

Microsoft



Vexcel Imaging / Microsoft Photogrammetry User Meeting, Tokyo, September 2008

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VEXCEL
IMAGING
a Microsoft company

Vexcel Imaging Photogrammetry Products

Microsoft

UltraCamXp

VEXCEL
IMAGING Gm

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UltraCam Xp

- **Based on the most successful UltraCamX**

- **Key features**

- **CCD size 6.0 μm** (UCX: 7.2 μm)
- **195 Mega pixel pixel)** (UCX: 136 Mega)
- **Storage system 2 x 2.1 Terra byte** (UCX: 2 x 1.7 TB)
- **Storage system 6600 images** (UCX: 4700 images)
- **New filters for even improved image dynamic**

UltraCam Xp

■ Projects

- 500m flying height -> 2.9 cm GSD -> 514m strip width
- 1000m flying height -> 5.8 cm GSD -> 1028m strip width
- 3000m flying height -> 17.4 cm GSD -> 3085m strip width

■ Largest digital camera world-wide

■ Lowest possible collection costs

■ Most efficient digital camera world-wide

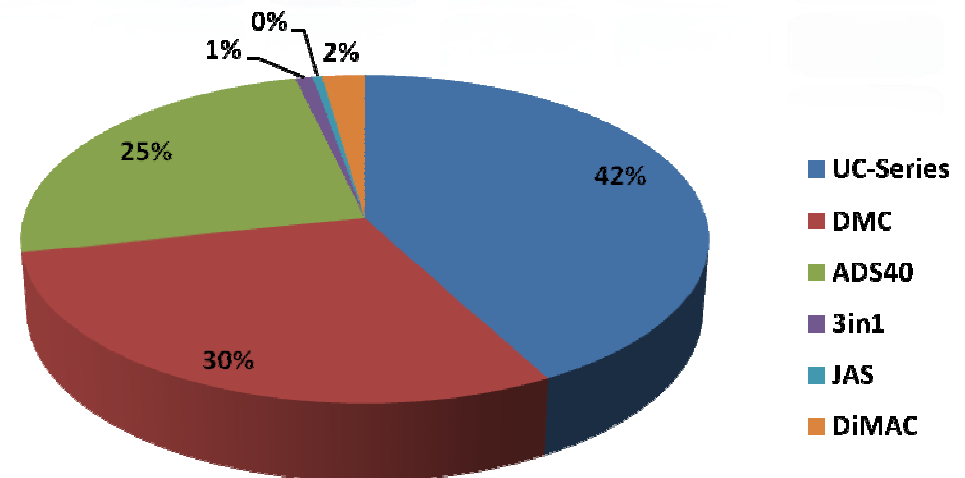
Success Story

■ Sales Figures

- 244 cameras world-wide
- 101 cameras of UCD and UCX
 - 47 UltraCamD
 - 54 UltraCamX

- **Announcement:**
The UltraCam #100 has been sold in July 2008 to Geokosmos, Russia, by our partner GeoLidar

Total Market Share



- Vexcel market share 42% with UCD/UCX

Success Story

■ Sales Figures

- 244 cameras world-wide
- 103 cameras of UCD, UCX and UCXp
 - 47 UltraCamD
 - 54 UltraCamX
 - 2 UltraCamXp
- (end of July 08)

- **Announcement:
Aerodata, Belgium,
purchased UltraCam Xp
#1 and #2 at ISPRS 08**

