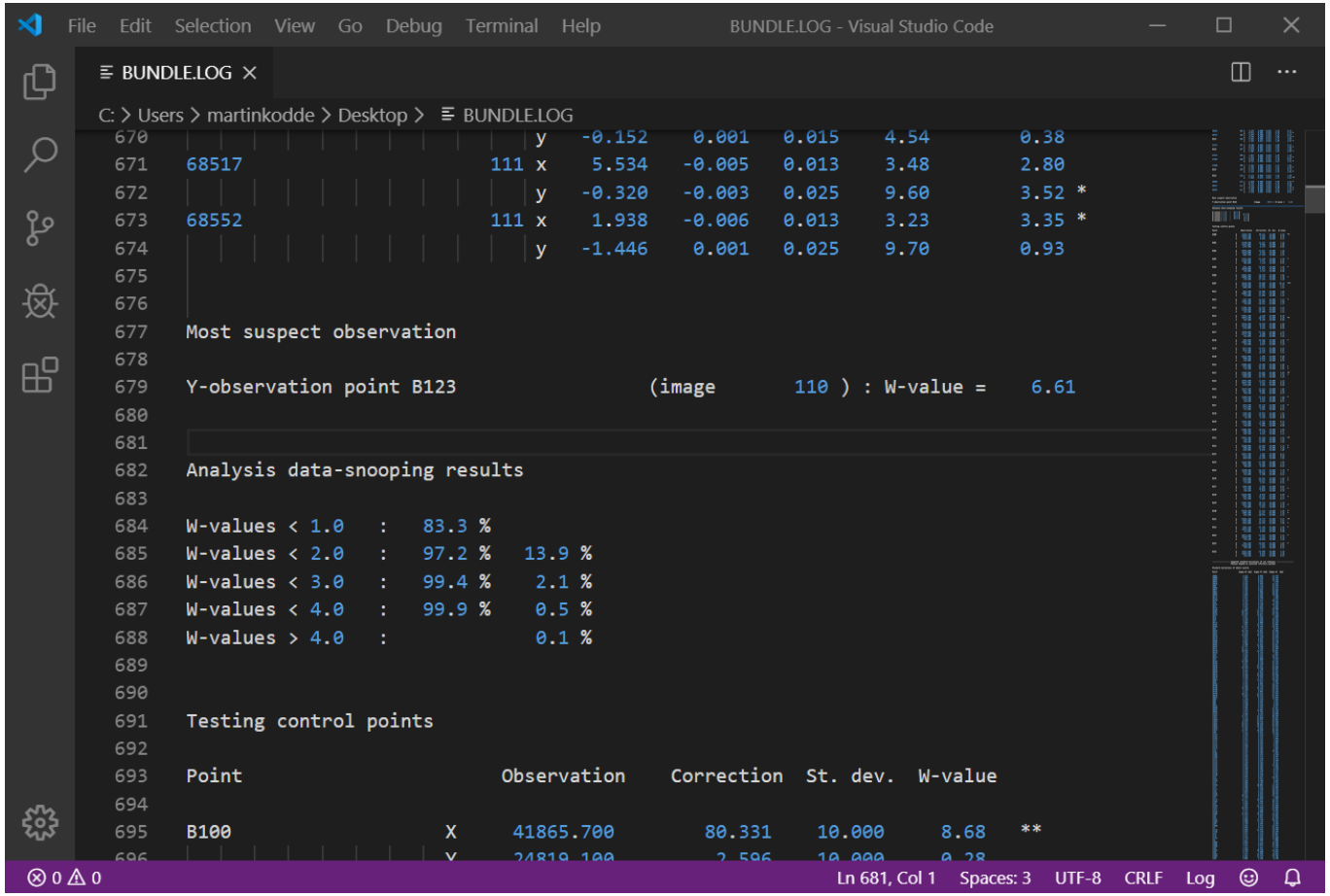


Bundle block adjustment



GEODELTA




File Edit Selection View Go Debug Terminal Help
BUNDLE.LOG - Visual Studio Code
BUNDLE.LOG
C: > Users > martinkodde > Desktop > BUNDLE.LOG
y -0.152 0.001 0.015 4.54 0.38
68517 111 x 5.534 -0.005 0.013 3.48 2.80
y -0.320 -0.003 0.025 9.60 3.52 *
68552 111 x 1.938 -0.006 0.013 3.23 3.35 *
y -1.446 0.001 0.025 9.70 0.93
Most suspect observation
Y-observation point B123 (image 110) : W-value = 6.61
Analysis data-snooping results
W-values < 1.0 : 83.3 %
W-values < 2.0 : 97.2 % 13.9 %
W-values < 3.0 : 99.4 % 2.1 %
W-values < 4.0 : 99.9 % 0.5 %
W-values > 4.0 : 0.1 %
Testing control points
Point Observation Correction St. dev. W-value
B100 X 41865.700 80.331 10.000 8.68 **
0 0
Ln 681, Col 1 Spaces: 3 UTF-8 CRLF Log

