JKU

JKU LINZ INSTITUTE OF TECHNOLOGY

LAND OBERÖSTERREICH

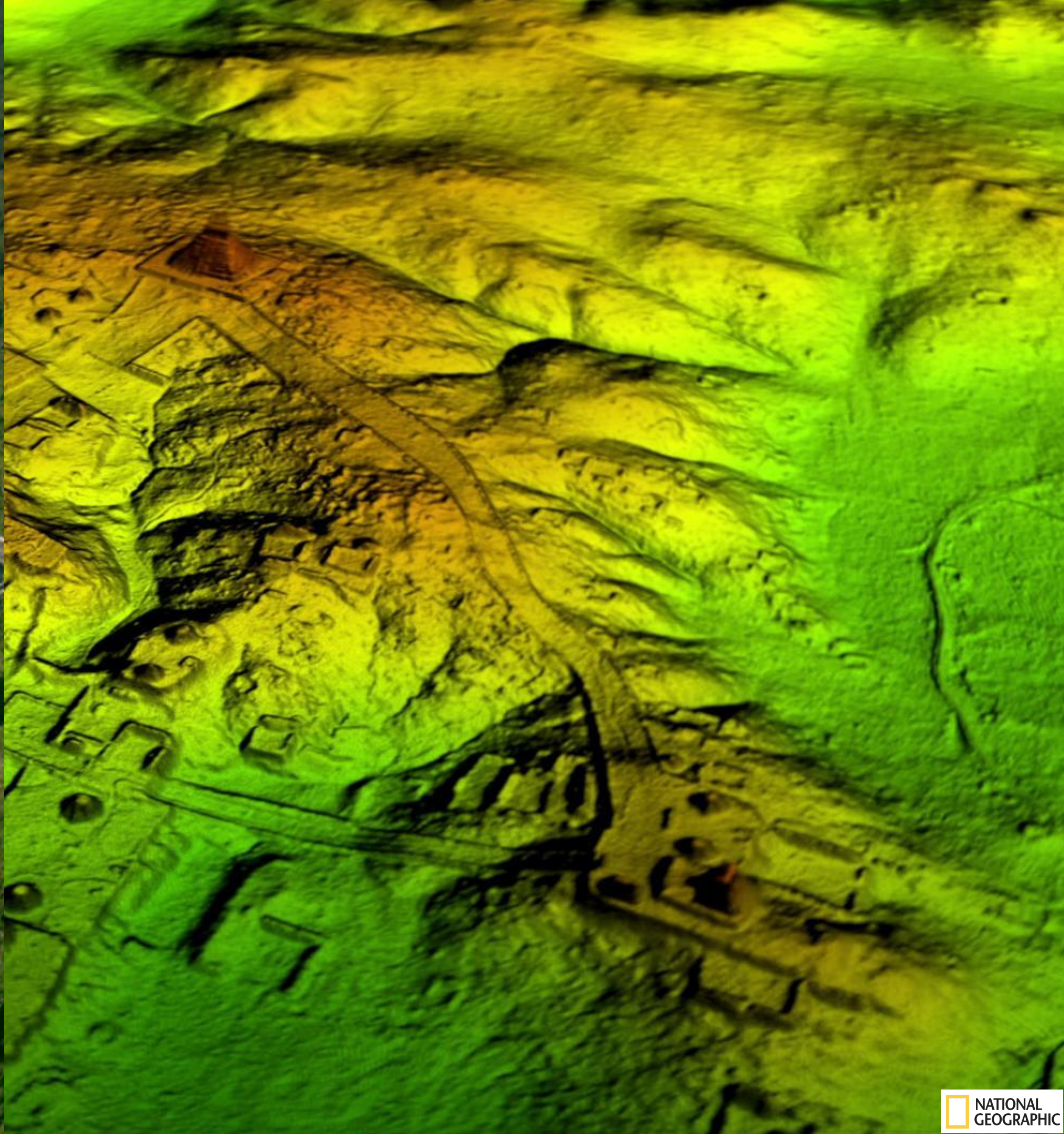
FWF Der Wissenschaftsfonds.