**Vexcel = Industry
Leader**

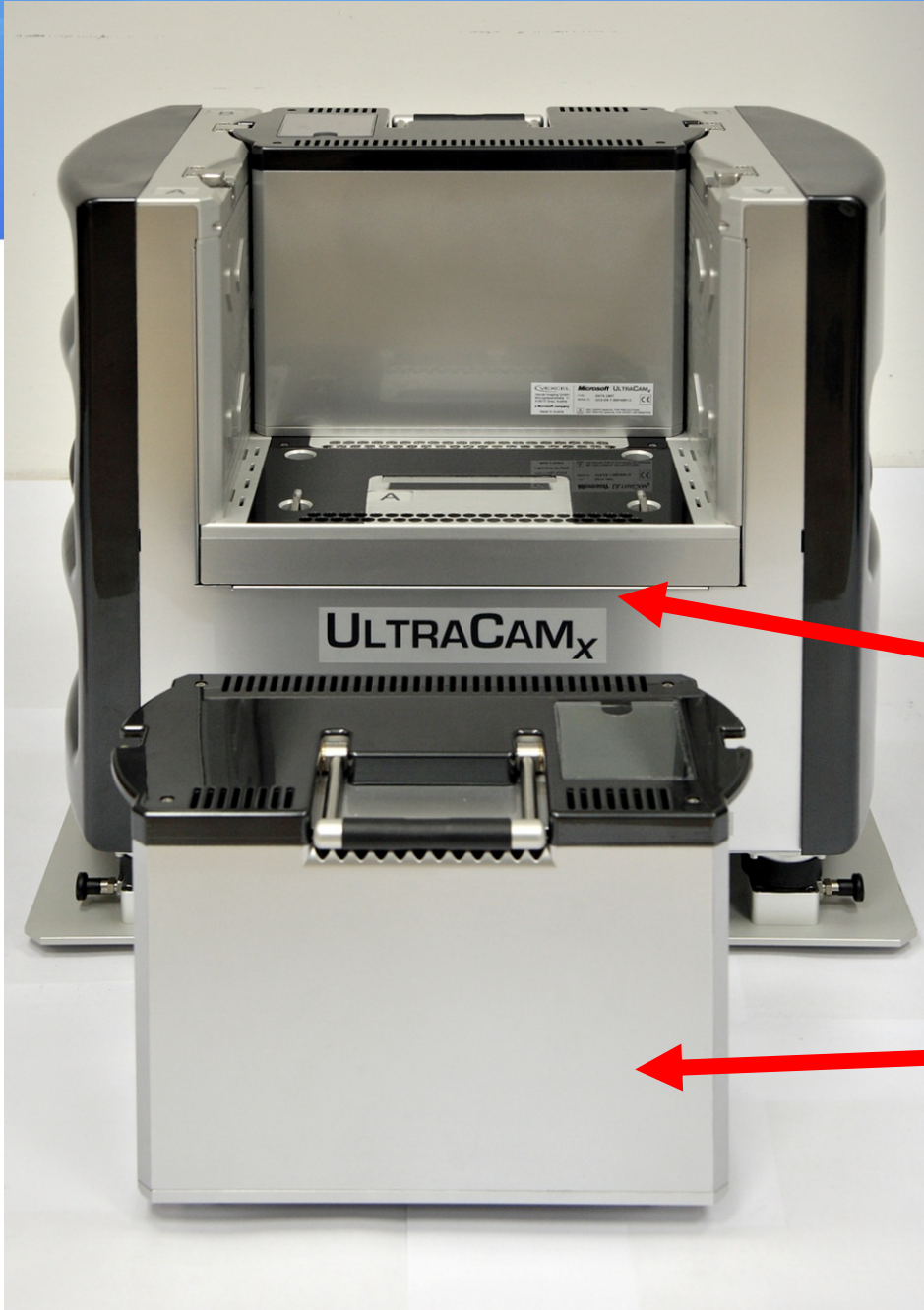
UltraCamXp

Microsoft



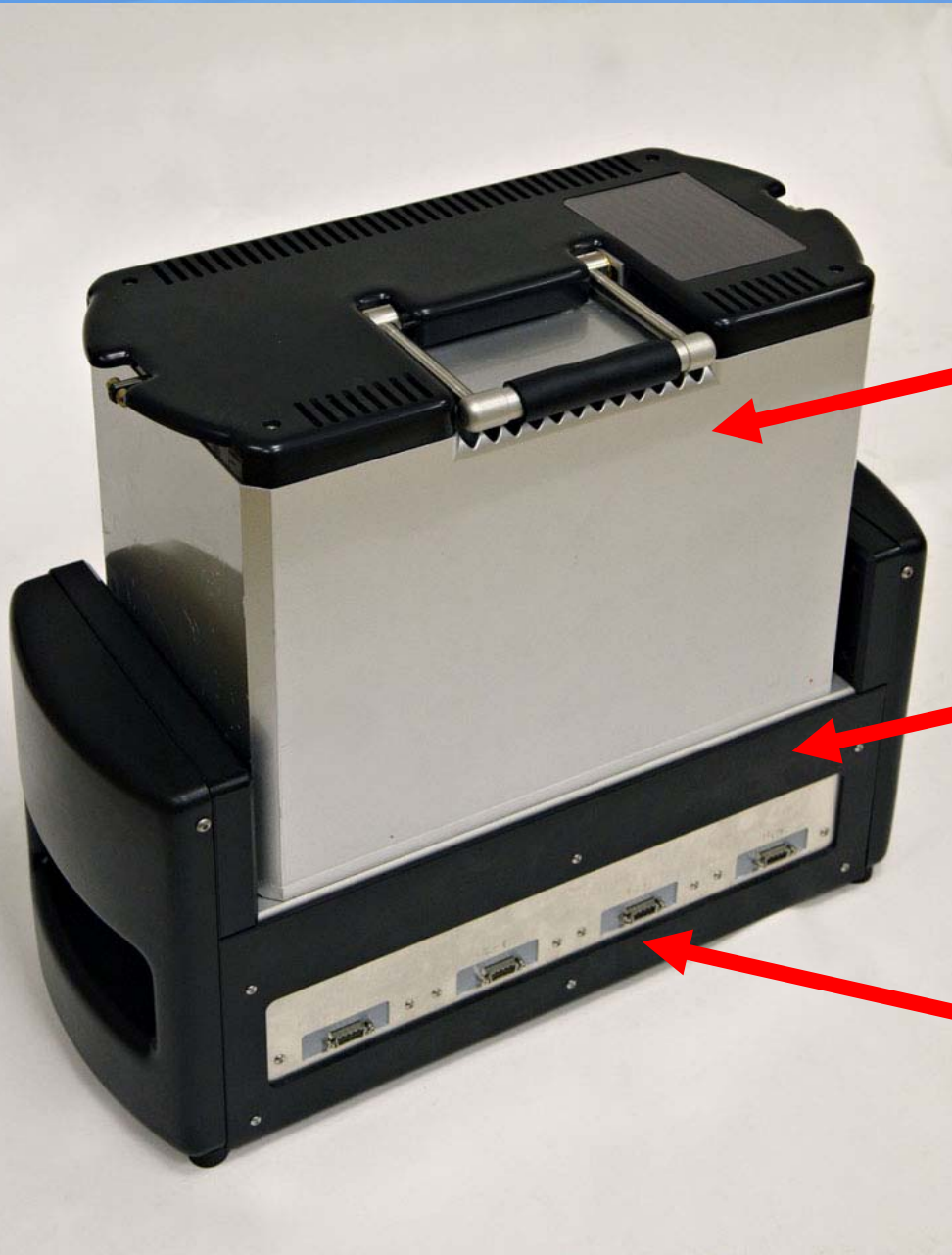
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Computing Unit

**exchangeable
Data Unit**



Data Unit

Docking Station

**4 parallel
Download Ports**

UltraCamXp

Largest Image Format

17310 by 11310 pixel (195 Mpixel)

On board Data Storage

6600 Frames / Data Unit

Short frame intervall (2 sec)

3cm GSD / 60% Endlap / 140 kn



UltraCamD, 7500 * 11500



UltraCamX, 9420 * 14430



UltraCamXp, 11310 * 17310

Microsoft/Vexcel Aerial Camera Evolution

UltraCamD

UltraCamX

UltraCamXp



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Design Basics

Panchromatic Channel:

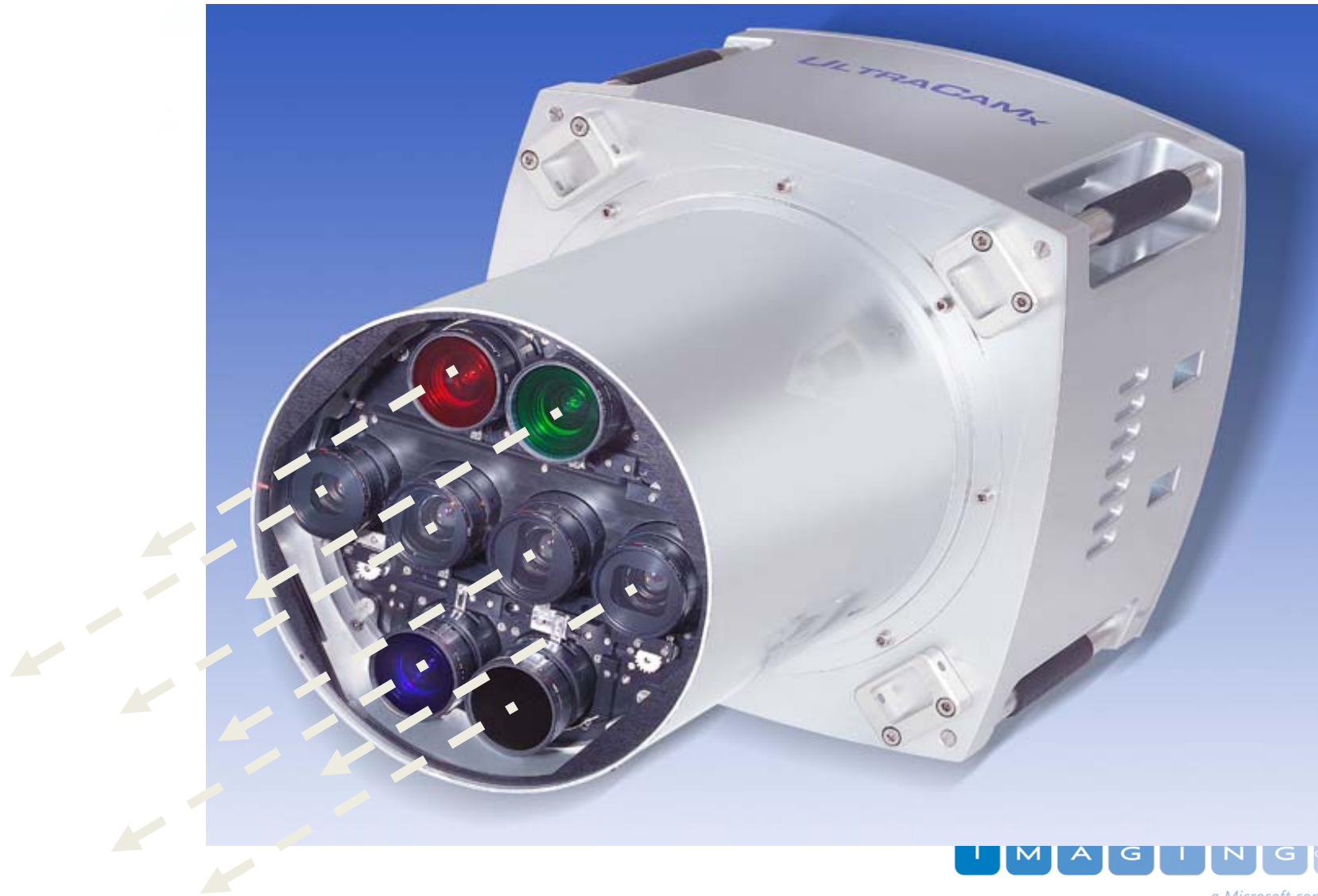
Set of four Cones and 9 CCDs
one Master Cone

Multispectral Channels:

Set of four Cones

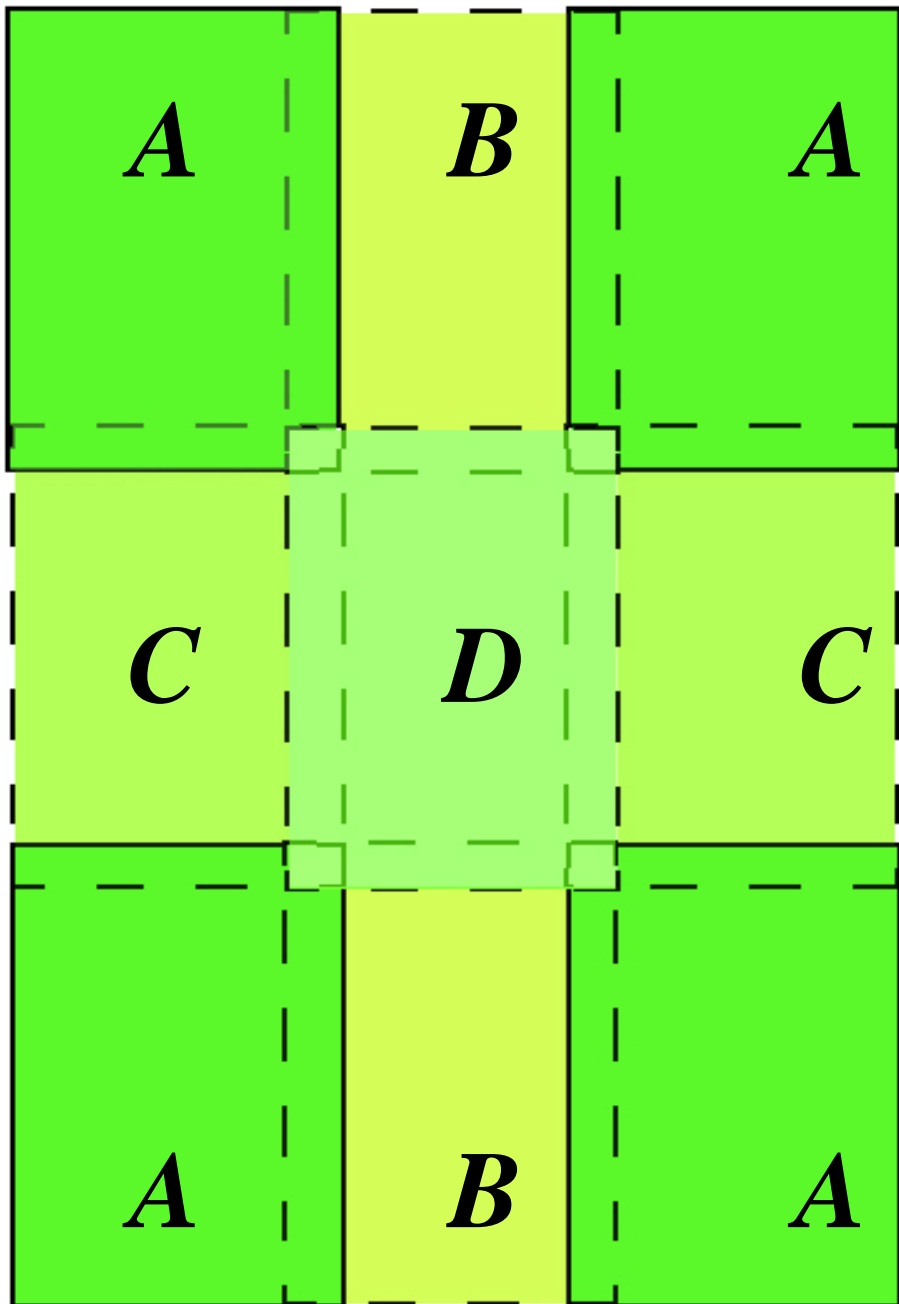
Red-Green-Blue-Nir

UltraCamX – Cone Design



Master Cone





4 Cones

4 Lenses

4 Focal Planes

9 CCD Sensor Arrays

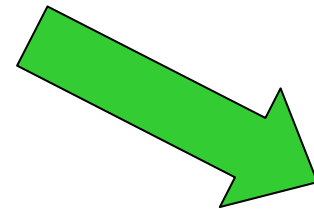
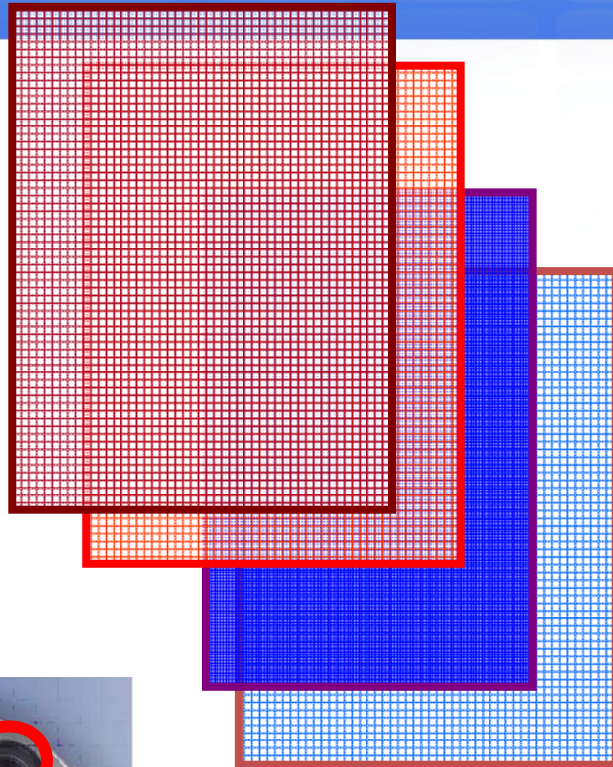
12 Overlap Areas

