The future of the Dutch National Height Model (AHN)

Point Cloud Processing Symposium

Jeroen Leusink

Het Waterschapshuis

Delft: March 13th 2018

Actueel Hoogtebestand Nederland

History

- AHN1: 1997 – 2004
  - Initiated by Waterboards, Ministery of Infrastructure and Water Management and the Provinces to manage the watersystems and watersecurity
  - 1pt/16m2 → 1pt/m2
- AHN2: 2007 – 2012
  - Map an object of 2x2m with an accuracy of 50cm from the pointcloud
  - Height accuracy < 5cm stochastic + 5cm systematic
  - Classification: ground – non-ground
- AHN3: 2014 – 2019
  - Additional demands on classification: Ground, Water, Buildings, Civil structures, other
  - AHN1, AHN2 and AHN3 Open data

Actueel Hoogtebestand Nederland

AHN4: applications

Actueel Hoogtebestand Nederland

Internal analysis (Waterboards, RWS, Provinces)

AHN congress 2016

- Flood analysis
- Tree Cadaster
- Solar potential
- 3D analysis
- Change detection
- Etc.

Open data:

Tax incomes > costs AHN

Technical Developments

- LiDAR technology
- Dense Matching
- Combined LiDAR – Imagery sensors
- Local point clouds
- Other techniques to indicate changes

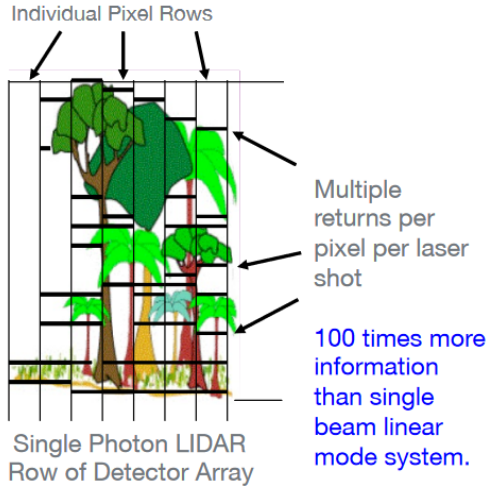
Pilots in three areas with two new sensors:

- Single Photon LiDAR
- Riegl 1560i DW

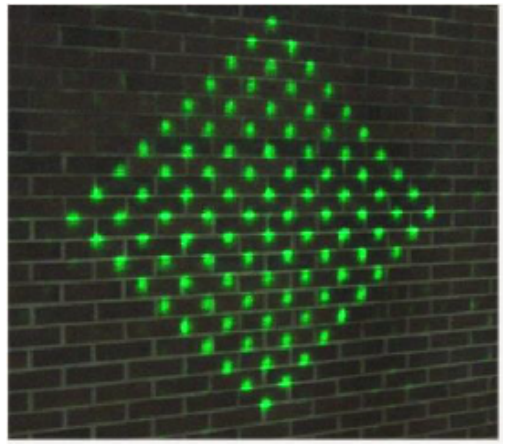
Actueel Hoogtebestand Nederland

Single Photon LiDAR

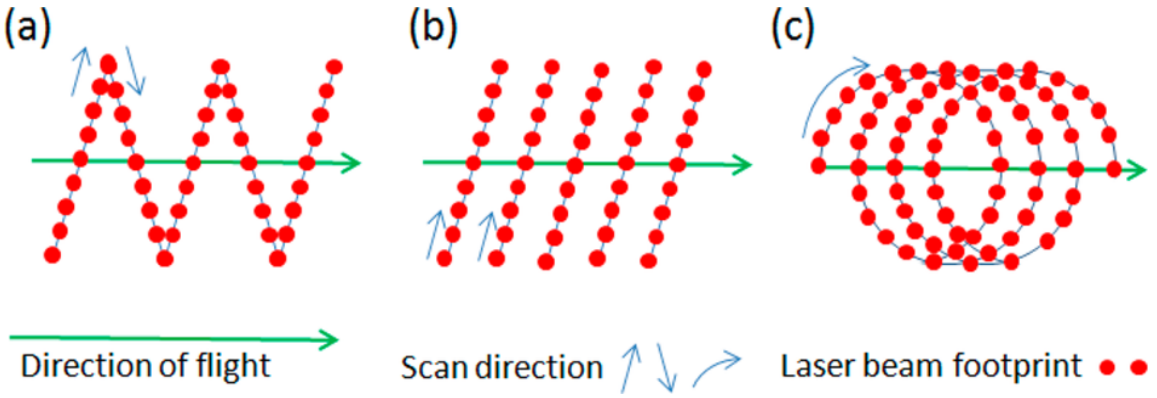
- Laser pulse split into 10x10 beamlets
- Signal strength per beamlet is low, still multiple returns
- 60 kHz → 6mln points/sec
- Conical pattern (c)
- Opening angle 10 – 30 degrees
- Green LiDAR (532 nm), bathymetry?