Seeing through Forest

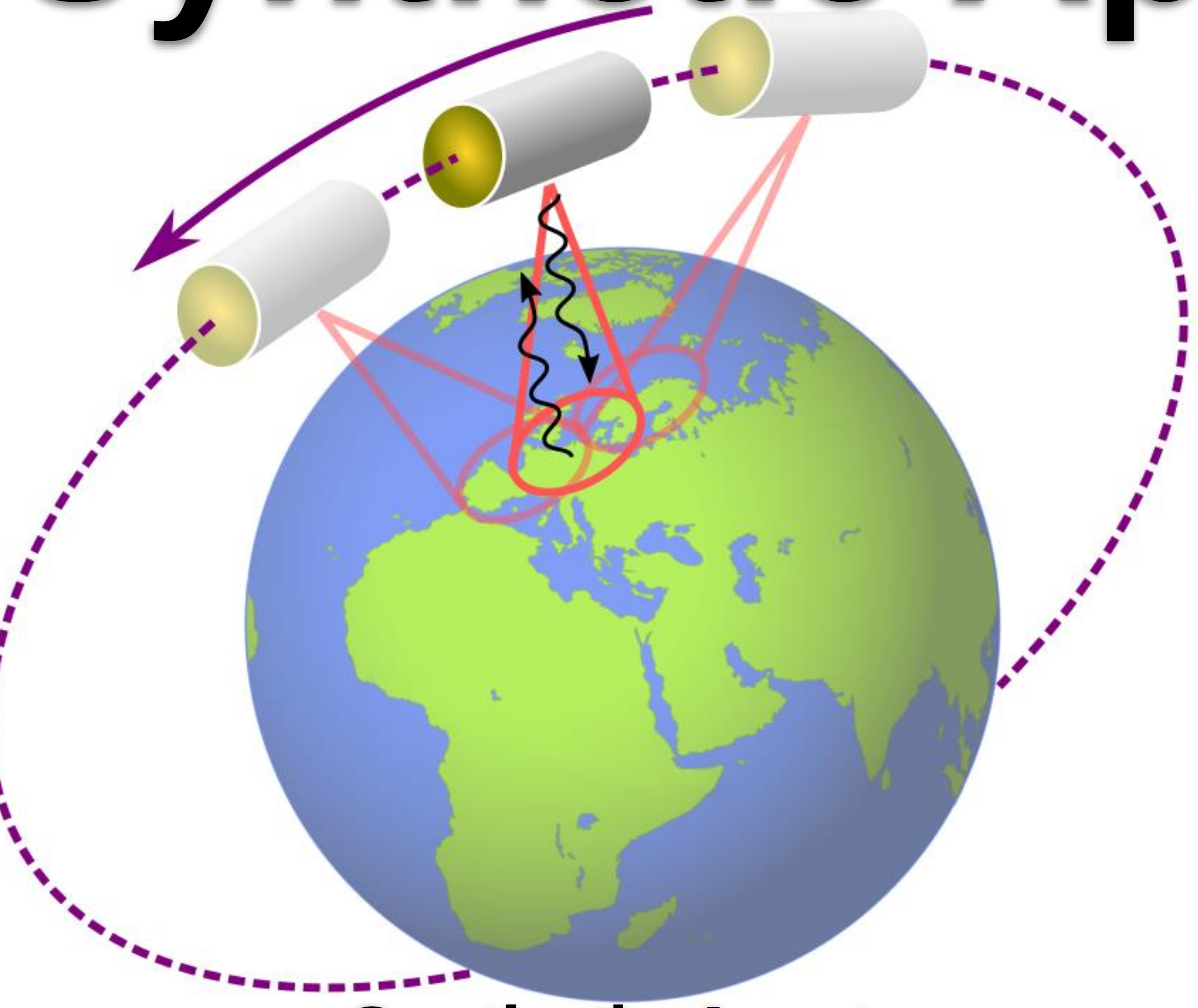
Oliver Bimber

autonomous drone equipped with RGB and thermal cameras

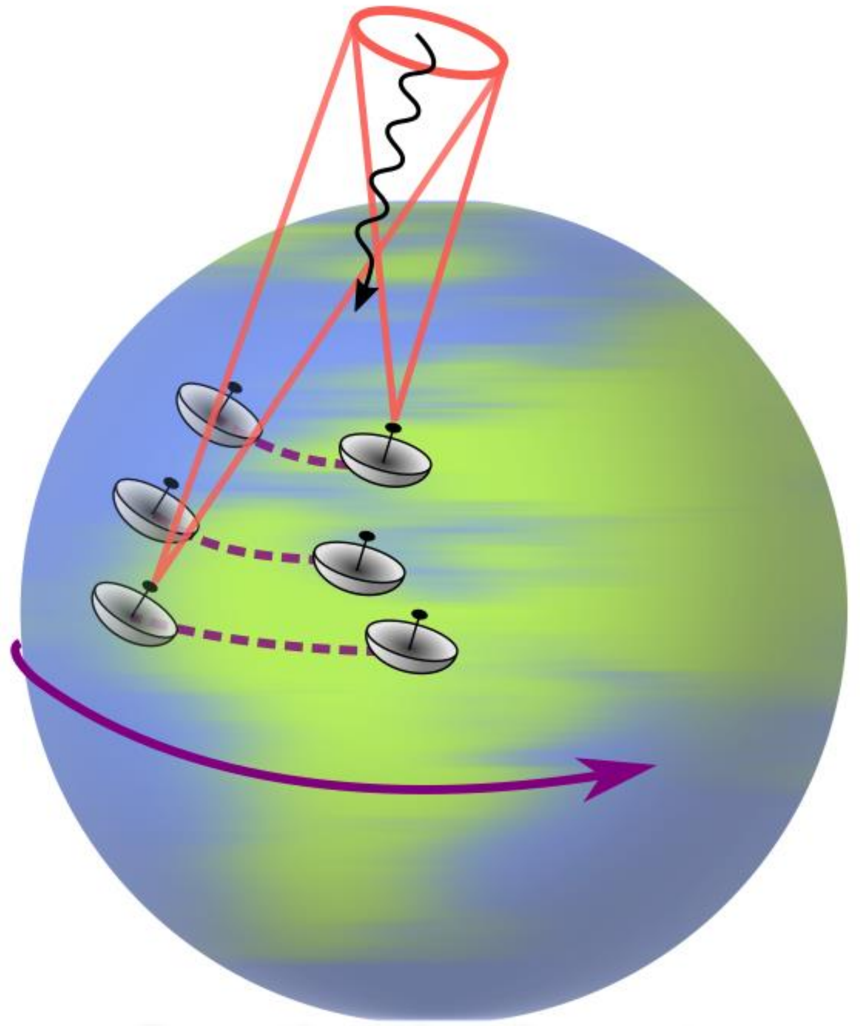
LiDAR



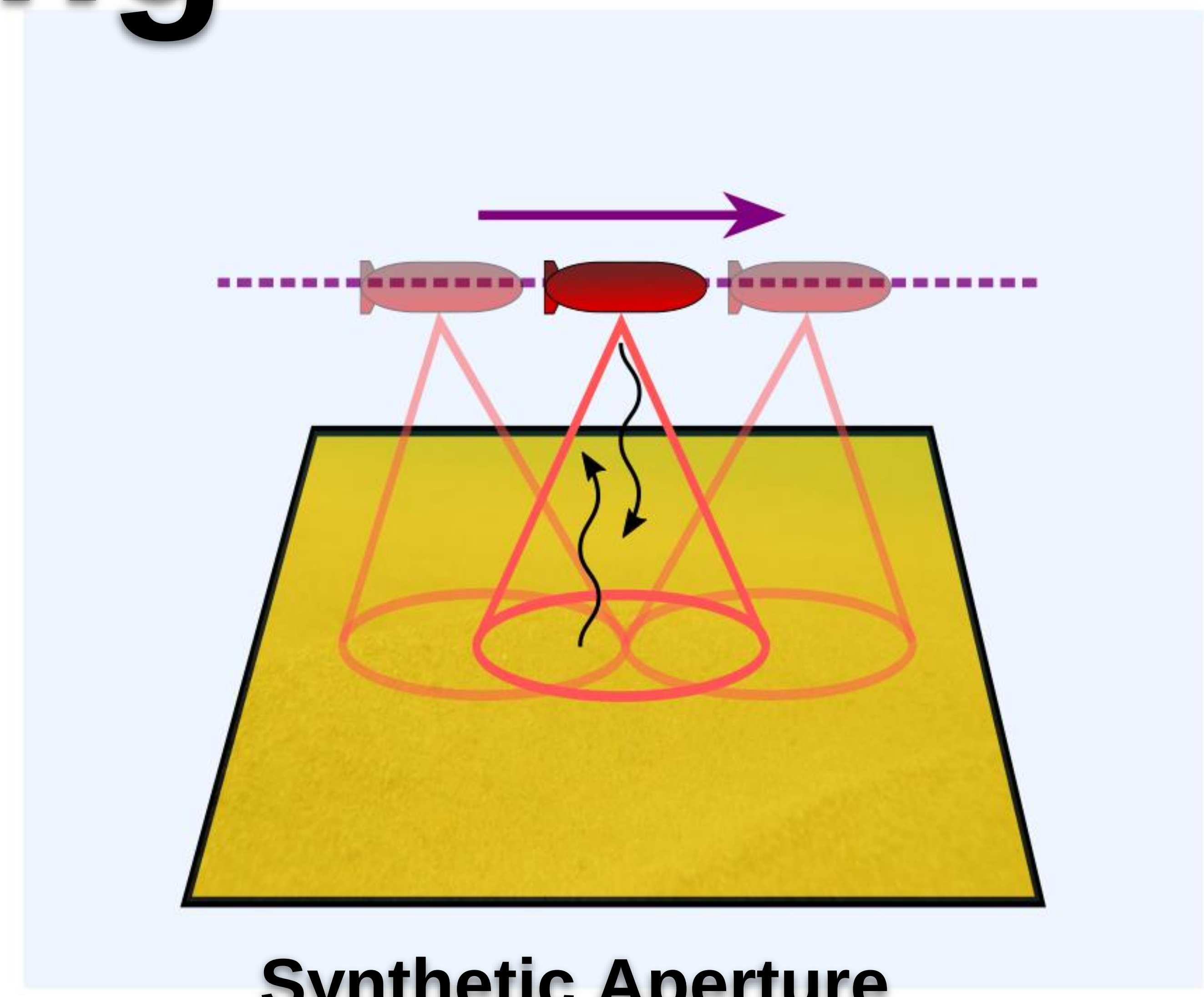
