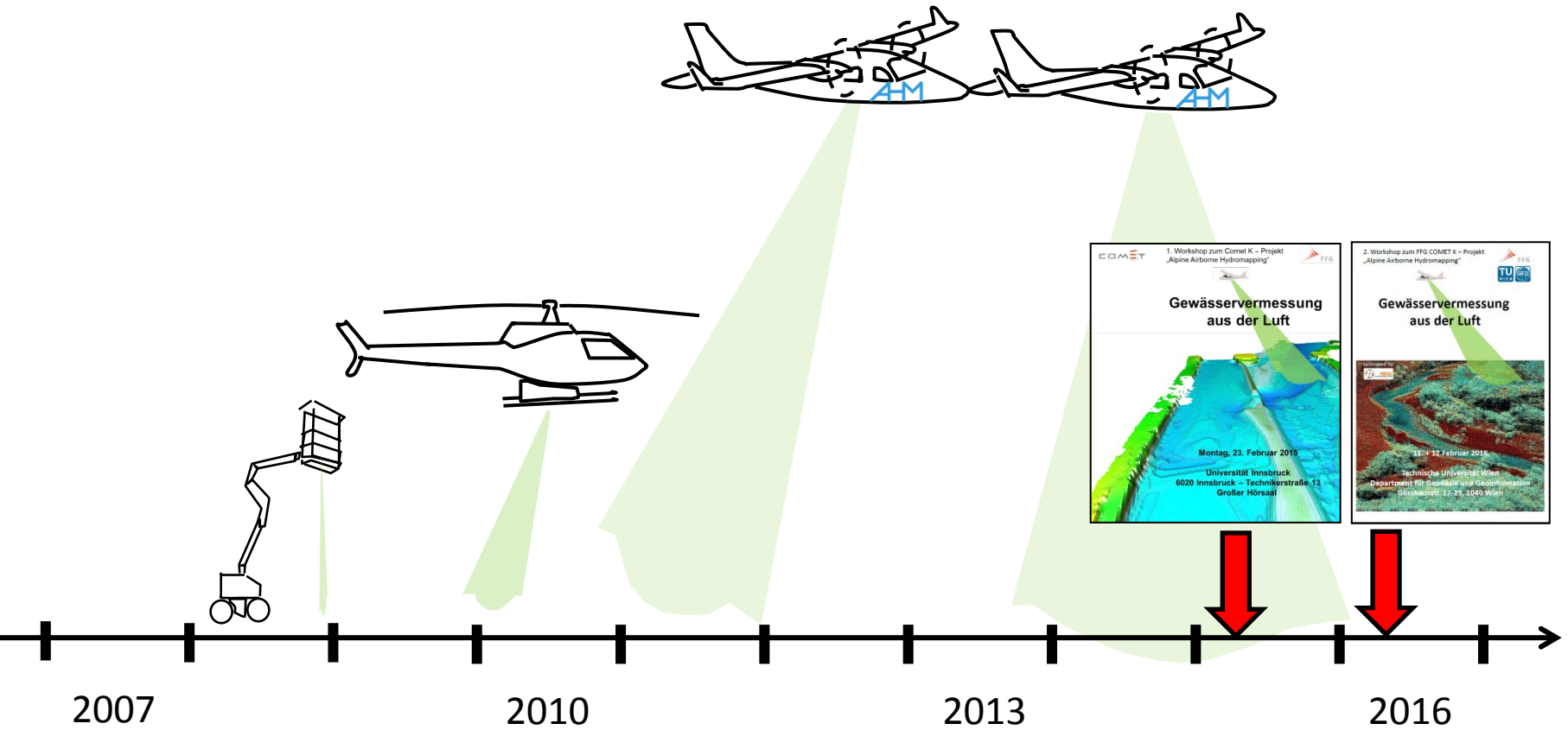


Comet K – Projekt „Alpine Airborne Hydromapping“ Research to Practice



What we have learned





„Airborne Hydromapping“

„Alpine Airborne Hydromapping“



Comet K – Projekt: Alpine Airborne Hydromapping



AAHM: Consortium

Scientific Partners:



Company Partners:



AAHM: RESEARCH AREAS

Research Area 1

DATA ACQUISITION

- Surveying and picture flights
- Terrestrial surveying
- Sonar measurements

Goals:

Data inquiry with best possible technology

Responsibilities:



Unit for Surveying and Geoinformation
(University of Innsbruck)

Research Area 2

DATA PROCESSING AND DATA MANAGEMENT

- Filter methods
- Full Waveform Analysis
- Data management
- Point classification methods
- Foot print size analysis
- Visualization methods
- Pilot project data

Scientifically best possible supported evaluation methods



Department of Geodesy and Geoinformation
(Vienna University of Technology)

Research Area 3

DATA EVALUATION

- Numerical models
- Alpine catchment areas
- Gravel river systems
- Inland delta systems
- Reservoirs

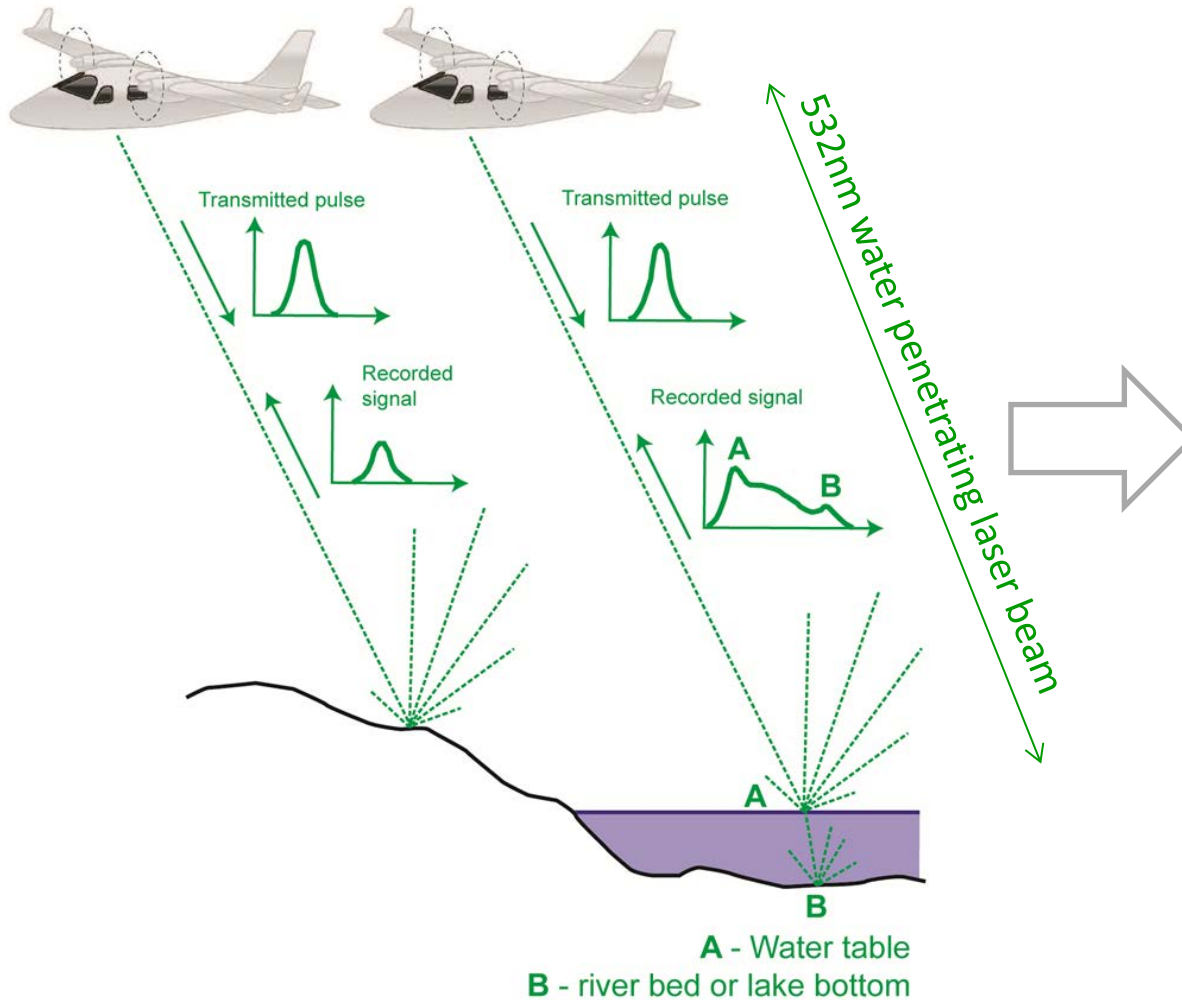
River investigations in joint cooperation with the company partners