[http://shoals.sam.usace.army.mil/Workshop_Files/2015/Day_01_pdf/1100_Sirota.pdf, Feb 6th 2018]

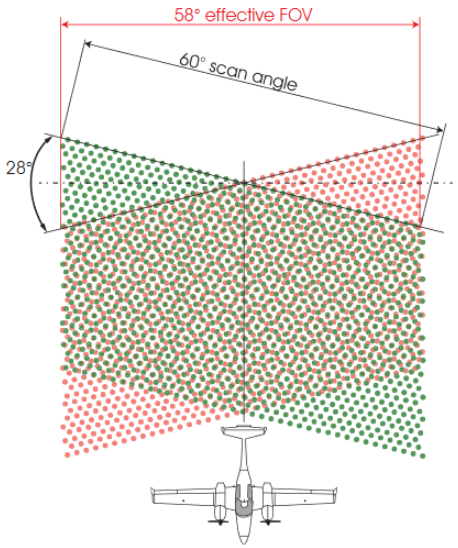


[Sigma Space]

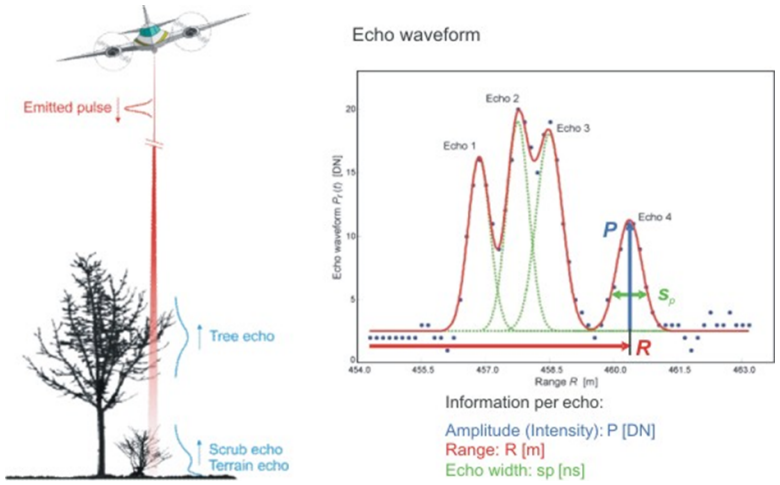


[Juan Carlos Fernandez-Diaz et. al, 2014, Now You See It… Now You Don't: Understanding Airborne Mapping LiDAR Collection and Data Product Generation for Archaeological Research in Mesoamerica]

Actueel Hoogtebestand Nederland



[Riegl]