Synthetic Aperture Sensing



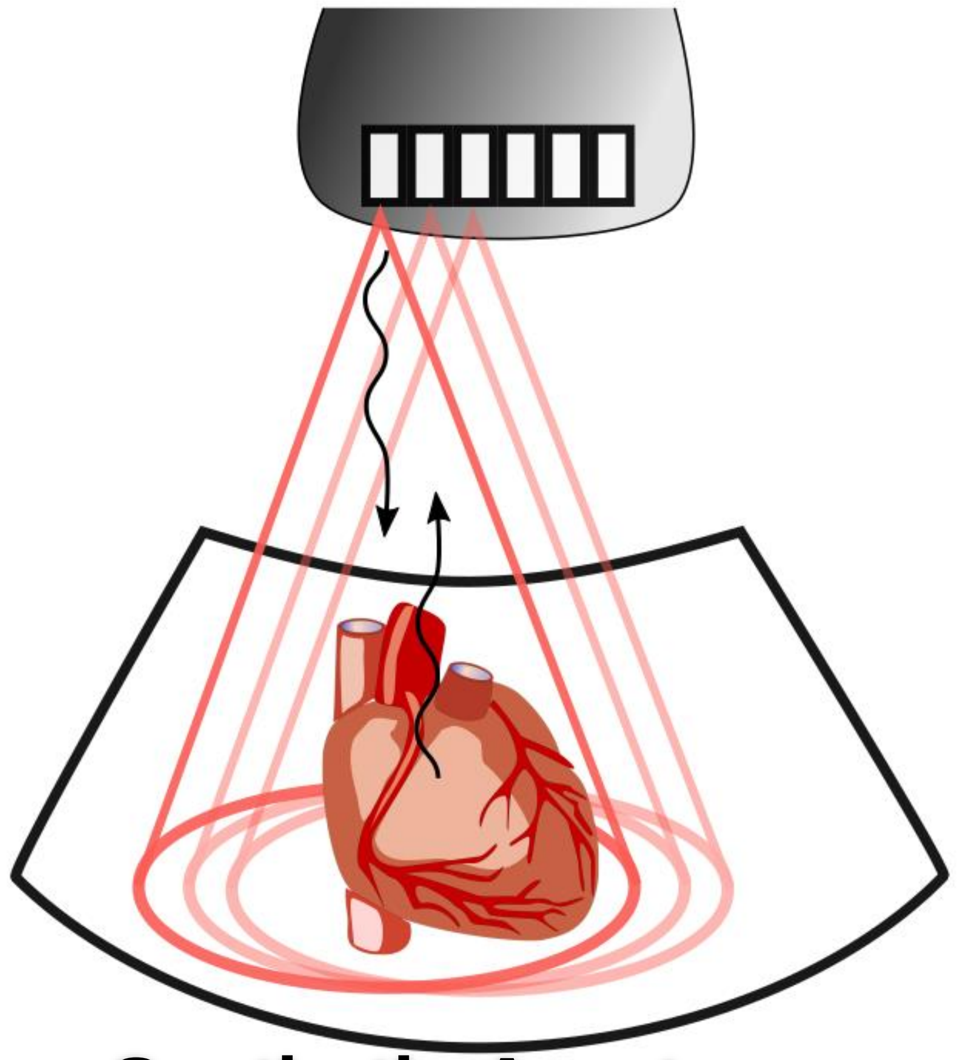
Synthetic Aperture Radar (SAR)



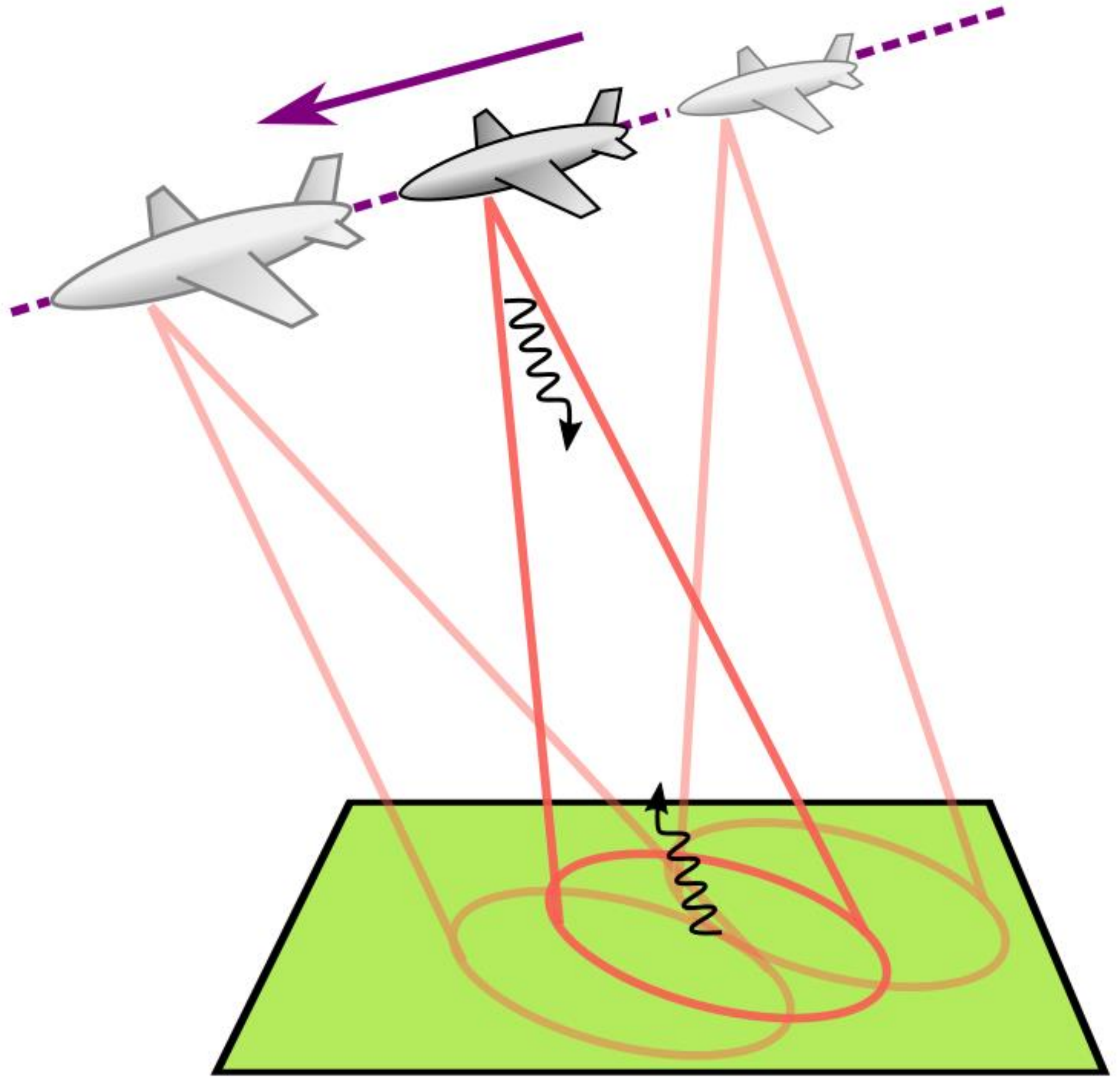
Synthetic Aperture Radio Telescopes (SART)