Multispectral (RGB+NIR) Image

RGB and NIR



Cone # 5,6,7,8, each 1 Sensor Elements



RGB/IR
bands
merged with
pan scene





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Large Scale Capability

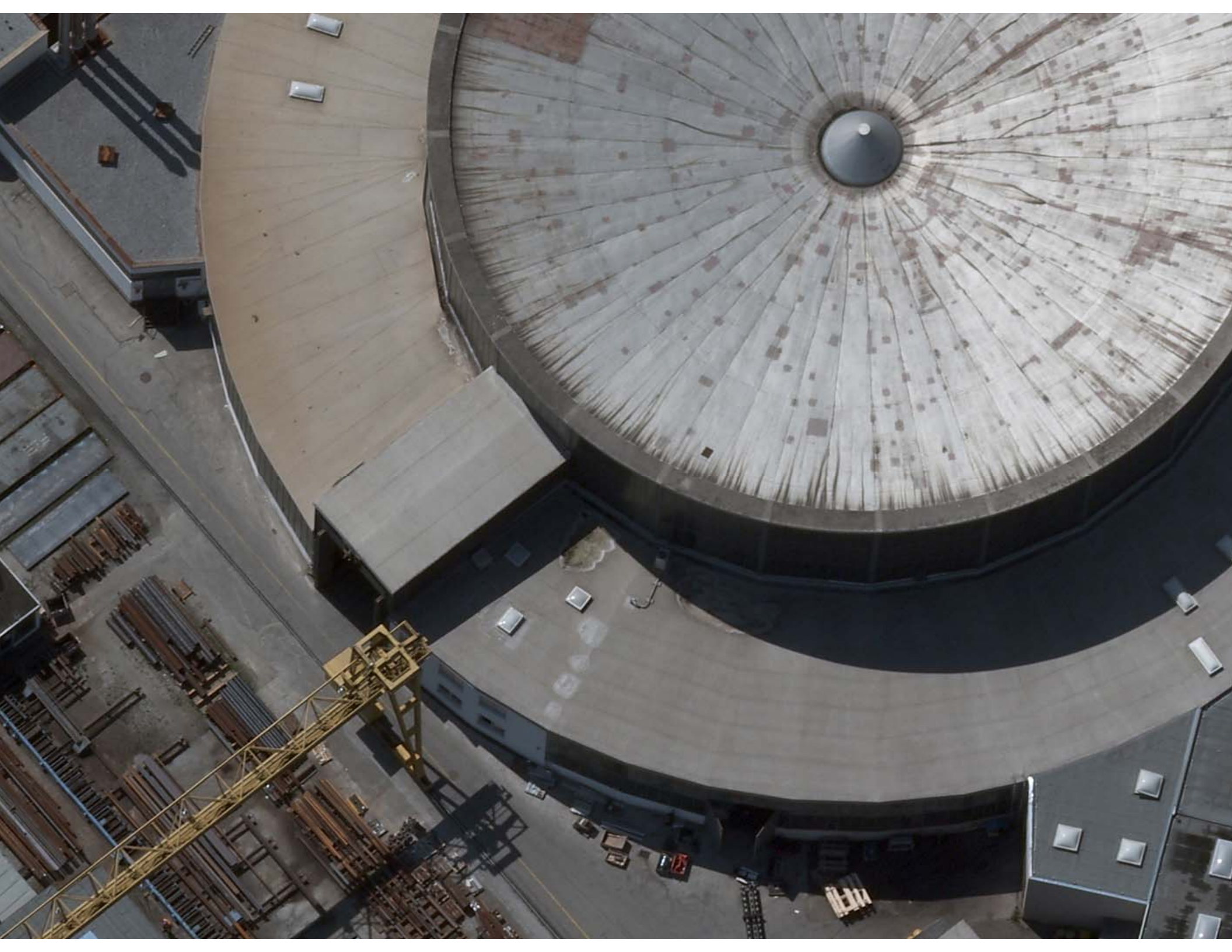
Gleisdorf

GSD: 5 cm

August 2008

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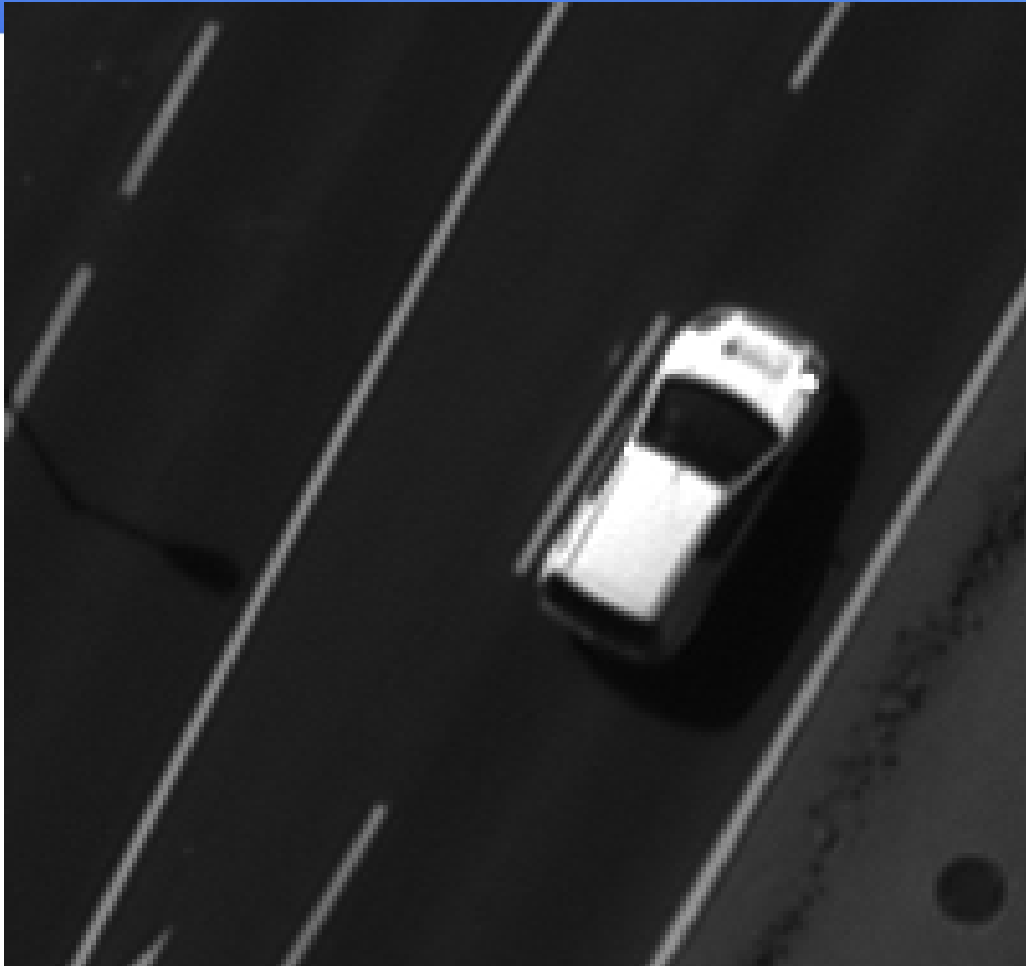
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Radiometric Performance of UltraCam Xp

| | |
|------------------------------|-------------------|
| 12+ bit CCD Sensor | (~6000 DN) |
| 14 bit ADC | (16384 DN) |
| 16 bit postprocessing | (65536 DN) |





Area (Pan):

Min 60

Max 7920

7860 Grey Levels

12.94 bit



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Color Infrared

Gleisdorf

GSD: 5 cm

August 200

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Color

Grayscale

GSD:

10 cm

August 200

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Geometric Performance of UltraCam Xp