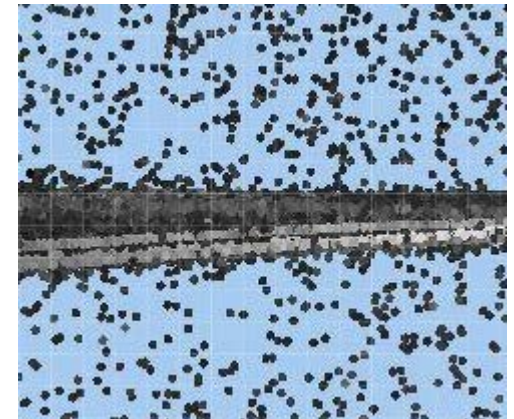
Unit of Hydraulic Engineering
(University of Innsbruck)

Data Acquisition

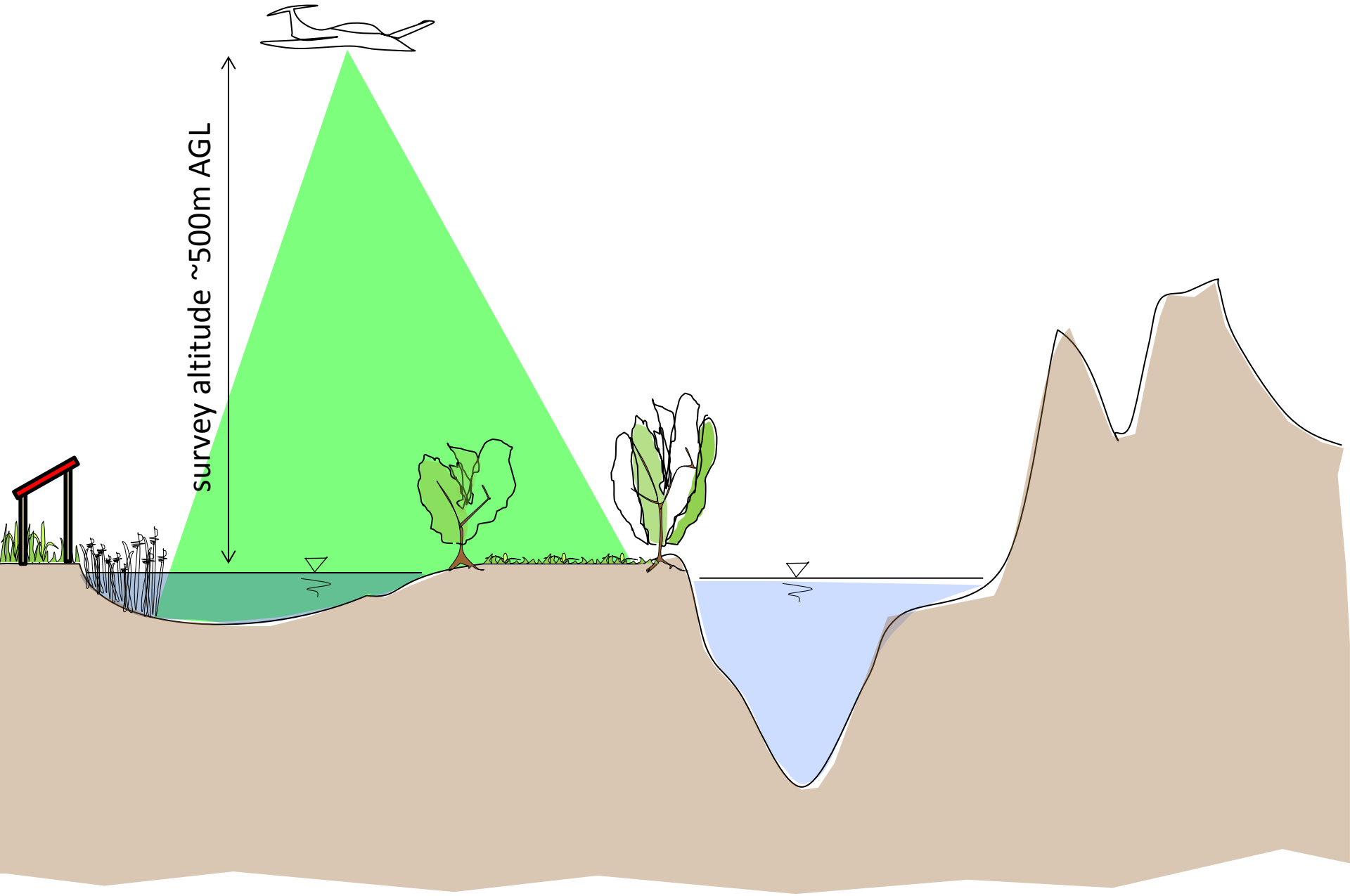
Airborne Mapping: Topographic and Bathymetric Survey within one system