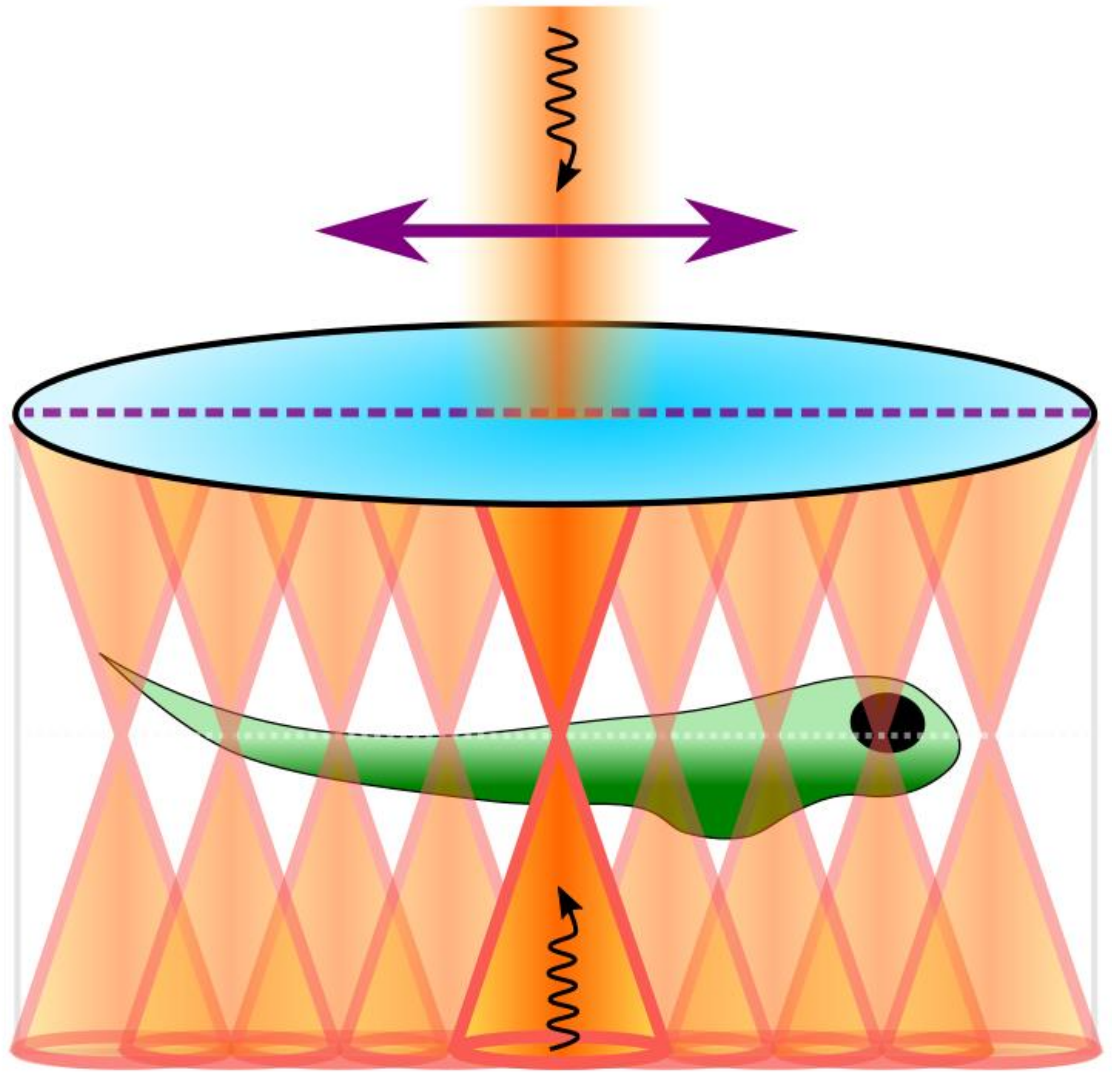
Synthetic Aperture Sonar (SAS)



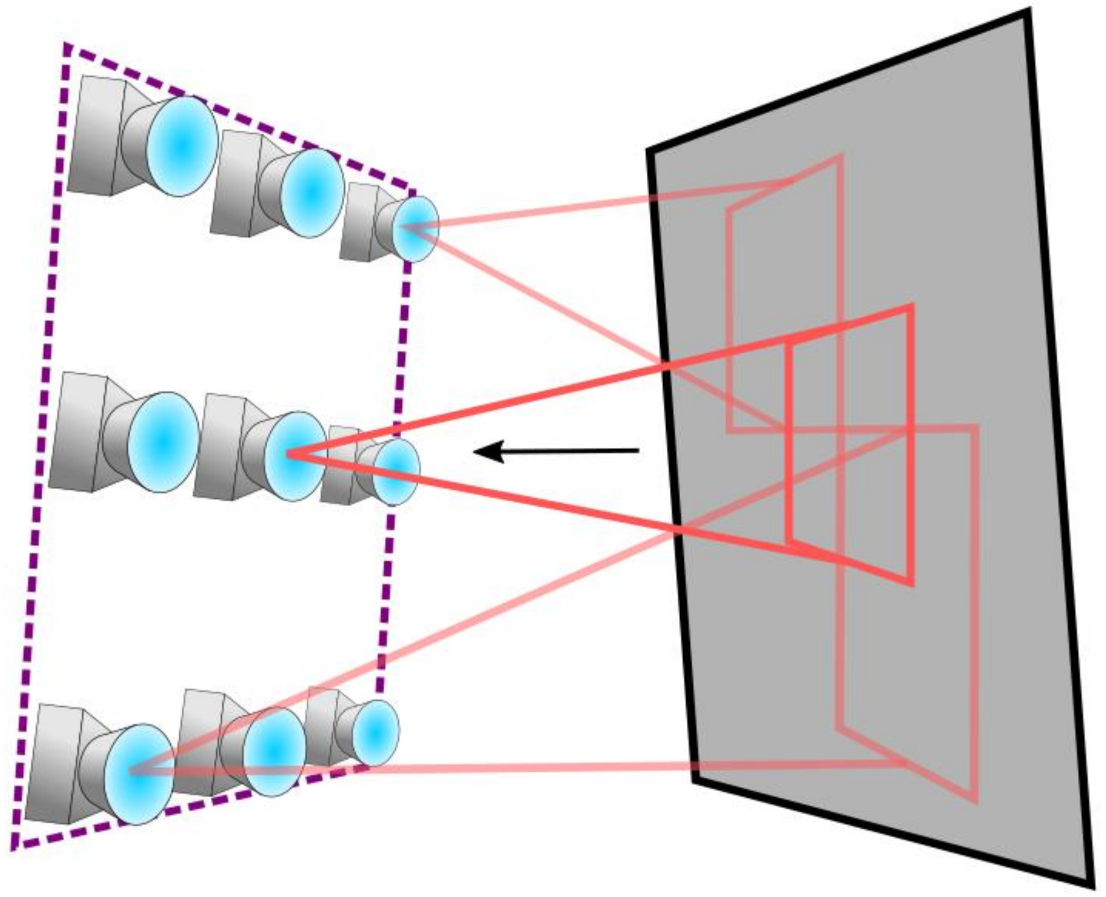
Synthetic Aperture Ultrasound (SAU)