UltraCam Xp BA-Result

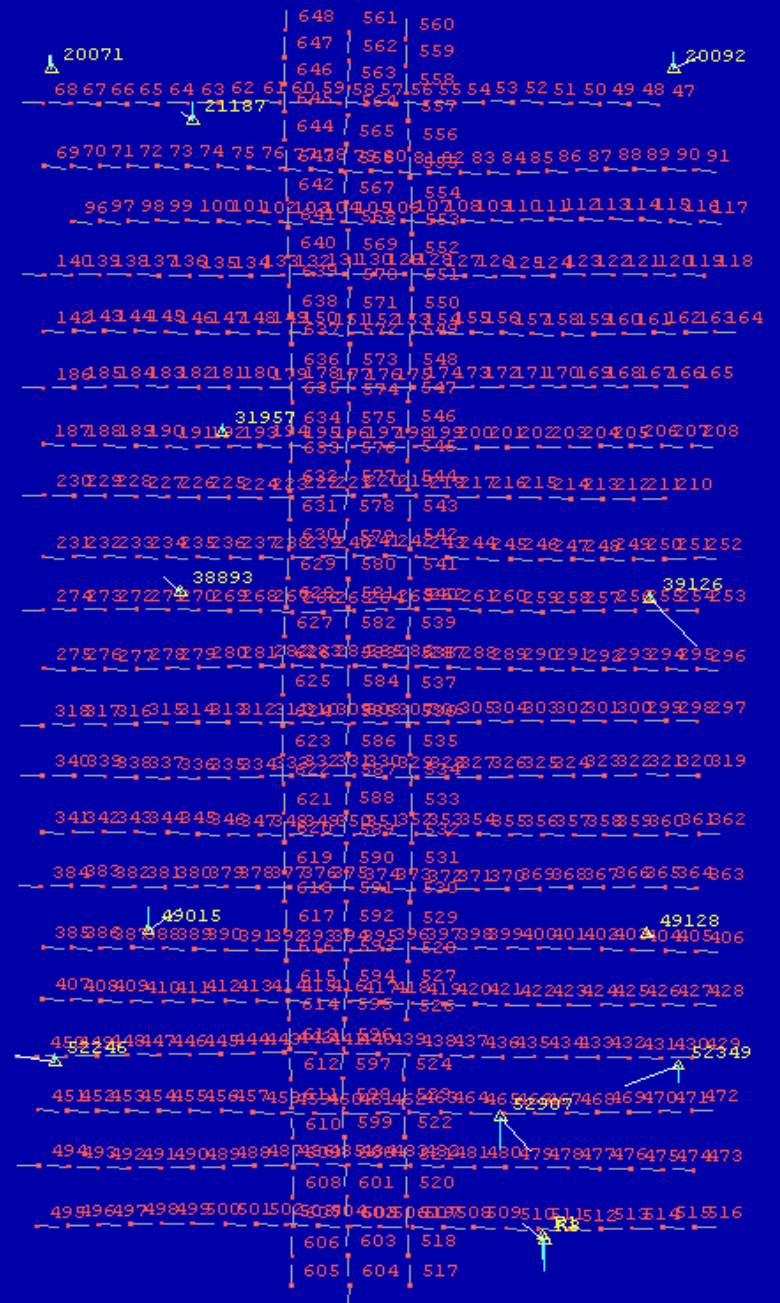
GSD = 10 cm
Sig_o = 0.80 μm

GCPs RMSE
21. 33. 48. mm

CHCK Points
67. 49. 67. mm

with AP

Project: d:\camera-kp\bingo



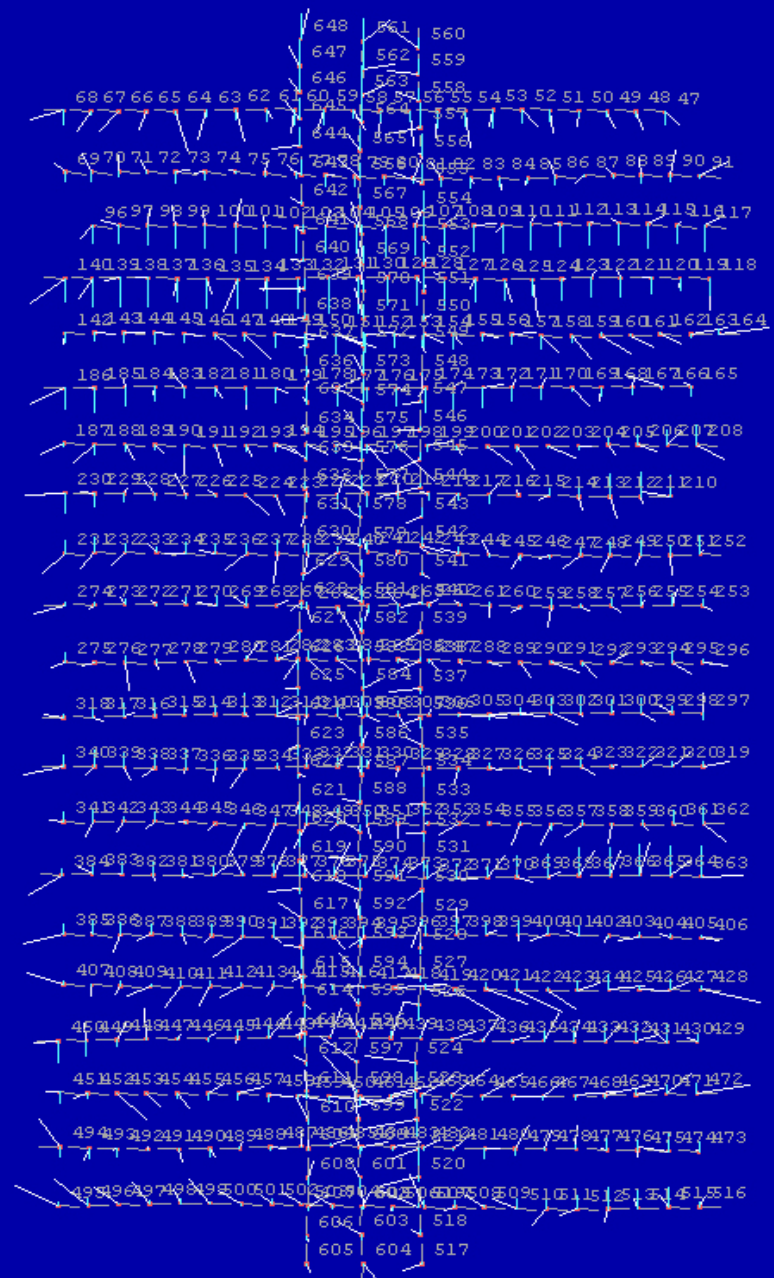
Drawing space: d:\camera-kp\bingo\... v=12670... v=7570...

UltraCam Xp BA-Result GSD = 10 cm Sig_o = 0.80 μm

GPS/IMU RMSE

| | | | |
|-----|-----|-----|------|
| 27. | 22. | 19. | mm |
| 2.7 | 3.3 | 7.5 | mgon |

