

# Ableitung aktueller 3D Information aus hochauflösenden Pleiades Stereodaten am Beispiel Eisenstadt

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TU WIEN  
DEPARTMENT OF GEODESY  
AND GEOINFORMATION

# DSM/DTM Generation



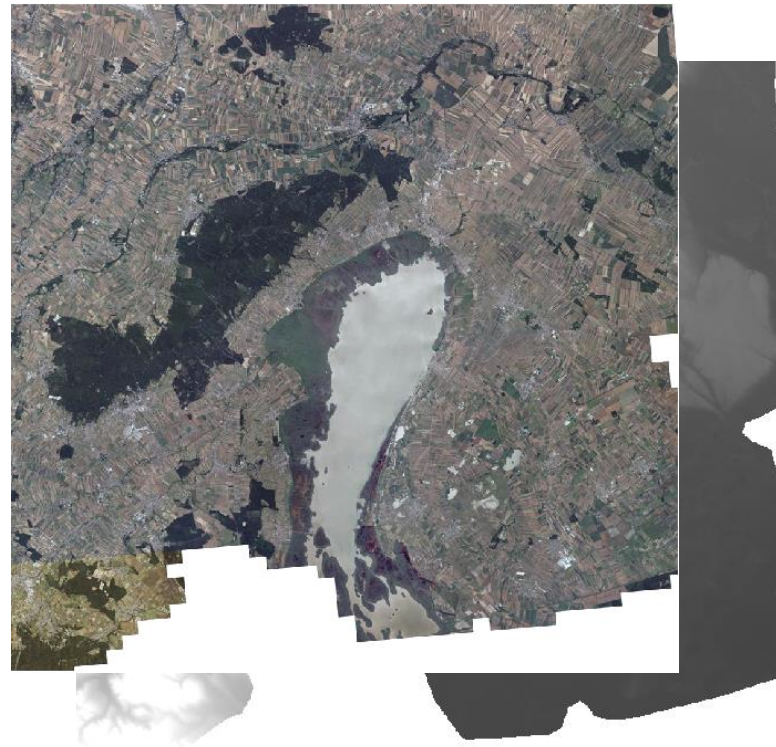
- Was ist der Service?
  - Ableitung von Höheninformation über multi-Stereo basierend auf Pleiades Daten
- Wofür kann der Service verwendet werden?
  - Aktualisierung bestehender DSM/DTMs
  - True Ortho Erstellung
- Welche räumliche und zeitliche Abdeckung?
  - user defined