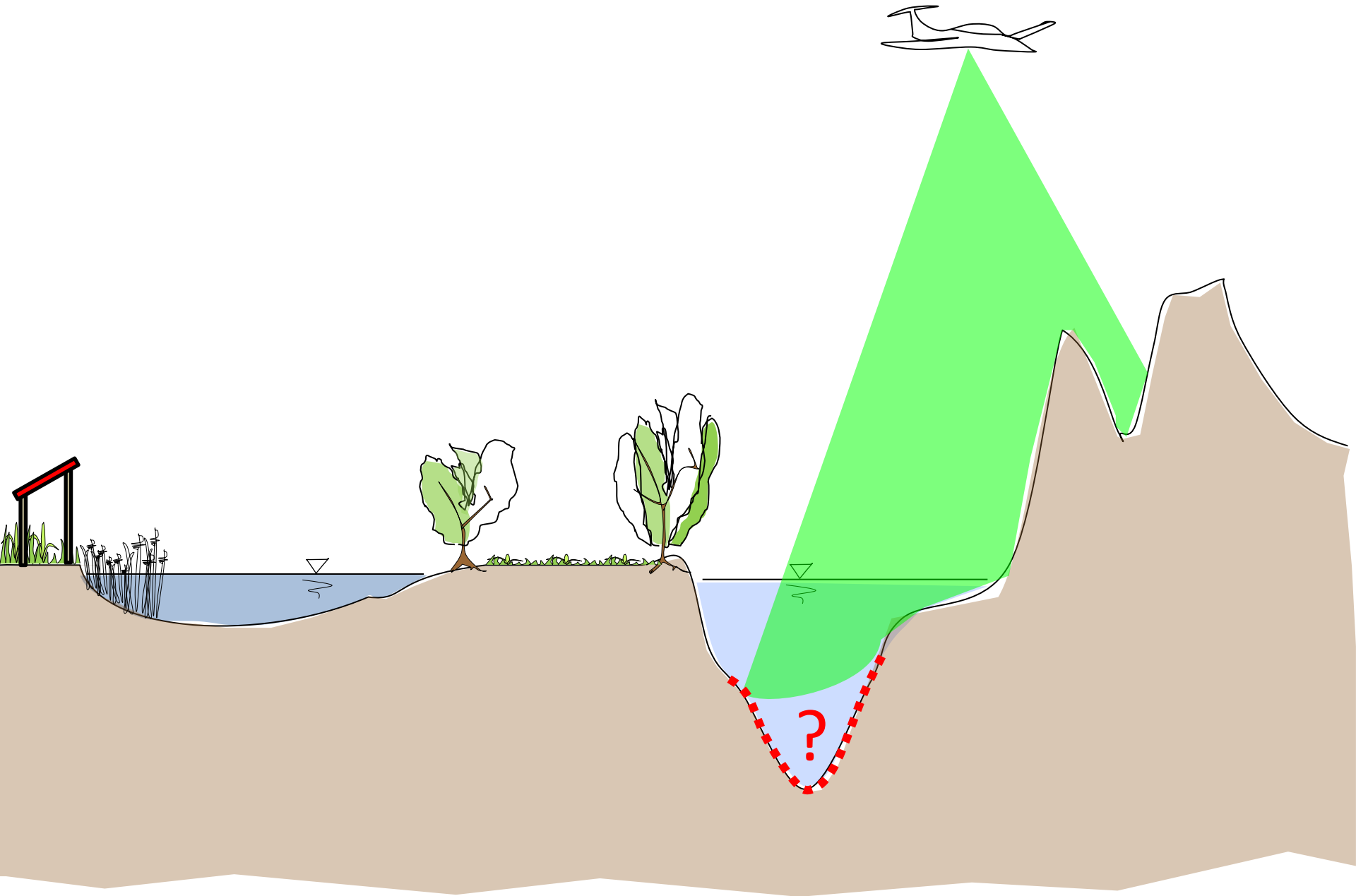


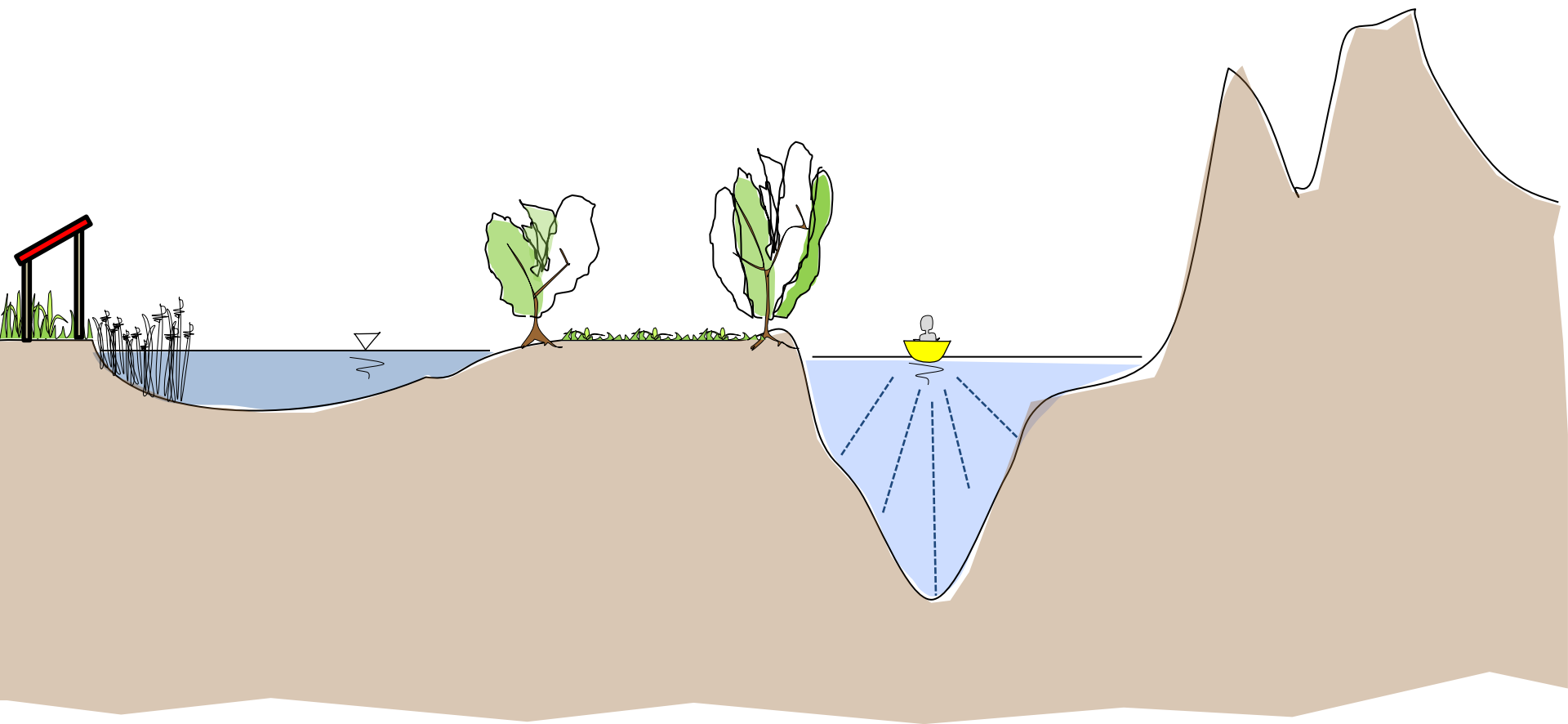
Point cloud

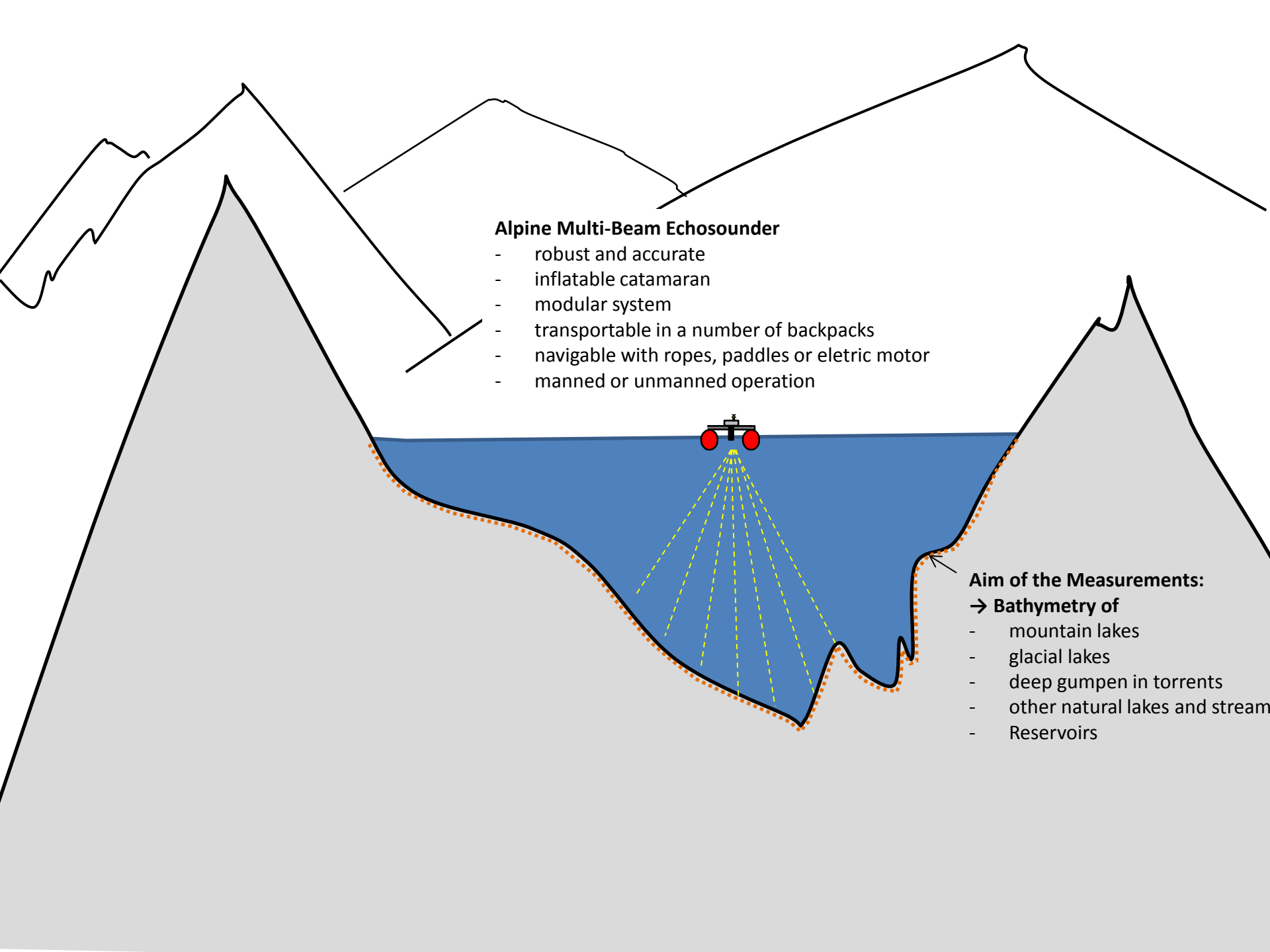


Point density
10-20 points/m²









The diagram illustrates the Alpine Multi-Beam Echosounder system in a mountain lake. A small boat with two red buoys is positioned on the water's surface. Yellow dashed lines represent the echosounder's beams fanning out to map the lake floor. The lake is surrounded by steep, grey mountains. A line points from the text 'Alpine Multi-Beam Echosounder' to the boat. Another line points from the text 'Aim of the Measurements:' to the lake floor. The lake floor is outlined with a solid black line, and the area being measured is highlighted with a dotted orange line.