Project: d:\camera-kp\bingo



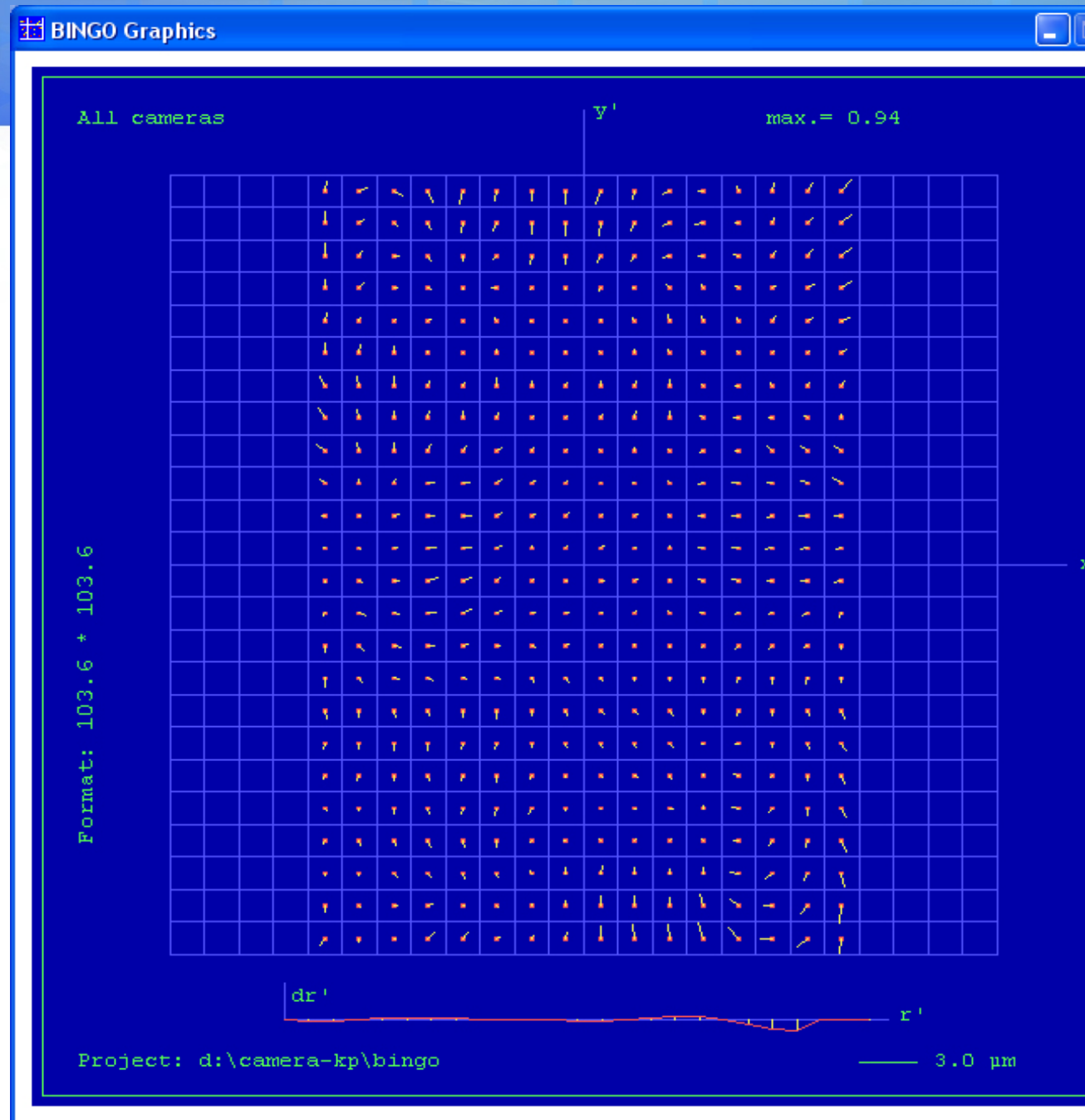
0.20 Vector scale

UltraCam Xp Image Residuals

< 1 μm (=1/6 Pixel)