# Pléiades Eisenstadt

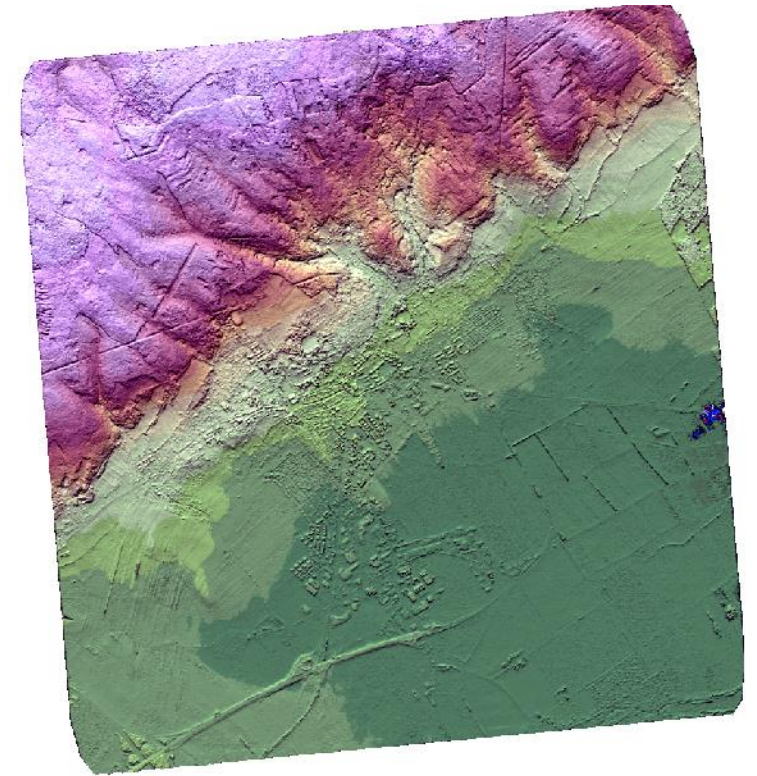
image triplet



reference data  
BEV: DOP and ALS DSM



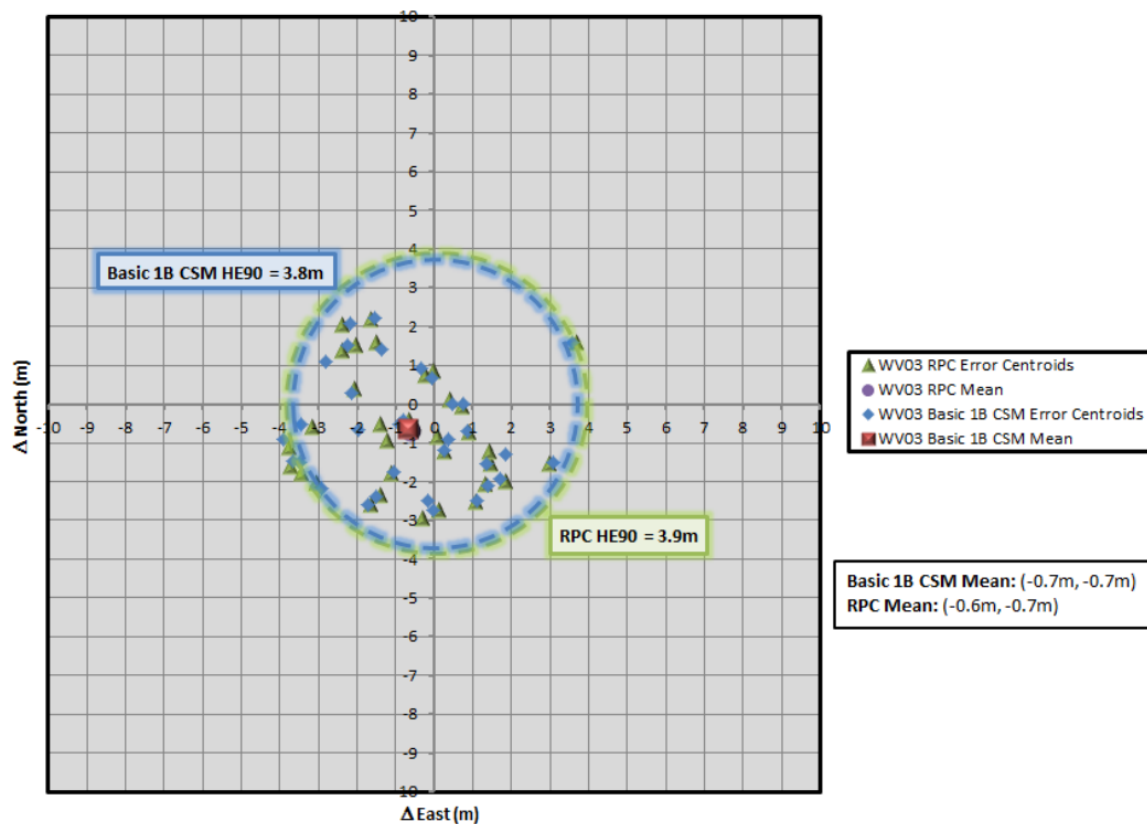
digital surface model





# Pleiades 2D Lagegenauigkeit

WV03 Basic 1B Mono Geolocation Accuracy (More Nadir Mates)



WorldView 3 Beispiel [Bresnahan, 2015]

Pléiades erreicht:

- 8.5 m CE90 @ Nadir
- 10.5 m CE90 @ 30° Off-Nadir

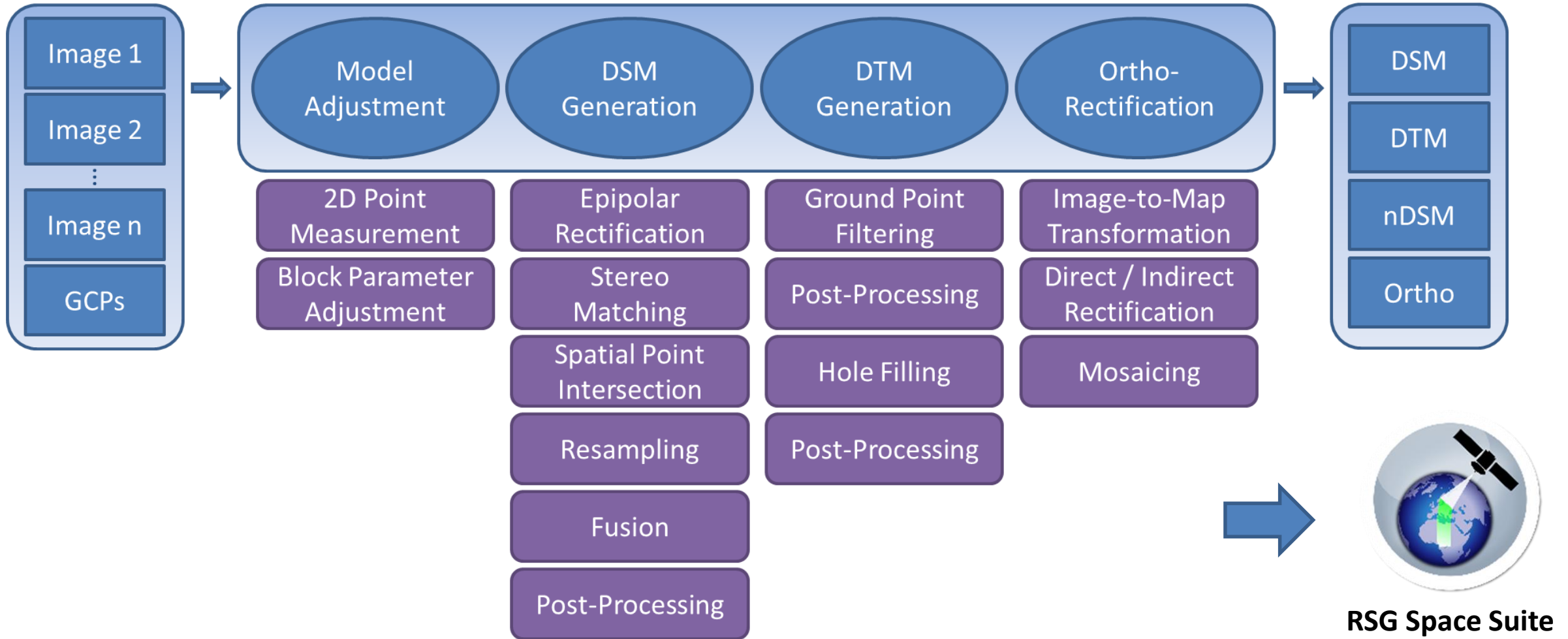
→ **Zu schlecht für DSM Erstellung**  
(auch für Orthorektifizierung)

Passpunktmessung und Optimierung  
des Sensormodells notwendig!