Alpine Multi-Beam Echosounder

- robust and accurate
- inflatable catamaran
- modular system
- transportable in a number of backpacks
- navigable with ropes, paddles or electric motor
- manned or unmanned operation

Aim of the Measurements:

→ Bathymetry of

- mountain lakes
- glacial lakes
- deep gumpen in torrents
- other natural lakes and streams
- Reservoirs

GCV1



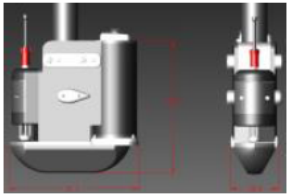
GeoSwath Plus Compact

Wide Swath Multibeam und Sidescan System

- Frequenz: 500 kHz
- Wasserdichtes Gehäuse zum Anschluss externer Sensoren, Schwinger
- Software



GCT1



V-Plate - 500kHz Schwingerkopf

- Integrierter 500kHz Schwinger mit Halterung zur Aufnahme des Schwingers, des Bewegungssensors und der Schallsonde



Echo Sounder



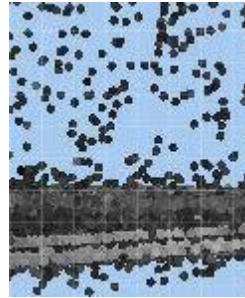
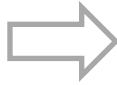
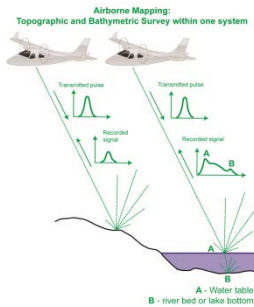
GeoSwath





AAHM: Sequence of Events

1)

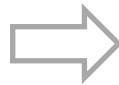


Data Acquisition

Point cloud

2)

Boresight



3)

Adjustment of
the flight stripes



4)

Georeference

5)

Classification of
water points



6)

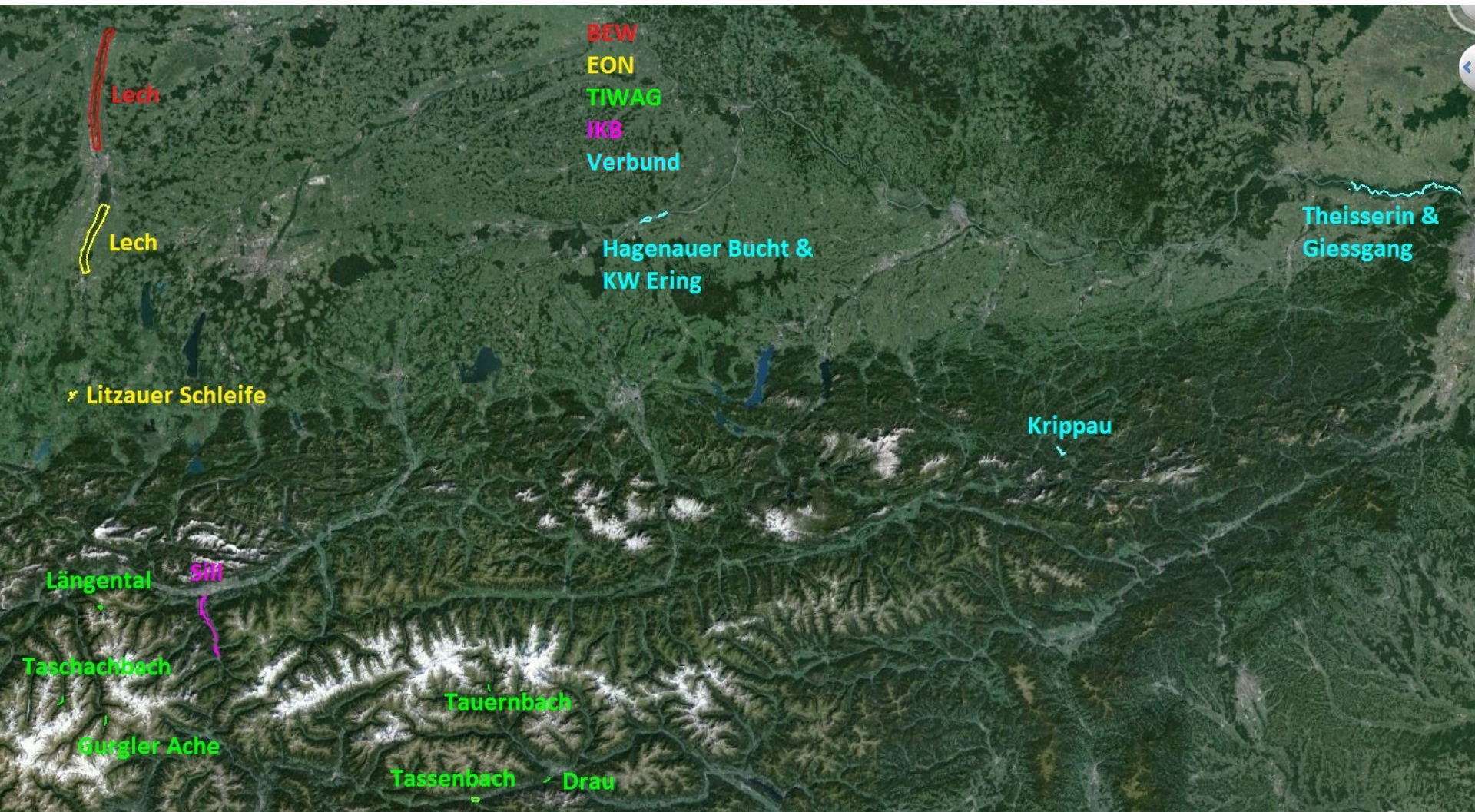
Calculation of
the refraction



7)

Classification of
the ground points

AAHM: Arial Survey Routes



AAHM: Alpine Catchment Areas

- Sill (IKB) beflogen – Auswertung läuft (Neurechnung Trajektorie)
- Taschachbach (Tiwap) 
- Drau (Tiwap) 
- Gurgler Ache (Tiwap) beflogen – Auswertung abgebrochen; 2. Flug Nov 15
- ~~Tauernbach (Tiwap)~~ gestrichen
- Ahr (Provinz Bozen) 

- Sill (IKB)
- Taschachbach (Tiwag)
- Drau (Tiwag)
- Gurgler Ache (Tiwag)
- ~~Tauernbach (Tiwag)~~
- Ahr (Provinz Bozen)

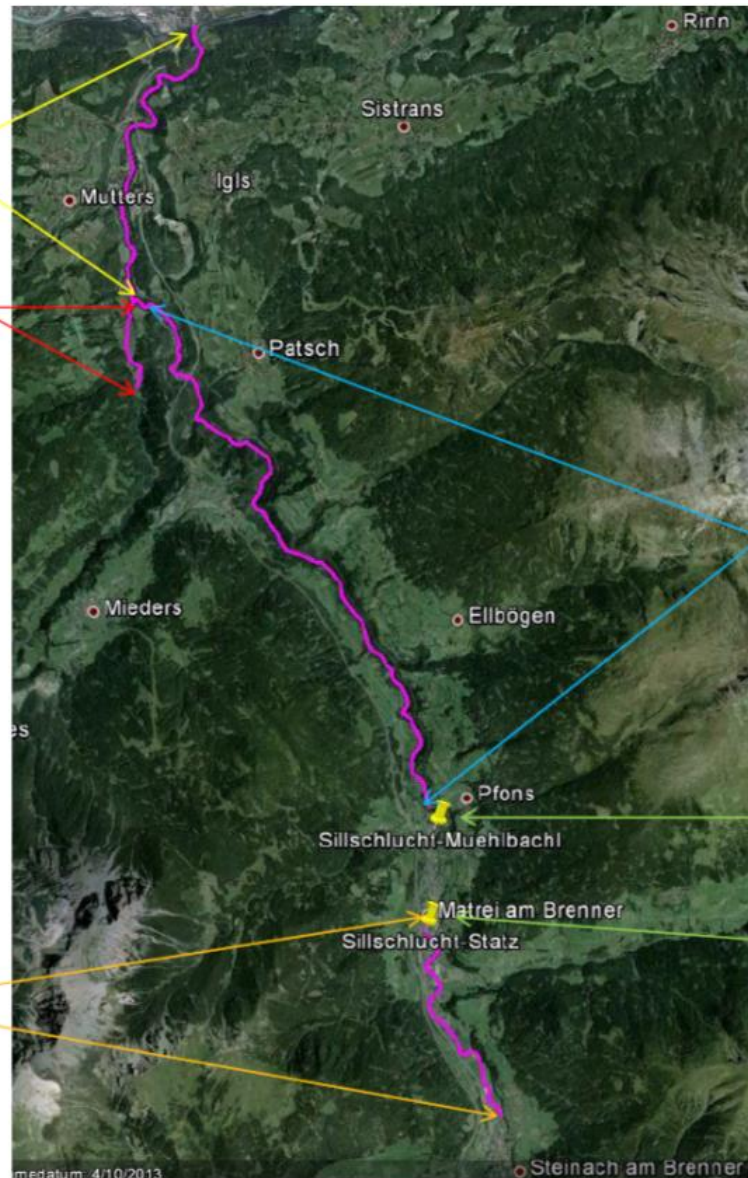
Alpine Catchment Areas (SILL)