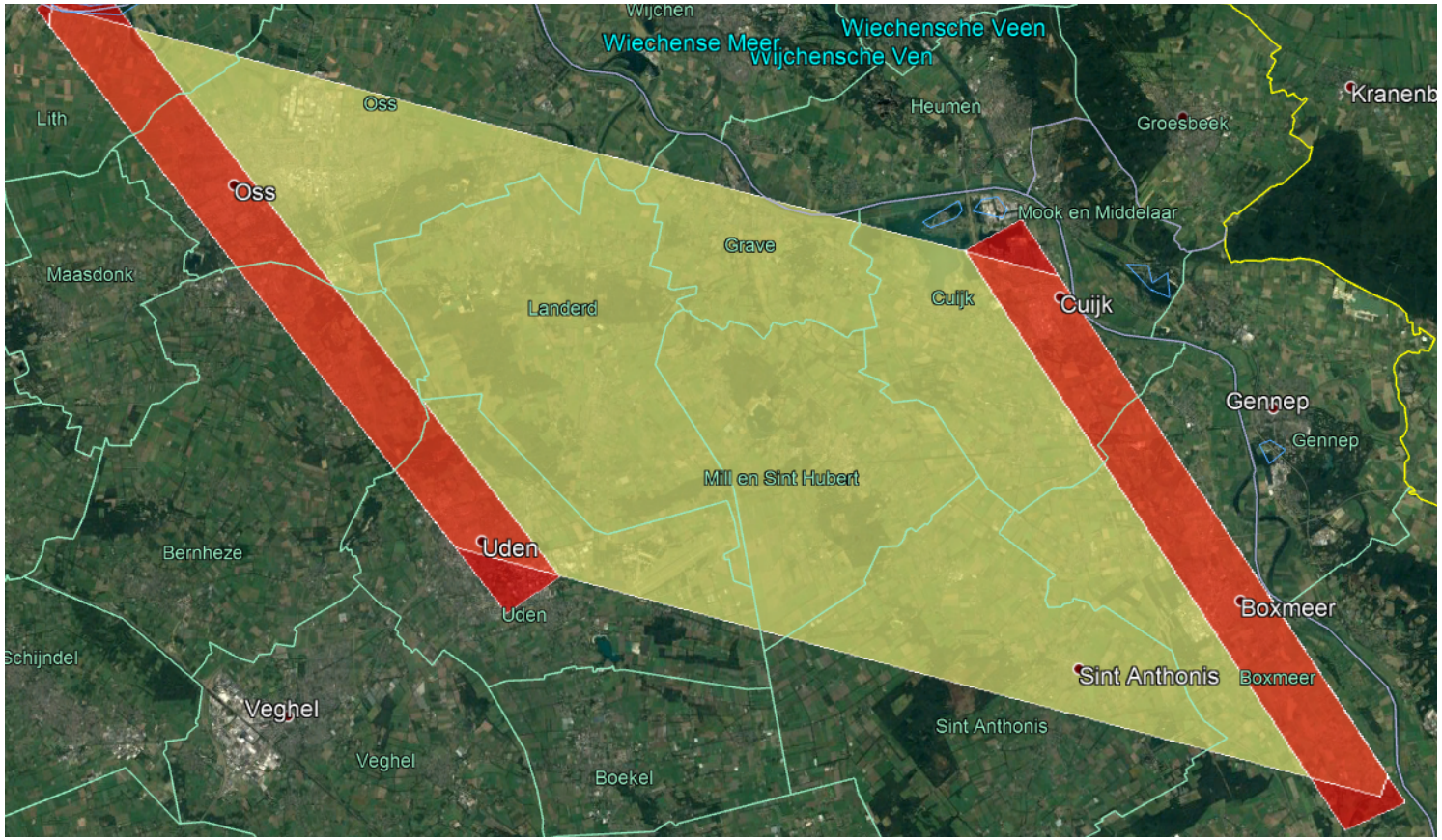


[http://geo.tuwien.ac.at/opals/html/ModuleFullwave.html, Feb 6th 2018]

Riegl 1560i DW

- Full wave form analysis
- 2 lasers x 1.000 kHz
- Opening angle 60 degrees
- Effective pulse rate: 1,33 mln points / sec
- Equal point distribution
- Dual wavelength (red 1064nm, green 532nm)

Actueel Hoogtebestand Nederland



Single Photon LiDAR & Riegl 1560i DW

Actueel Hoogtebestand Nederland

Area 1

Characteristics

Agricultural area, some medium cities, river, forest

Purpose

Compare to AHN2 / AHN3 data

Aimed point density

8 pts/m2

Area 2

Characteristics

City, urban canyoning

Purpose

3D buildings; Ground measurements in urban cannyoning; Compare Rotterdam data

Aimed pointdensity

60 points / m2

Single Photon LiDAR & Riegl 1560i DW

Actueel Hoogtebestand Nederland

Single Photon LiDAR & Riegl 1560i DW

Area 3

Characteristics

Water area influenced by tides, dry mud flats, dikes, agricultural landscape with little villages