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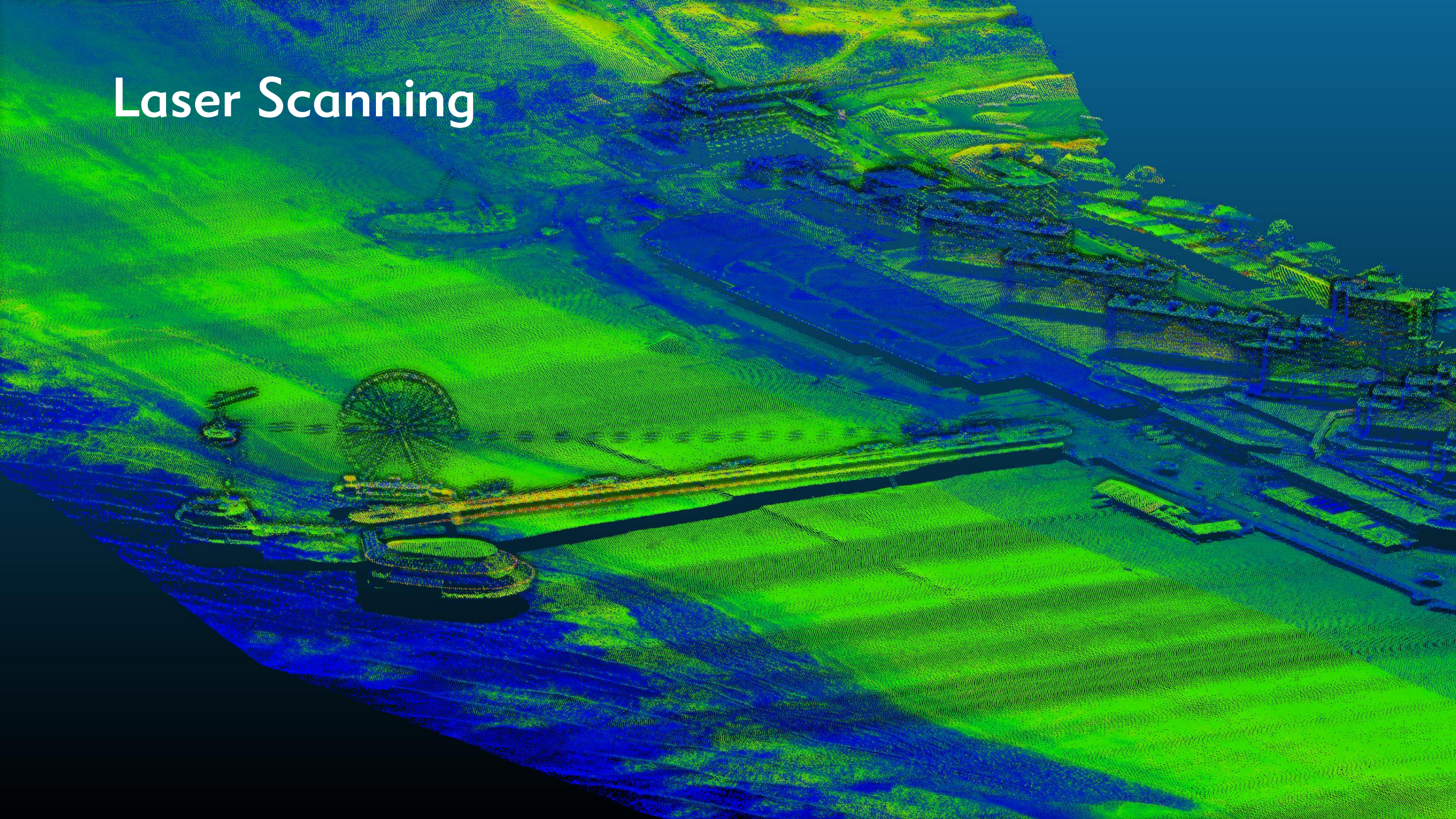