Projektgebiete

1) Ausgang-Sillschlucht

2) Ruetzkraftwerk-Mündung bis
Ruetz-Sill

4) IKB-Strecke-Puig



Projektgebiet

3) Schleuse-Matrei I
Mündung-Ruetz-S

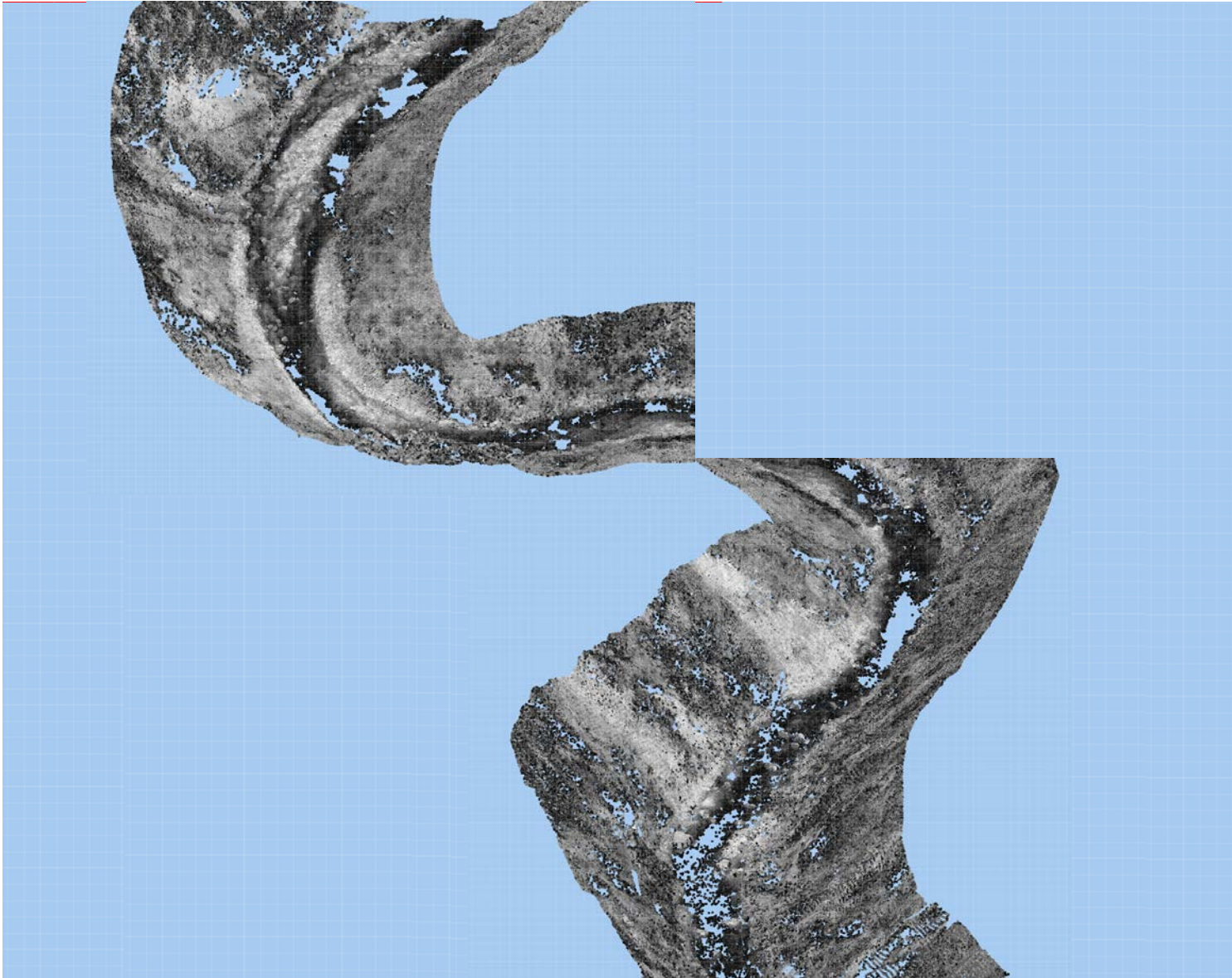
Referenzmessung

R1) Mühlbachl

Referenzmessung

R2) Statz

Alpine Catchment Areas (SILL)



Alpine Catchments

Gravel Rivers

Reservoirs

Inland Deltas

Alpine Catchment Areas (SILL bei Statz)



Alpine Catchments

Gravel Rivers

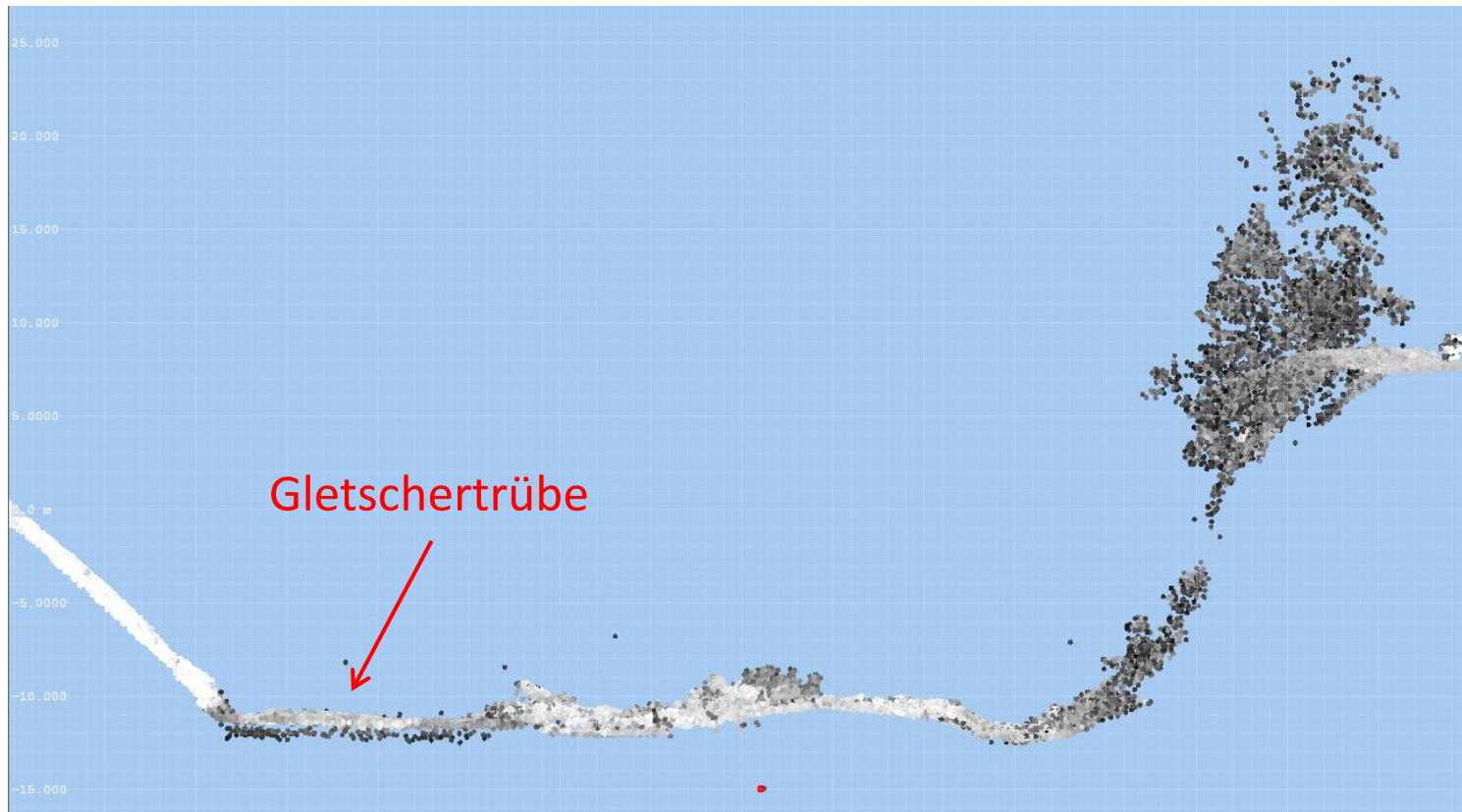
Reservoirs

Inland Deltas

Alpine Catchment Areas

- Sill (IKB)
- Taschachbach (Tiwag)
- Drau (Tiwag)
- Gurgler Ache (Tiwag)
- ~~Tauernbach (Tiwag)~~
- Ahr (Provinz Bozen)