Purpose

See how instruments perform on dry mud flats and shallow waters

Aimed point density

8 pts/m2

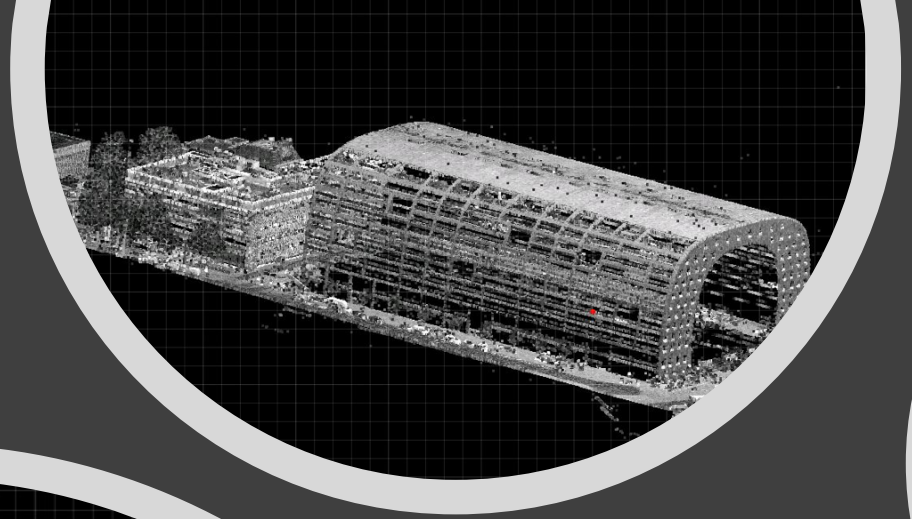
Actueel Hoogtebestand Nederland

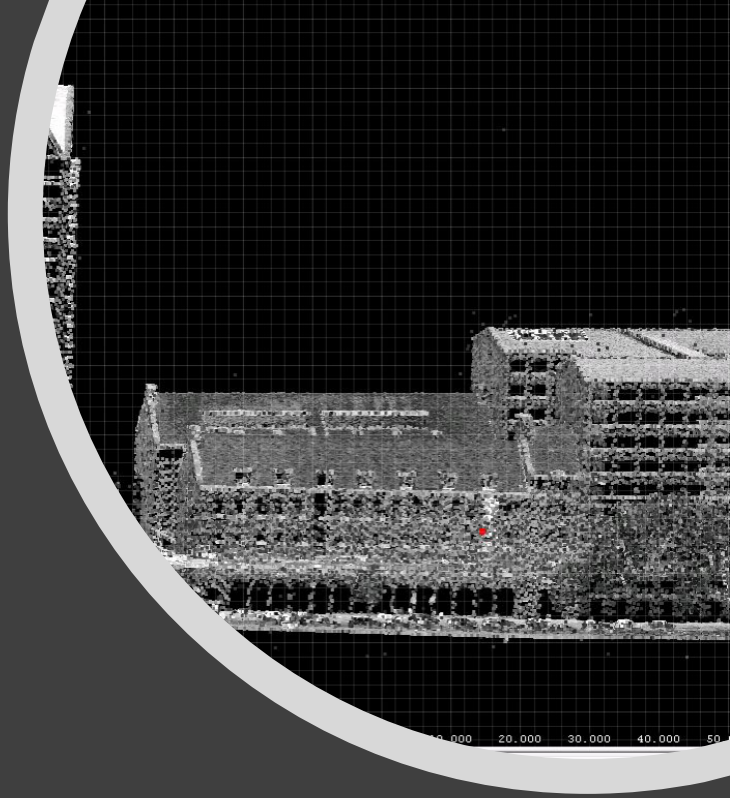
Concluding remarks

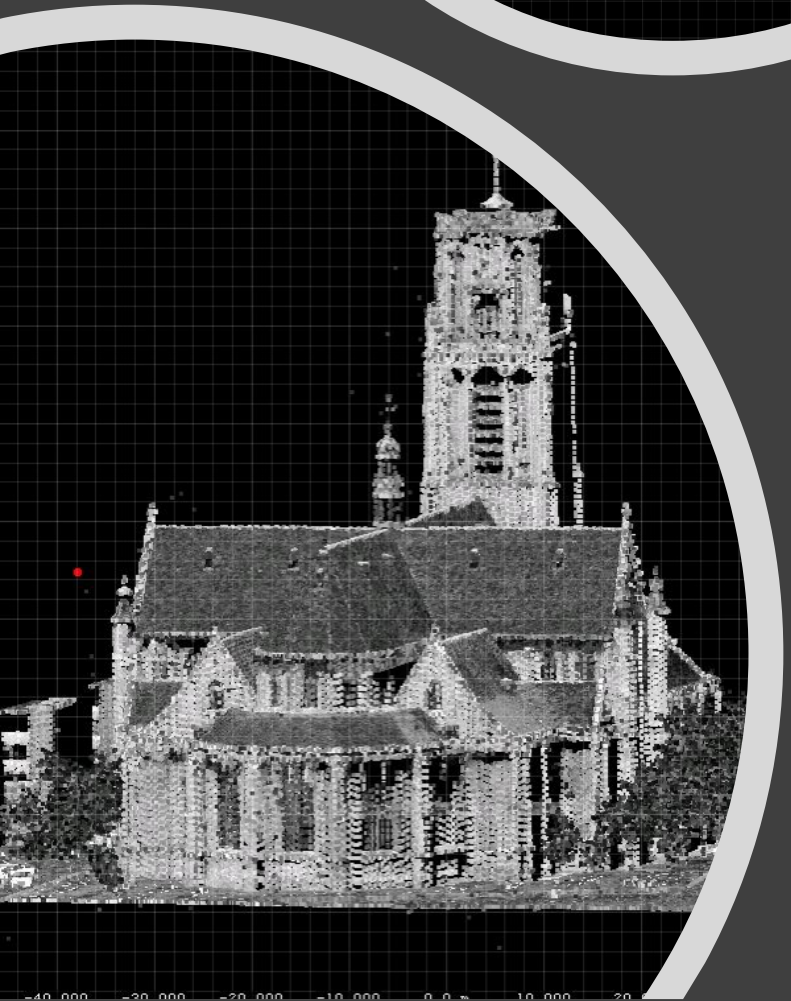
- Many more applications
- Many more organisations using AHN
- Are assumptions for AHN1-3 still valid for AHN4?
- Do new techniques bring us new applications?
- What are demands for new applications?

Think along with us to design AHN4

Jeroen Leusink | j.Leusink@hetwaterschapshuis.nl | 06-23884175







First impressions Riegl 1560i DW