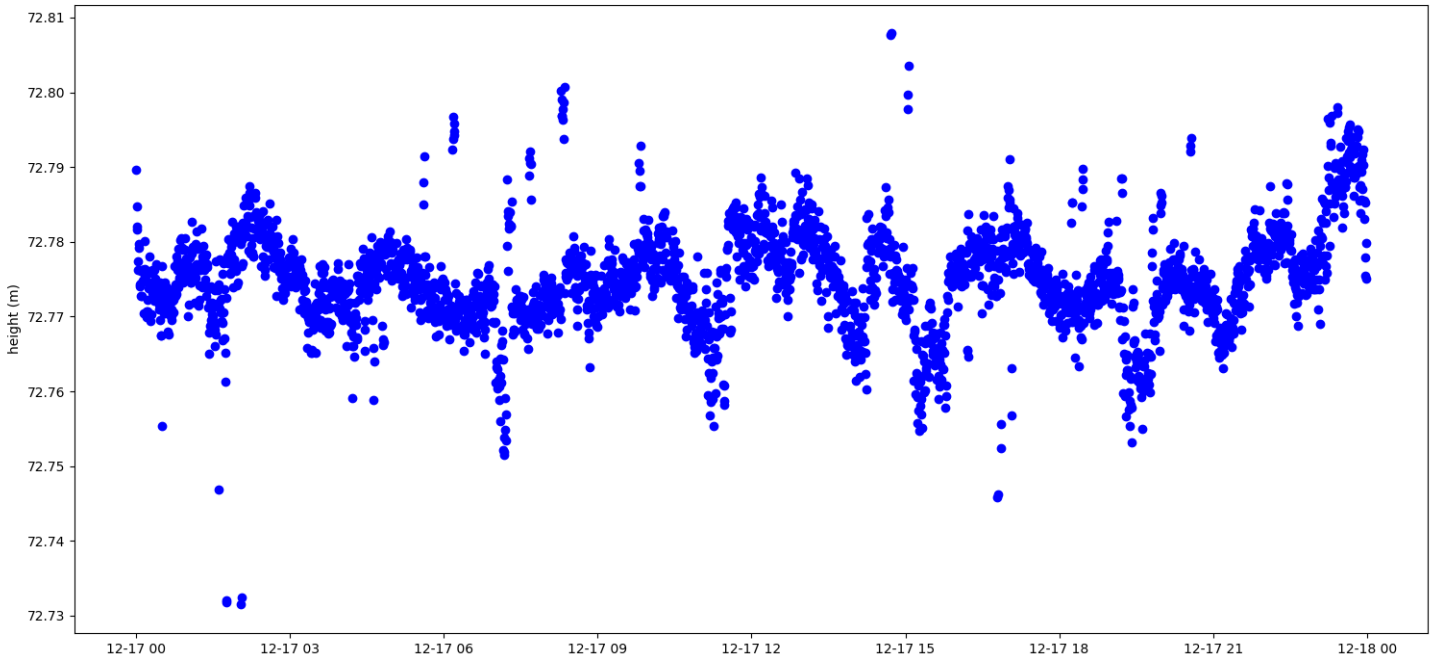
Laser Scanning



