

Digital Terrain Modeling by Image Matching

II/10

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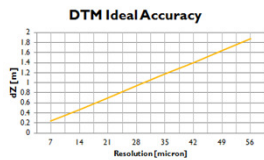
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Goal: to find an optimal scanning resolution of images used for DTM generation by image matching on photogrammetric workstations.

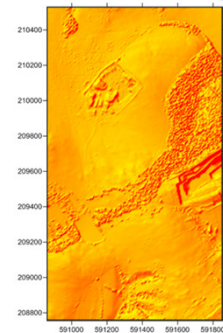
Source data: 5 m GRID interpolated from LIDAR point cloud. Vertical accuracy is +/- 0.15 m. It is used as a reference DTM. Year: 2008.

- Scanning resolution and height accuracy

$dZ = p \cdot R \cdot \frac{H}{f} \cdot \frac{H}{B}$
 dZ : height accuracy
 p : pointing error factor
 R : pixel size
 H : flight height
 f : focal length
 B : flight base

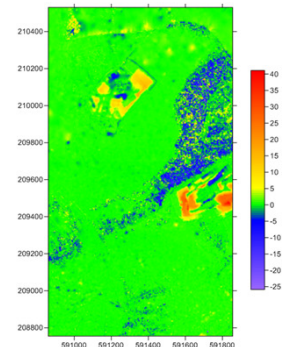
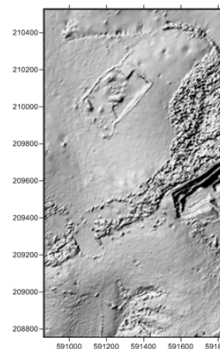
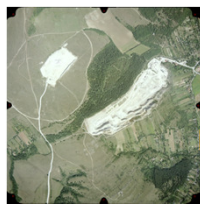


$p = 2.5, H = 1224 \text{ m}, f = 153.0 \text{ mm}, B = 731.7 \text{ m}$

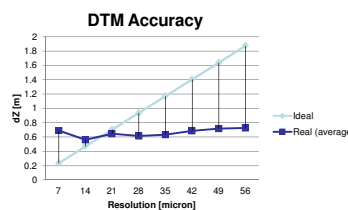
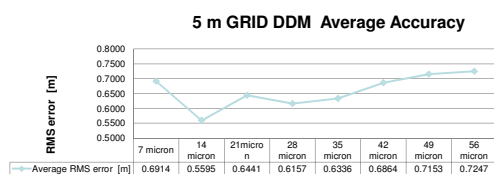


Series of 5 m GRID models interpolated from point cloud is gained by image matching using a Leica LPS 2011 workstation.

Year	2011
Photo Scale	1:8000
Model Area	1780x1000 m
Flight Height	1224 m
Photo Base	731.6 m
Focal Length	153.0 mm
Image Pair	9643-9644
Height accuracy (control points)	0.0869 m
Scanning Resolution (micron)	7,14,21,28
Interpolated Resolutions (micron)	32,42,49,56
GRID Dimension	5x5 m
GRID Interpolation Method	Kriging



Average RMS is calculated for each resolution:



$R_{op} = k \cdot \frac{1}{2 \cdot VA_v}$
 R_{op} : optimal scanning resolution (mm)
 $k = 2.5$: optimizing factor
 VA_v : aggregated film resolution (line pairs per mm)



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