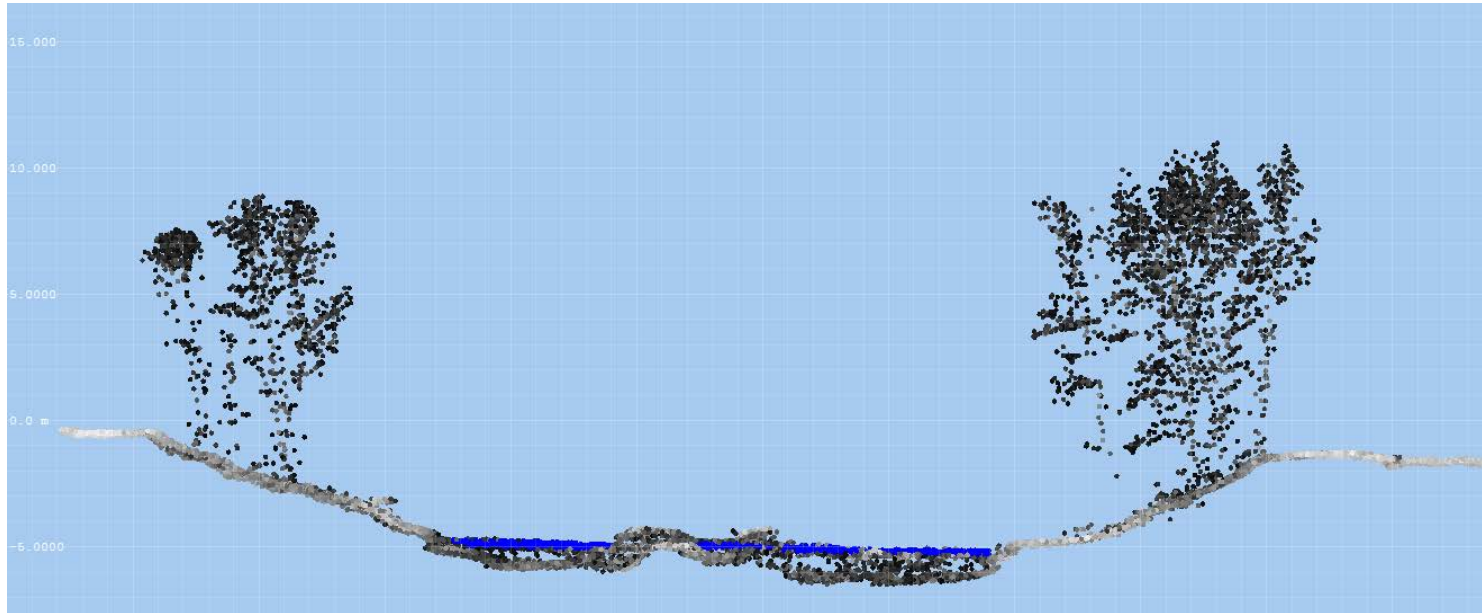
Alpine Catchment Areas (Gurgler Ache)



Alpine Catchment Areas

- Sill (IKB)
- Taschachbach (Tiwag)
- Drau (Tiwag)
- Gurgler Ache (Tiwag)
- ~~Tauernbach (Tiwag)~~
- Ahr (Provinz Bozen)

Alpine Catchment Areas (Drau)



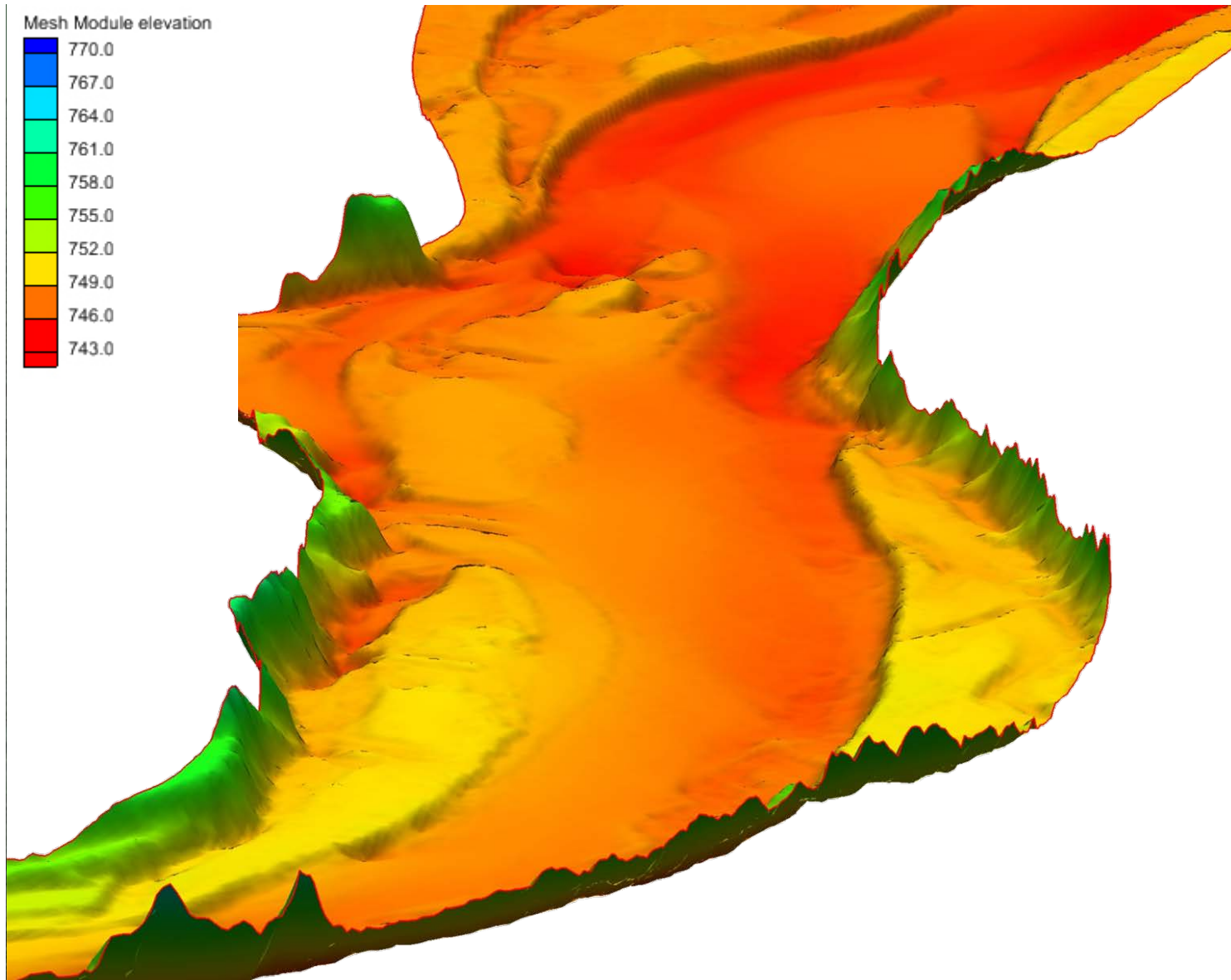
AAHM: Gravel River Systems

- Lech (BEW) ✓
- Lech (EON) ✓
- Lech Litzauer Schleife (EON) ✓
- Restwasserstrecke Krippau(Verbund) ✓
- Theisserin(Verbund) ✓
- ~~Gießgang(Verbund)~~ ✓
gestrichen