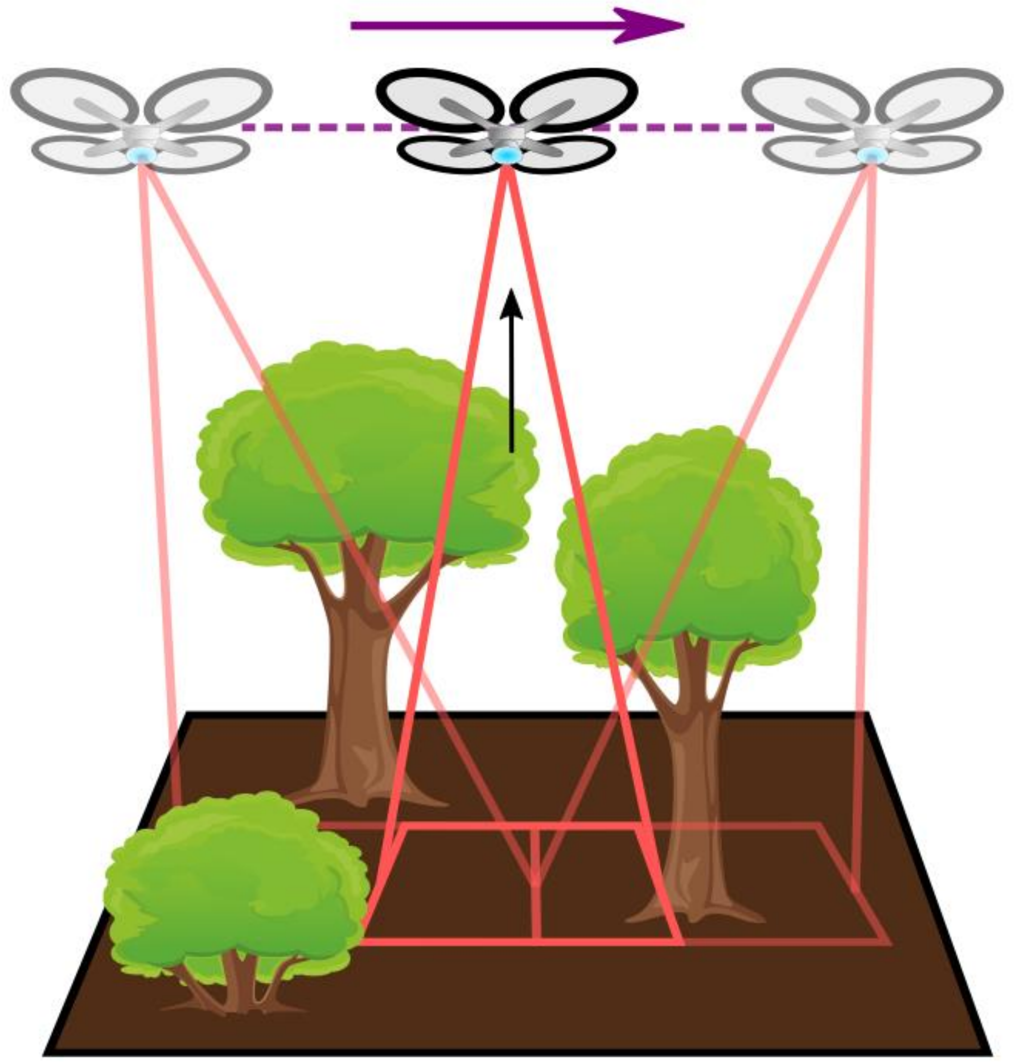
synthetic aperture LiDAR (SAL)
synthetic aperture imaging laser (SAIL)



Interferometric Synthetic Aperture Microscopy (ISAM)