Laser scanning

- Often based on GNSS + INS
- Calibrations



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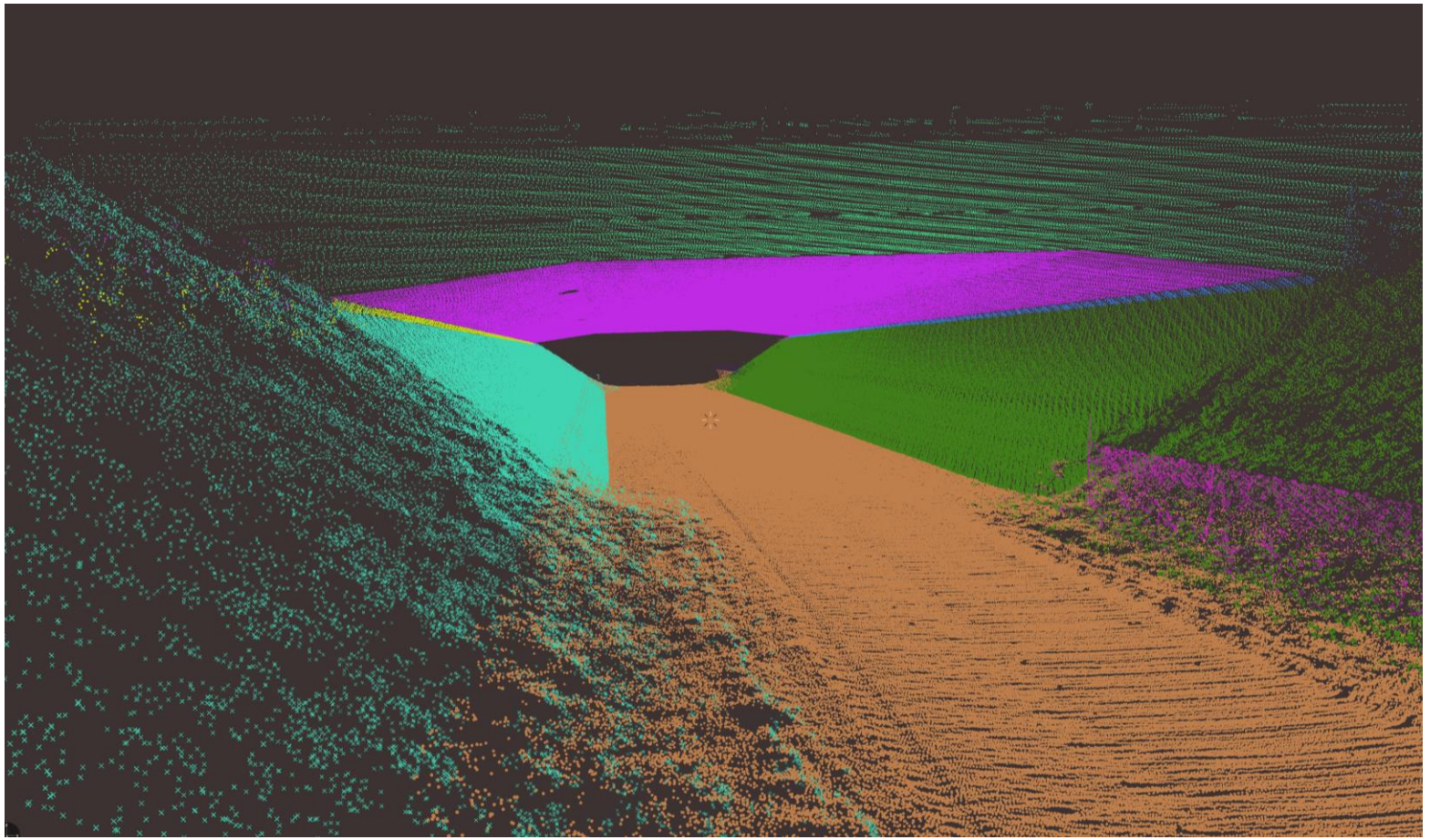
Example: calibration mobile mapping



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The Delft Method for adjustment and Testing

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Tour through the office

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  - +31 6 12111413
  - martin@geodelta.com

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