Gravel River Systems

- Lech (BEW)
- Lech (EON)
- Lech Litzauer Schleife (EON)
- Restwasserstrecke Krippau(Verbund)
- Theisserin(Verbund)
- ~~Gießgang(Verbund)~~

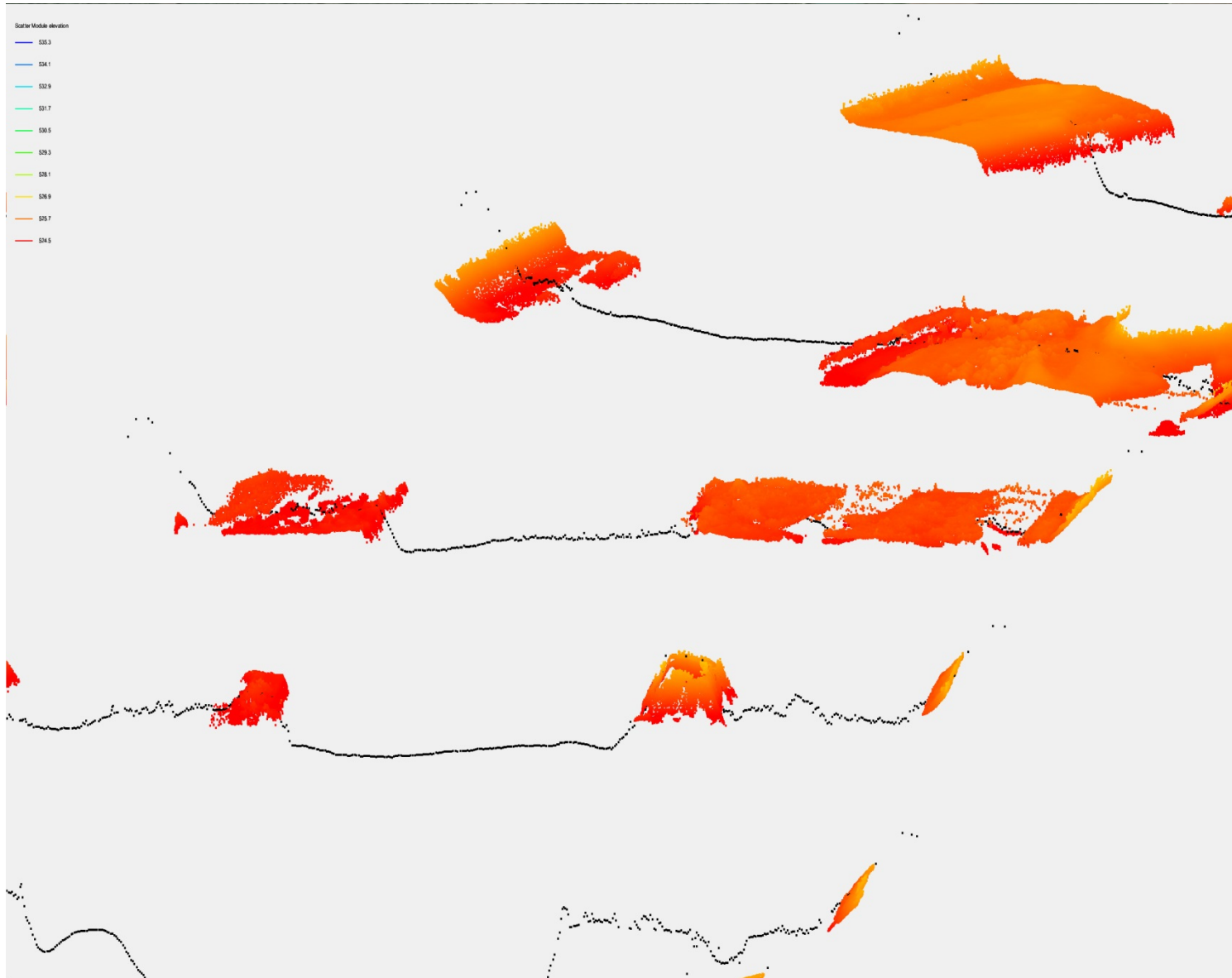
Gravel River Systems (Lech Litzauer Schleife)



- Lech (EON) 
- Speicher Längental (Tiwag) beflogen – Auswertung abgebrochen
- Speicher Tassenbach (Tiwag) beflogen im Nov 2015 – Auswertung läuft
- Inn Hagenauer Bucht(Tiwag) 

- Lech (EON)
- Speicher Längental (Tiwag)
- Speicher Tassenbach (Tiwag)
- Inn Hagenauer Bucht(Tiwag)

Reservoirs (LECH Staustufe 22 Unterbergen)



Reservoirs

- Lech (EON)
- Speicher Längental (Tiwag)
- Speicher Tassenbach (Tiwag)
- Inn Hagenauer Bucht(Tiwag)

Reservoirs (DRAU SP Tassenbach)



Alpine Catchments

Gravel Rivers

Reservoirs

Inland Deltas

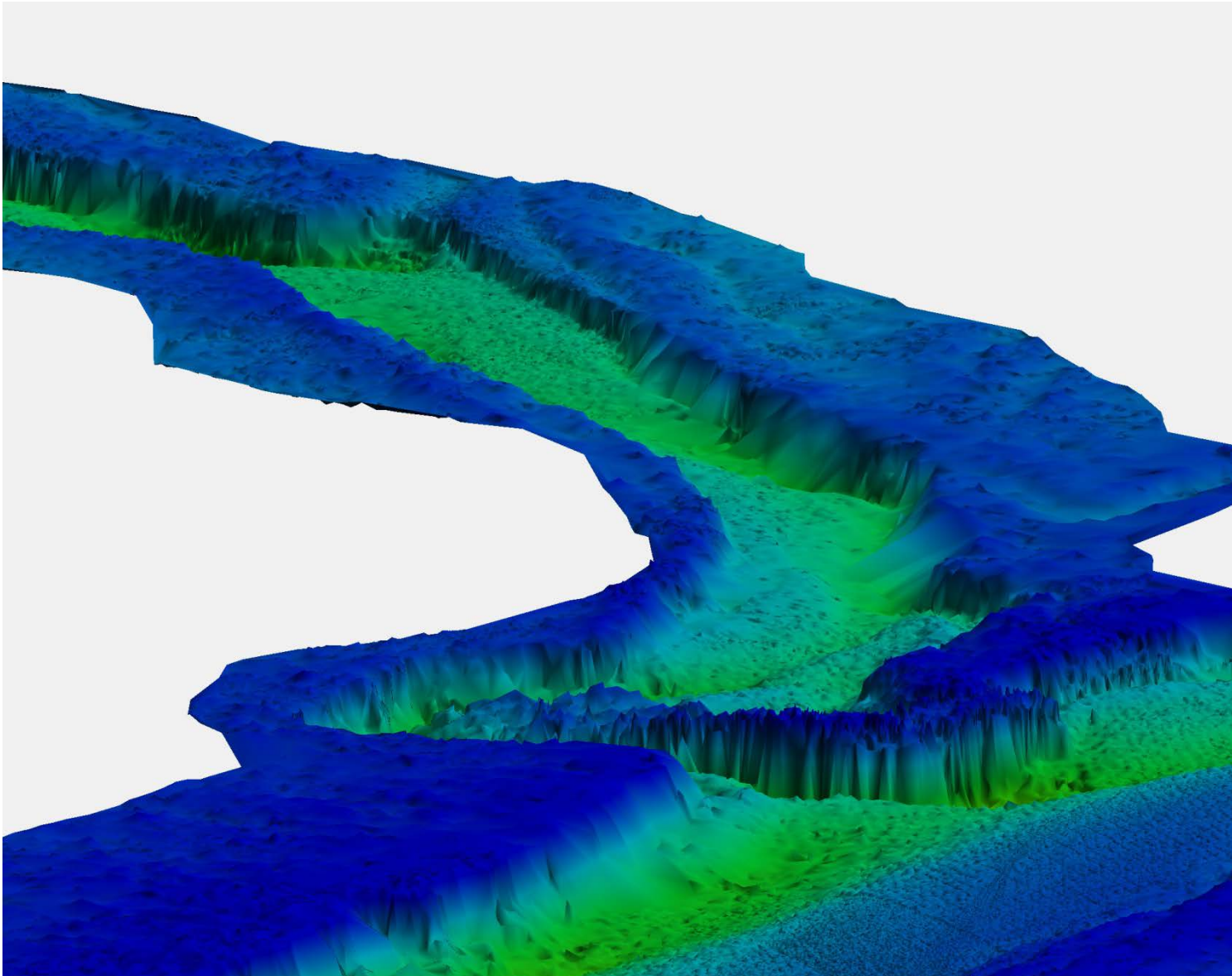
AAHM: Inland Deltas

- Chiemseedelta



- Chiemseedelta

Inland Deltas(Chiemseedelta)



Alpine Catchments

Gravel Rivers

Reservoirs

Inland Deltas

Lessons learned

AAHM: Sequence of Events

1) Data Acquisition

- Shallow Water !
- Low turbidity !
- Less white water !
- Good conditions of soil colour, composition !
- Weather ! (turbulences !)
- Flight planning !
- Logging of flight conditions !
- Vegetation !
- Technical equipment in function !