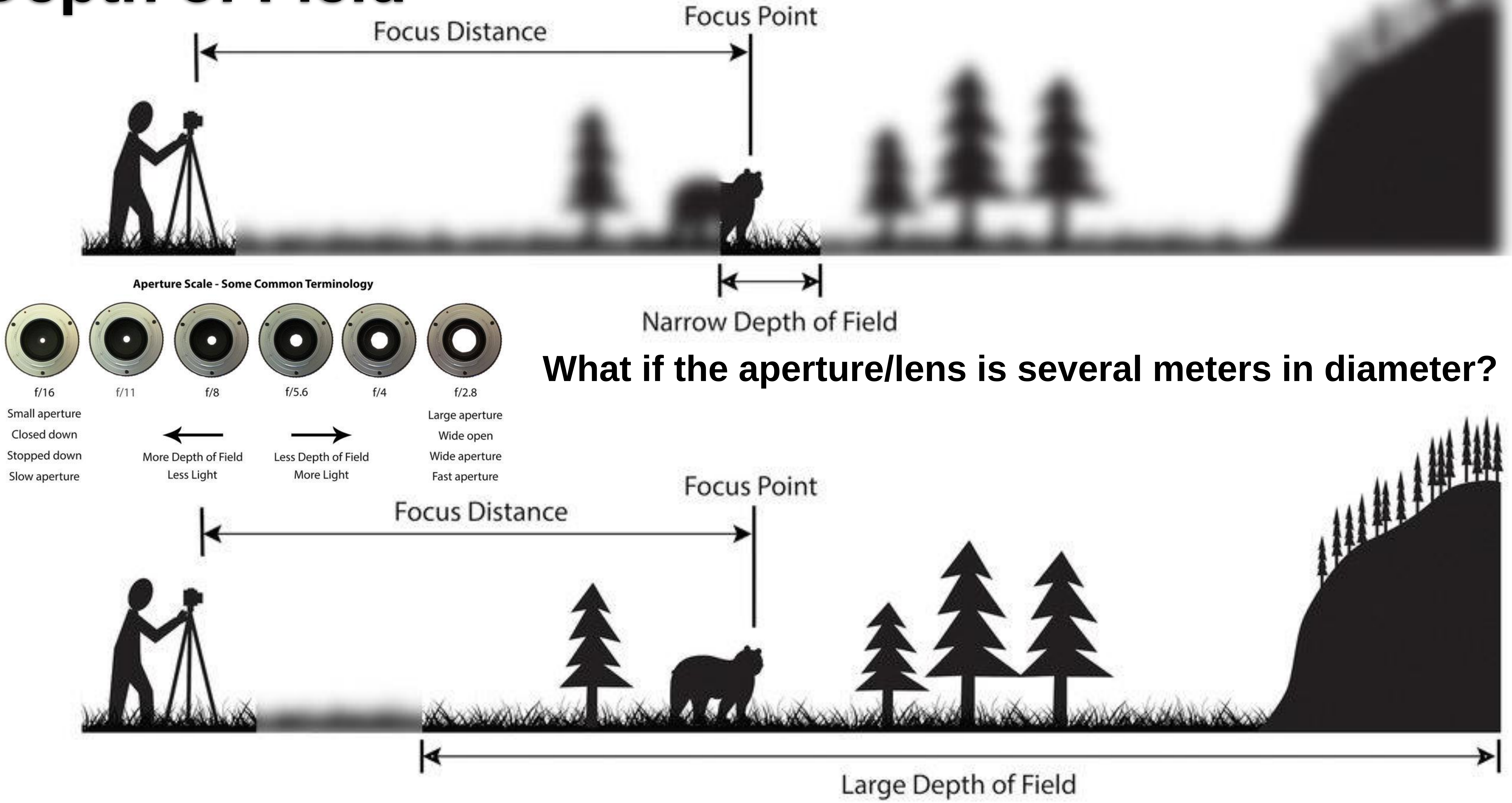


Structured Light-Field Imaging (SLFI)



Airborne Optical Sectioning

Depth of Field



What if the aperture/lens is several meters in diameter?


AOS
Σ
Synthetic Aperture Imaging
(unstructured Light-Field)

Airborne Optical Sectioning, J. Imaging 2018

Airborne Optical Sectioning, J. Imaging 2018

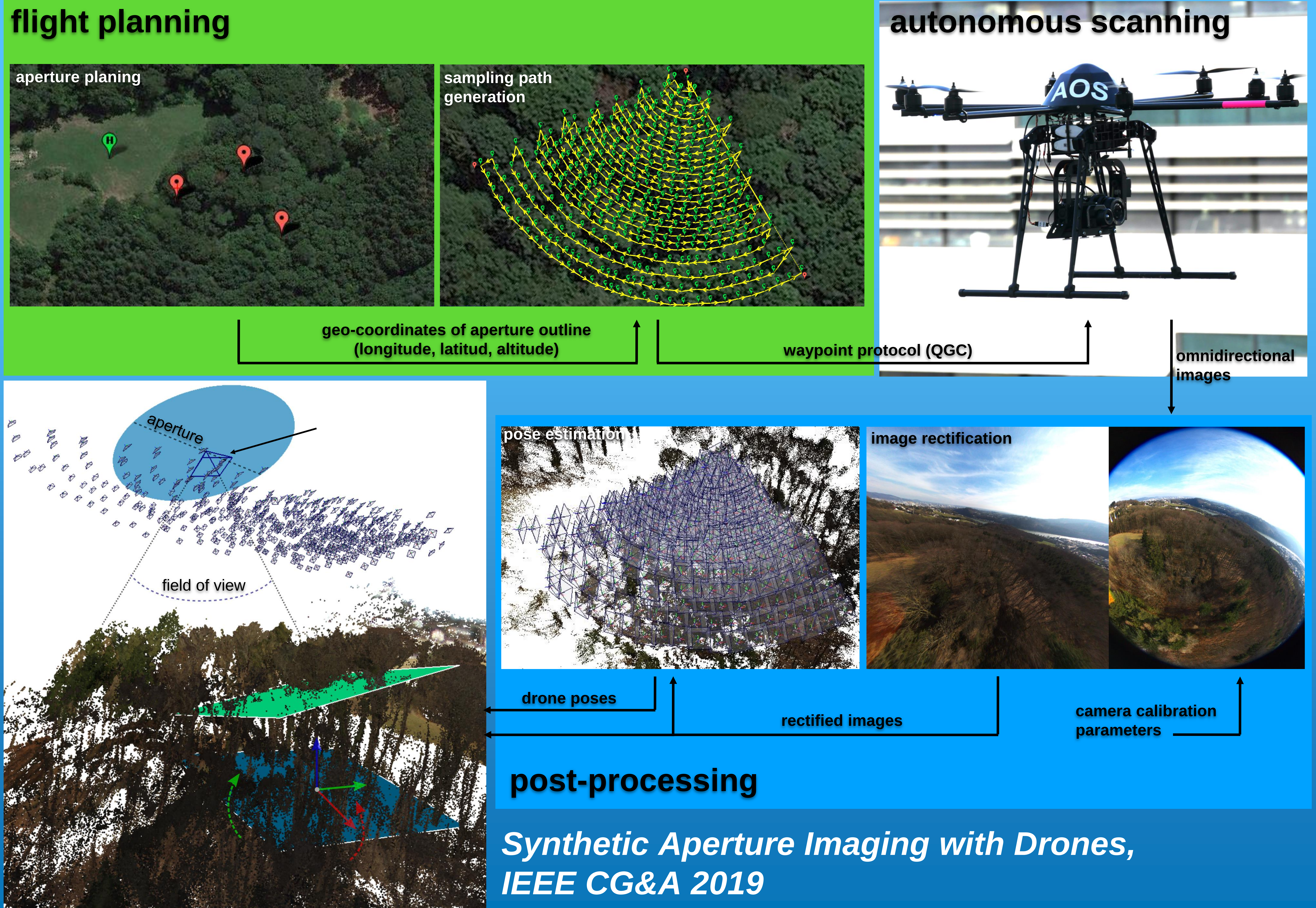
Airborne Optical Sectioning, J. Imaging 2018