# 3D Mapping Workflow



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# Passpunktmessung



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Control Point Viewer

File View Mode Options Help

Point List

All Points + - Show in Image View Hide in Image View

ID	Manifold
GCP-0001	3
GCP-0002	3
GCP-0003	3
GCP-0004	3
GCP-0005	3
GCP-0006	3
GCP-0007	3

29 of 29 points valid, 1 selected

Point Info

Reference Domain: Reference

General

- ID: GCP-0001
- Status: UM-

Position

- East: 4809263.7896
- North: 2769038.6428
- Height: 162.9840

Measurements

- SigE: 0.000000010
- SigN: 0.000000010
- SigH: 0.000000010
- Comment:
- Valid Domains: 4

Point Measurement

Set Point Status

Domain	Column	Line	Status
PLEIADES_2023-07-16_1	6299.36	8476.91	UM-
PLEIADES_2023-07-16_2	6337.07	8507.22	UM-
PLEIADES_2023-07-16_3	6312.53	8454.90	UM-

Reading Data

Reference

PLEIADES\_2023-07-16\_1

PLEIADES\_2023-07-16\_2

PLEIADES\_2023-07-16\_3

Synchronize zooming of image domains  Hide Views of Non-Valid Points  Hide the view for the reference domain View Columns [2] Lines [2]

100%

# Sensormodellierung

## A priori 2-D Residuen [pxl]

Bild / Pnt	RMS-X	RMS-Y	Mean-X	Mean-Y
1 / 29	5.94	13.13	-5.88	13.10
2 / 29	4.14	5.81	-4.07	5.72
3 / 29	1.55	2.87	-1.37	-2.70

## A priori 3-D Residuen [m]

29 Pnt	Res-E	Res-N	Res-H	Planar	Length
RMS	0.305	2.747	39.953	2.764	40.049
Mean	-0.042	2.707	39.931	2.723	40.026

## A posteriori 2-D Residuen [pxl]

Bild / Pnt	RMS-X	RMS-Y	Mean-X	Mean-Y
1 / 28	0.90	0.89	0.40	-0.46
2 / 28	0.82	0.77	0.27	-0.06
3 / 28	0.73	0.91	0.09	0.53