AAHM: Sequence of Events

2) Boresight

3) Adjustment of flight stripes

- Quality control!!!
- Evaluation only of suitable flight stripes ! (if there are enough)
- Calculation of height differences of combined flight stripes ! (quick quality check)
- A correct adjustment of flight stripes saves time in the classification !

4) Georeference

- Attention to coordinate systems !

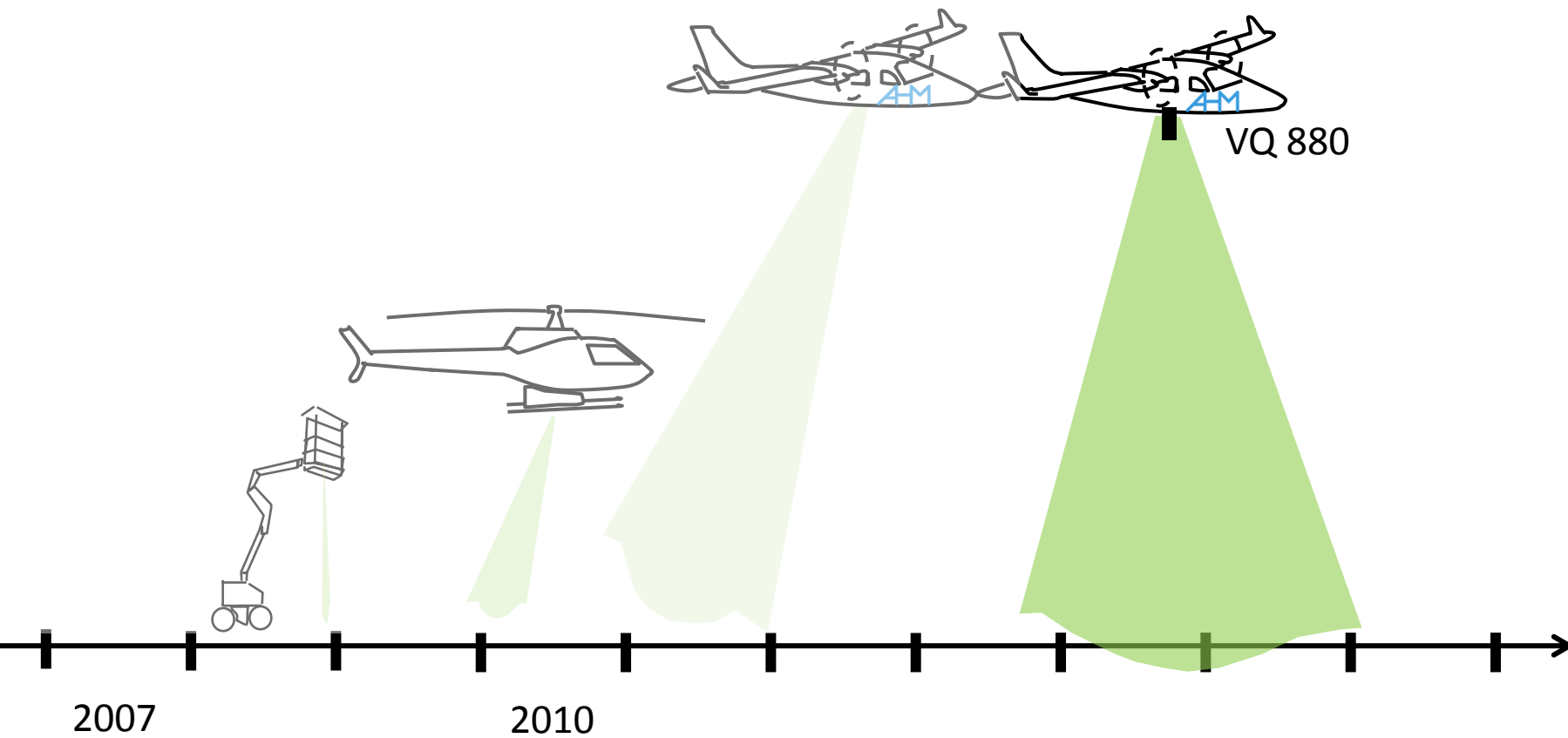
AAHM: Sequence of Events

5) Classification of water points

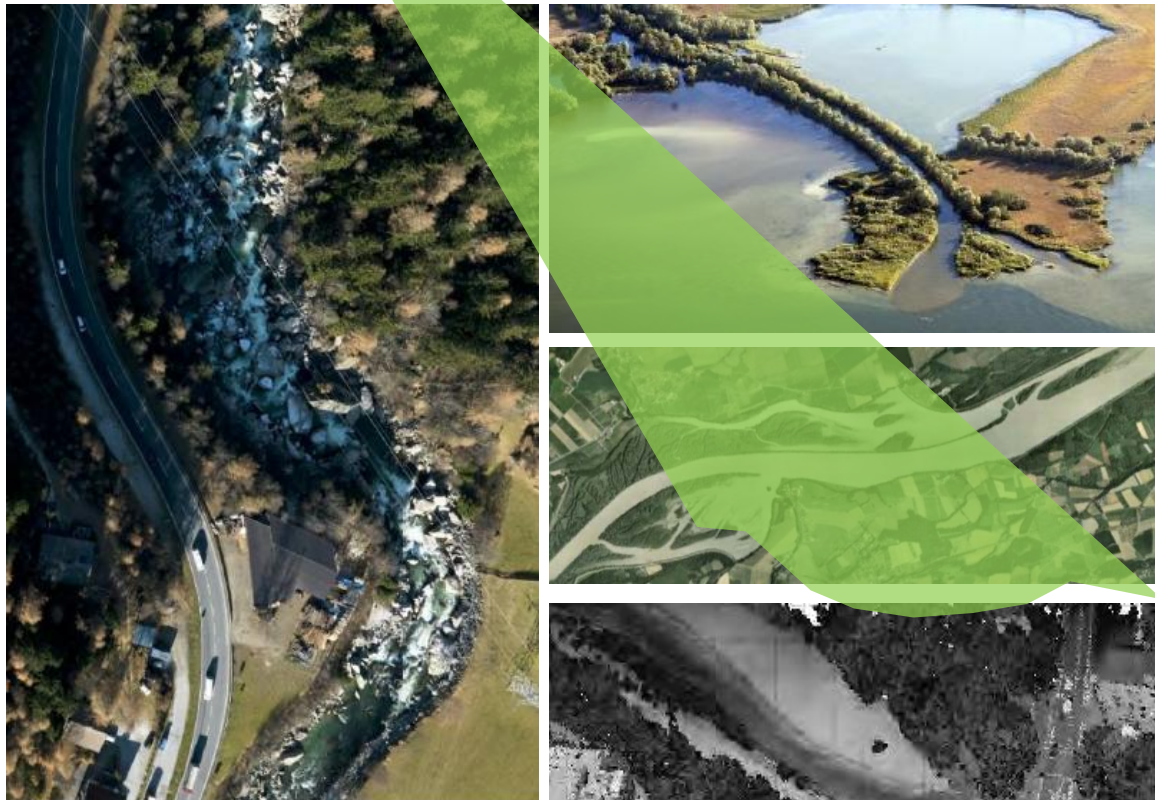
- Distinction between uniform water level and pools !
- Information of fluctuating runoff or inflows
- Attention in very shallow areas (water/ground)
- Difficulty with many echoes
- Development of automatic algorithms

6) Refraction

7) Classification of ground points



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END