90°
50m
Airborne Optical Sectioning, J. Imaging 2018
OÖ. LANDES MUSEUM

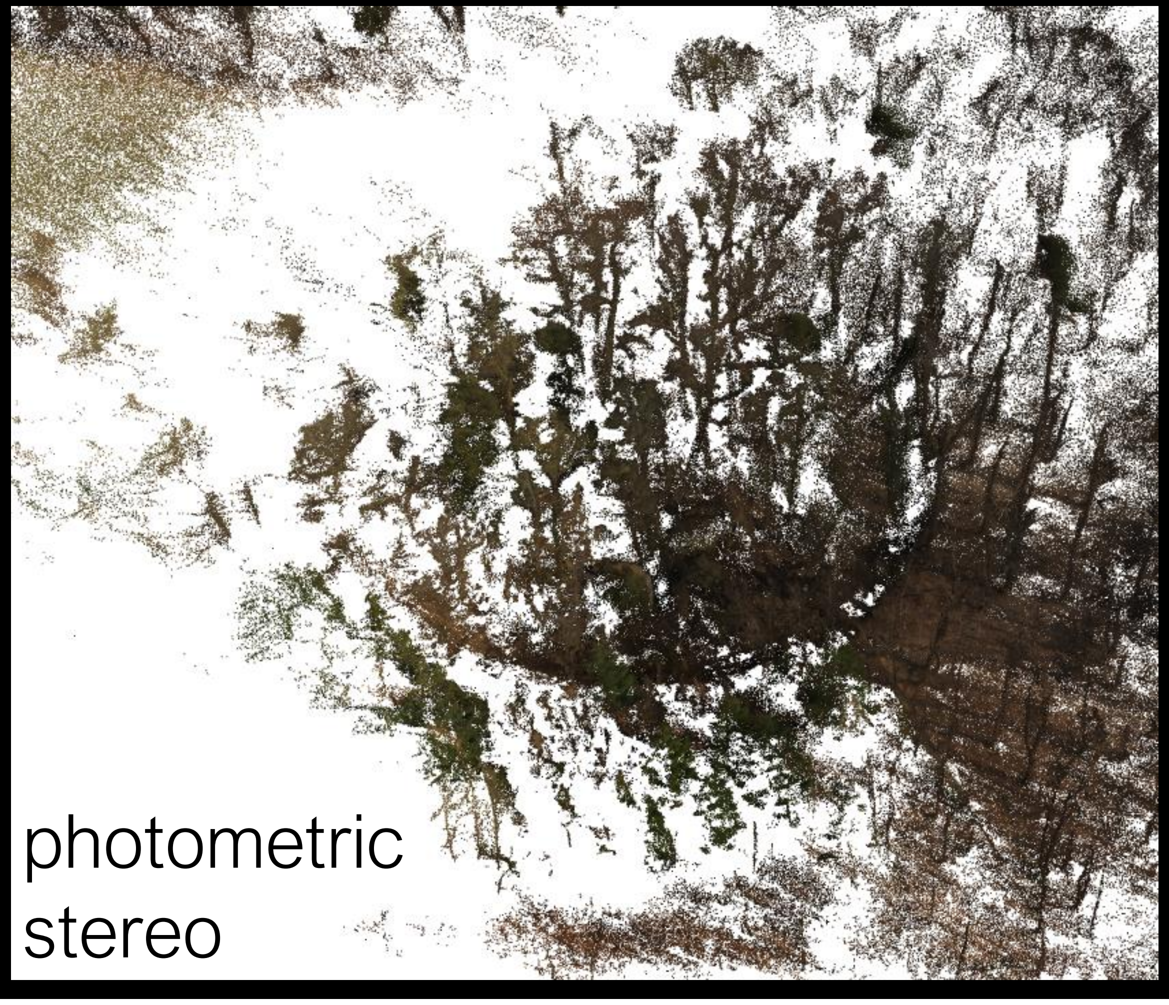
Airborne Optical Sectioning, J. Imaging 2018