## A posteriori 3-D Residuen [m]

28 Pnt	Res-E	Res-N	Res-H	Planar	Length
RMS	0.366	0.352	2.877	0.508	2.922
Mean	-0.020	-0.002	-2.536	0.450	2.760



# Pléiades Eisenstadt (1m<sup>2</sup> GSD)

## LiDAR reference



## Pléiades DSM



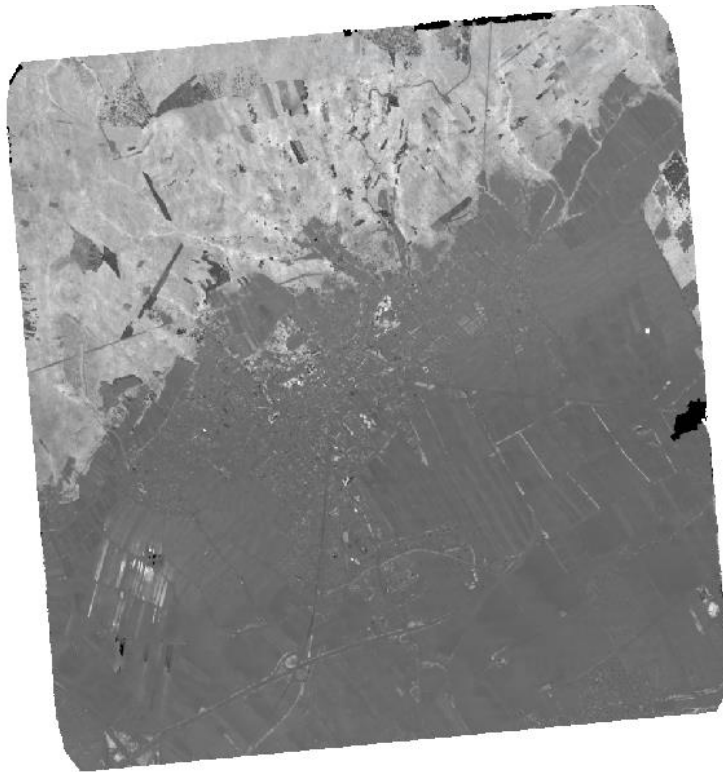
## Pléiades Ortho





# Differenz zu BEV-ALS

## Übersicht



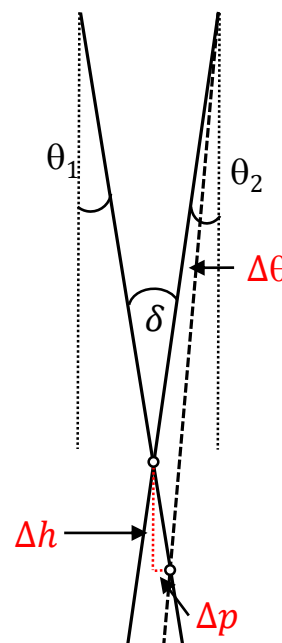
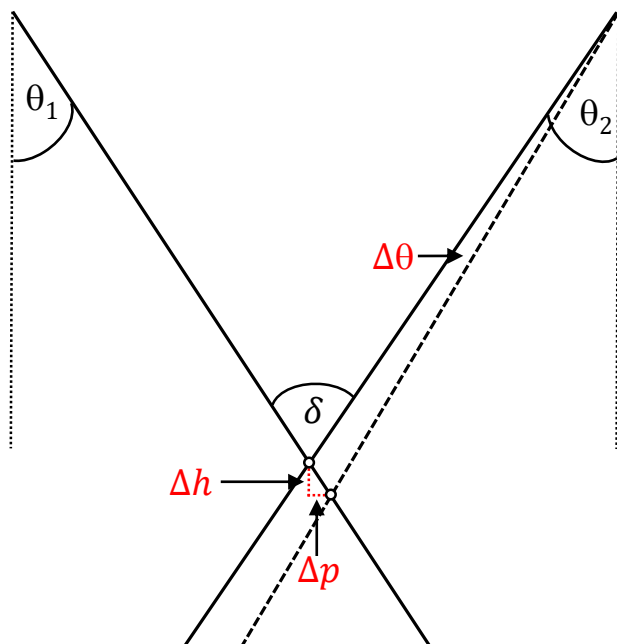
## Zoom-In



# Schnittwinkel



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small intersection angle  
(small B/H ratio)

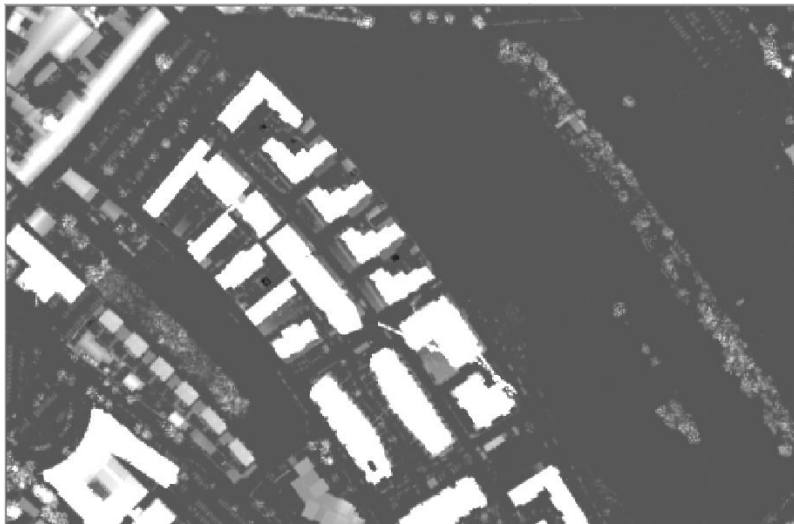
$\Delta\theta$ : angle error  
 $\Delta h$ : height error  
 $\Delta p$ : planimetric error

$\theta_1, \theta_2$ : look angles  
 $\delta$ : intersection angle

Note: The same angle error  $\Delta\theta$  causes larger height error  $\Delta h$ , with decreasing intersection angles.  $\Rightarrow$  Height accuracy of DSM decreases with decreasing intersection angles.

# Differenz zu BEV-ALS

## BEV-ALS nDSM



## Pléiades DSM



## BEV DOP



# Danke für ihre Aufmerksamkeit

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