M OÖ. LANDES MUSEUM

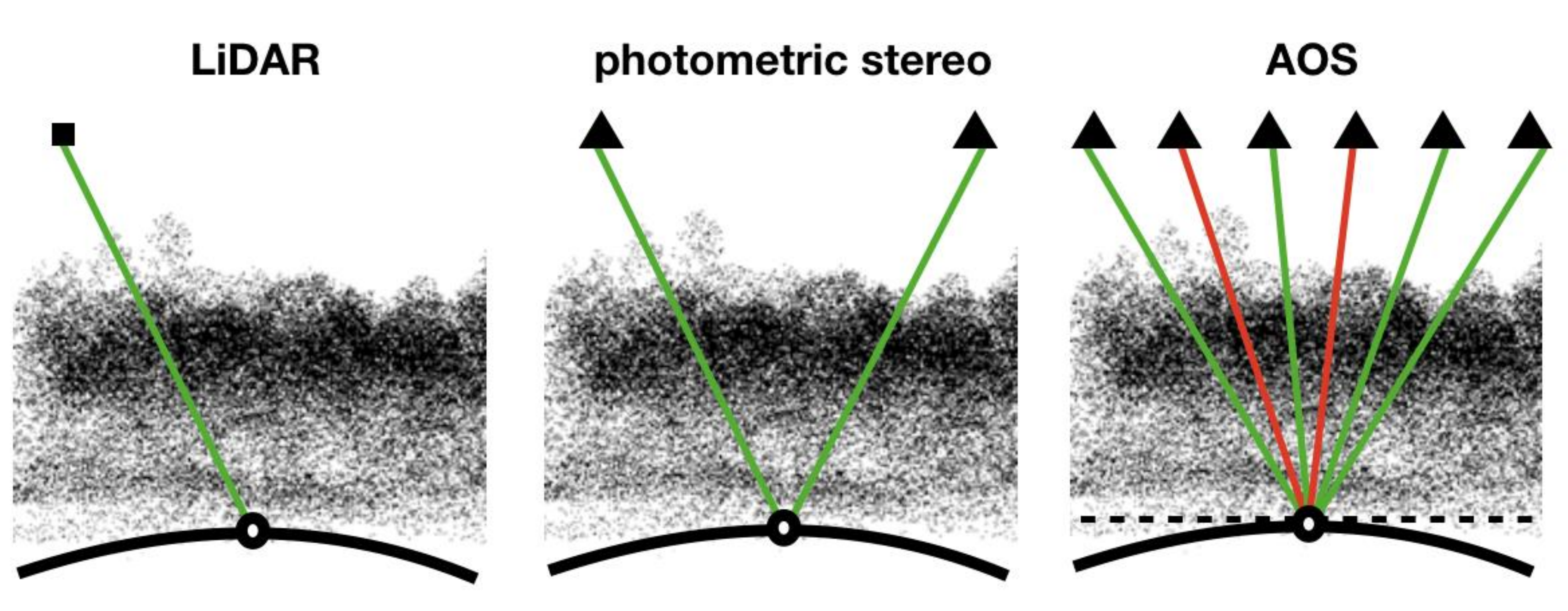
Process



Synthetic Aperture Imaging with Drones, IEEE CG&A 2019



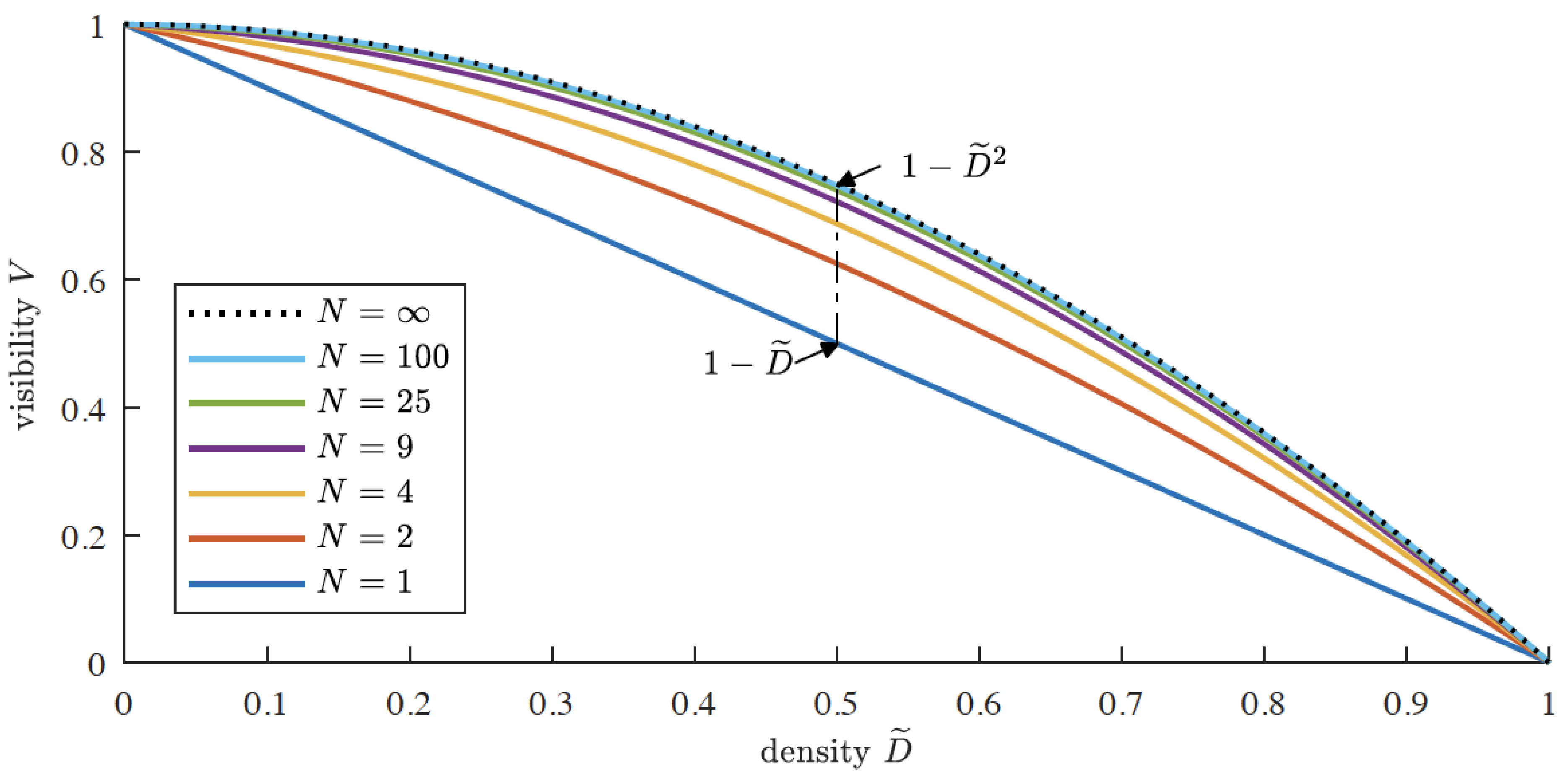
Does the aperture really have to be large and densely sampled?

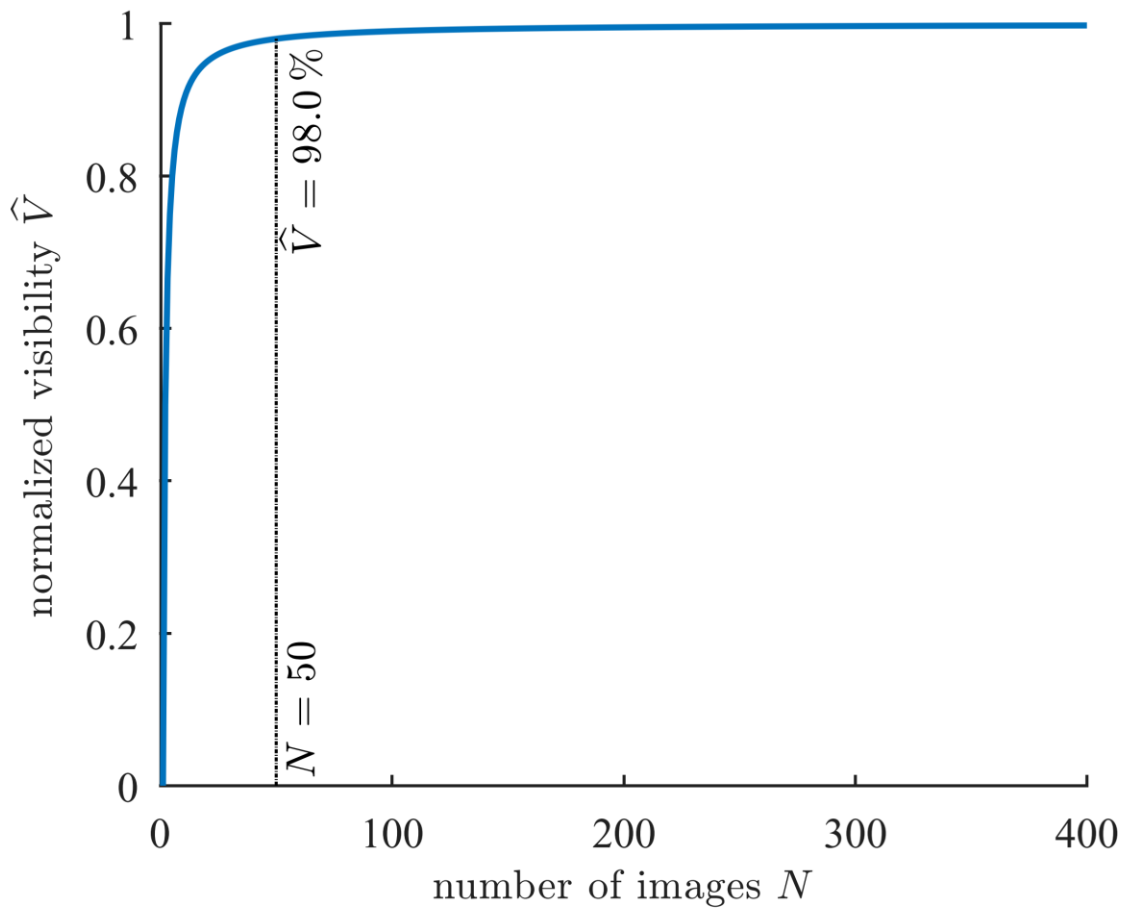


(1) There exists a limit to the baseline (distance) of sample positions. The minimal (optimal) baseline is the one that results in a disparity equal to the projected occluder size. Larger baselines do not improve visibility.

(2) There exists a limit to achievable visibility improvement that depends on the density of the occluder volume. The maximum visibility gain is achieved at a density of 50%.

(3) The (to the possible range normalized) visibility gain is independent of the occlusion density. It is directly correlated to a fixed number of samples.





A Statistical View on Synthetic Aperture Imaging, IEEE Sensors, 2019

Thermal Airborne Optical Sectioning (TAOS)

Thermal Airborne Optical Sectioning, J. Remote Sensing 2019

Thermal Airborne Optical Sectioning,
J. Remote Sensing 2019


RGB
thermal
thermal ROI
1
2
3
4
5
6
7
8
9
(a)
1
2
3
4
5
6
7
8
9
10
(b)
ROI
(c)
10 perspectives
(d)
16 perspectives
(e)
50 perspectives
Thermal Airborne Optical Sectioning, J. Remote Sensing 2019

Thermal Airborne Optical Sectioning, J. Remote Sensing 2019

redundant OktoXL 6S12
with synchronised Flir Vue Pro and
Sony A6000 (1.2m diameter, 5kg)


(a)
Danube
Germany
Linz
Munich
Inn
Austria
(b)
(c)
40m
12m
scanning area
(48°20'58.4"N 13°22'01.0"E)
350m
takeoff / landing position
(48°20'54.9"N 13°22'16.7"E)
100m


nature
SCIENTIFIC REPORTS
Airborne Optical Sectioning for Nesting Observation, Nature SciRep, 2020

Airborne Optical Sectioning for Nesting Observation, Nature SciRep, 2020