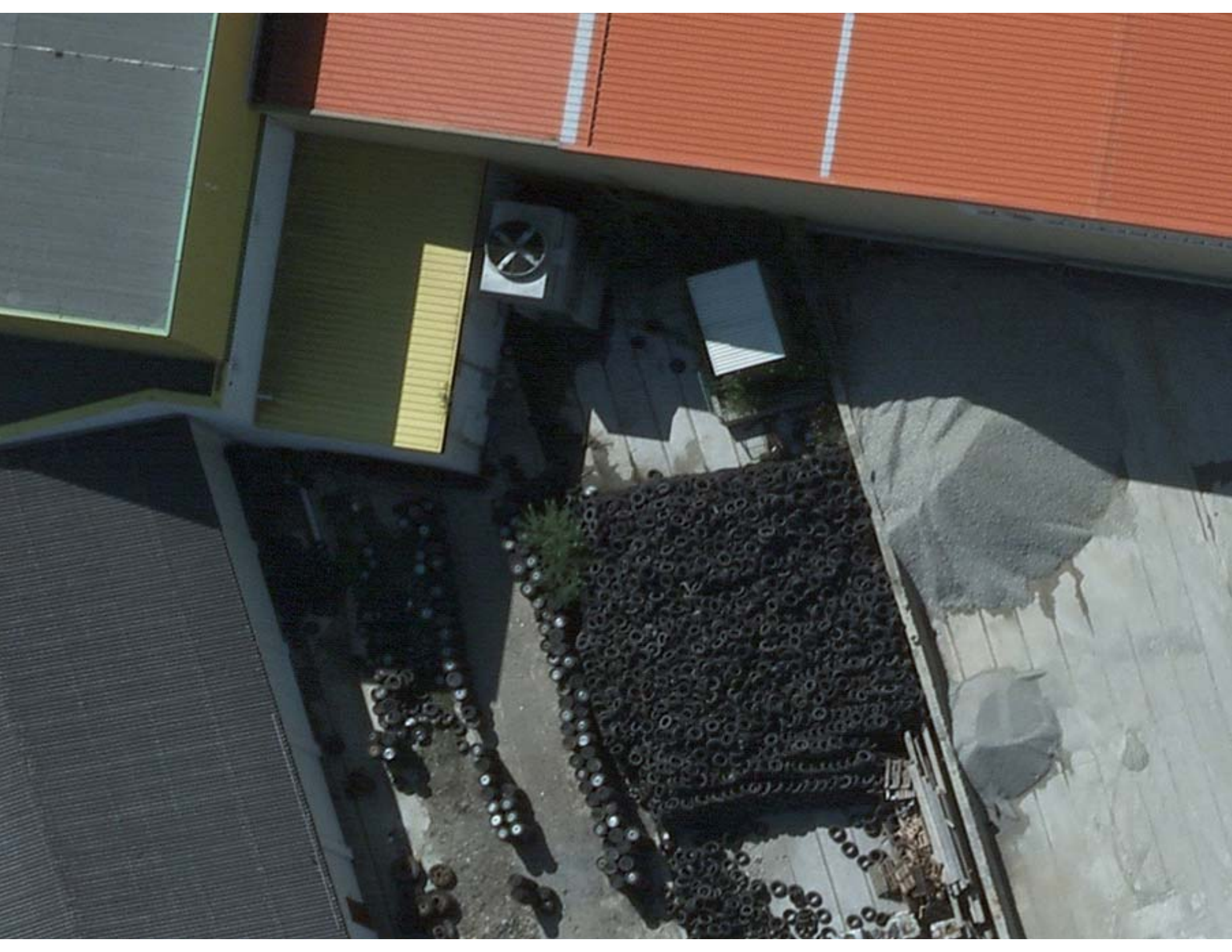
Radial Distortion

< 1.2 μm



Images from UltraCam Xp







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UltraCamL

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UltraCamL

- **The Large Photogrammetric Medium Format Camera**
- **Smaller large scale and photogrammetric projects**
- **High resolution (true) ortho mapping**
- **Multi-ray photogrammetry**
- **Corridor mapping**
- **Lidar integration**

UltraCamL

- **80+Mega pixel**
- **Pan, RGB and NIR in parallel**
- **Best matching quality and stereo capability**
- **Best in class radiometry**
- **Full metric capability incl. Aerotriangulation and DSM production**
- **Short frame intervall (2 seconds)**
- **GSD from 3" up at 80% overlapp**
- **Affordable for smaller mapping companies**
- **Smaller, lighter than large format cameras, serves small planes**

- **Available 2nd Quater 2009**

UltraMap Platform, the new photogrammetric Software

UltraMap Platform

- **Complete and integrated photogrammetric workflow**
 - **Data download and ship packs**
 - **Distributed level 0-2 and level 2-3 processing**
 - **Complete aero triangulation**
 - **Photogrammetric bundle adjustment**
 - **Automated tie point collection**
 - **Guided ground control point measurements**
 - **Camera auto calibration**
 - **Quality control**

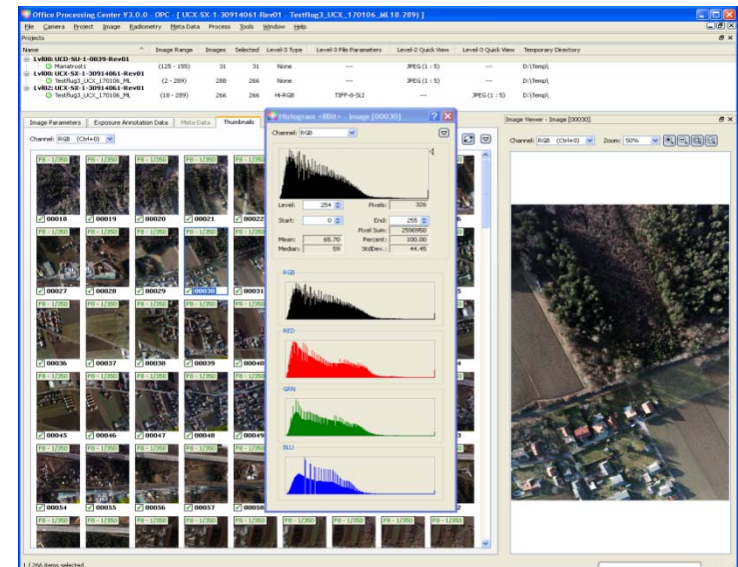
UltraMap Platform

- **Based on Microsoft .NET and Microsoft Seadragon technology**
- **Complete 16 bit image pipeline**
- **Supports distributed processing**
 - Level 0-2 and level 2-3
 - Central system management
 - Load balancing
- **Fully integrates UltraCam specific hardware (DX, DKS docking station)**

Current Software

- **Camera operating software (COS V3.2)**
 - In-flight control panel for controlling the camera

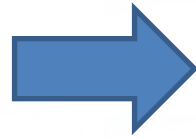
- **Office processing center (OPC V3.2)**
 - Single-computer image processing to level 3



#2: Download Manager



Recording



Download/Dump



Mission office



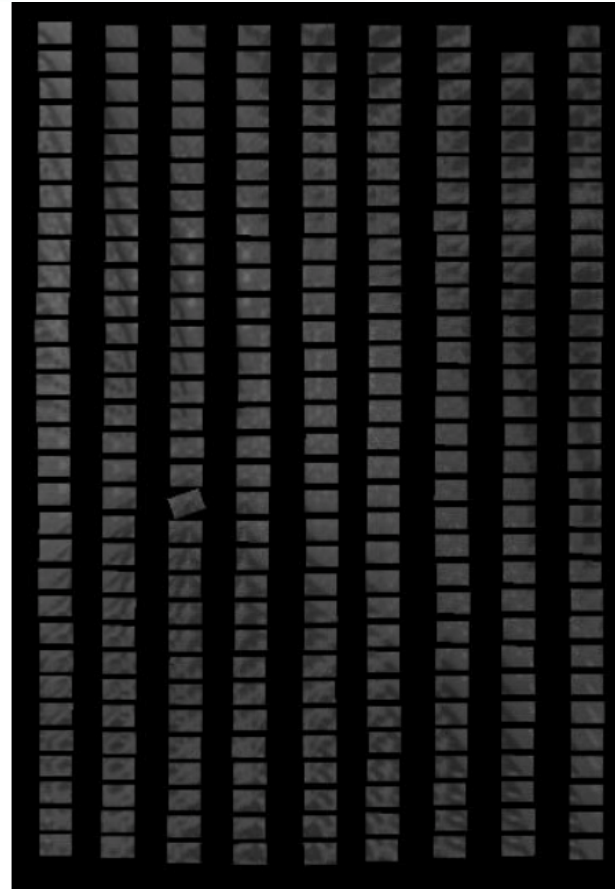
Main office

#3: Visual Quality Control

- **Index map-based visualization**
 - **Missing images**
 - **GPS/IMU accuracy**
 - **Crab angle**
 - **Overlap**
 - **Radiometry over the whole block**



UltraMap GUI Features



UltraMap GUI Features



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DragonFly Technology

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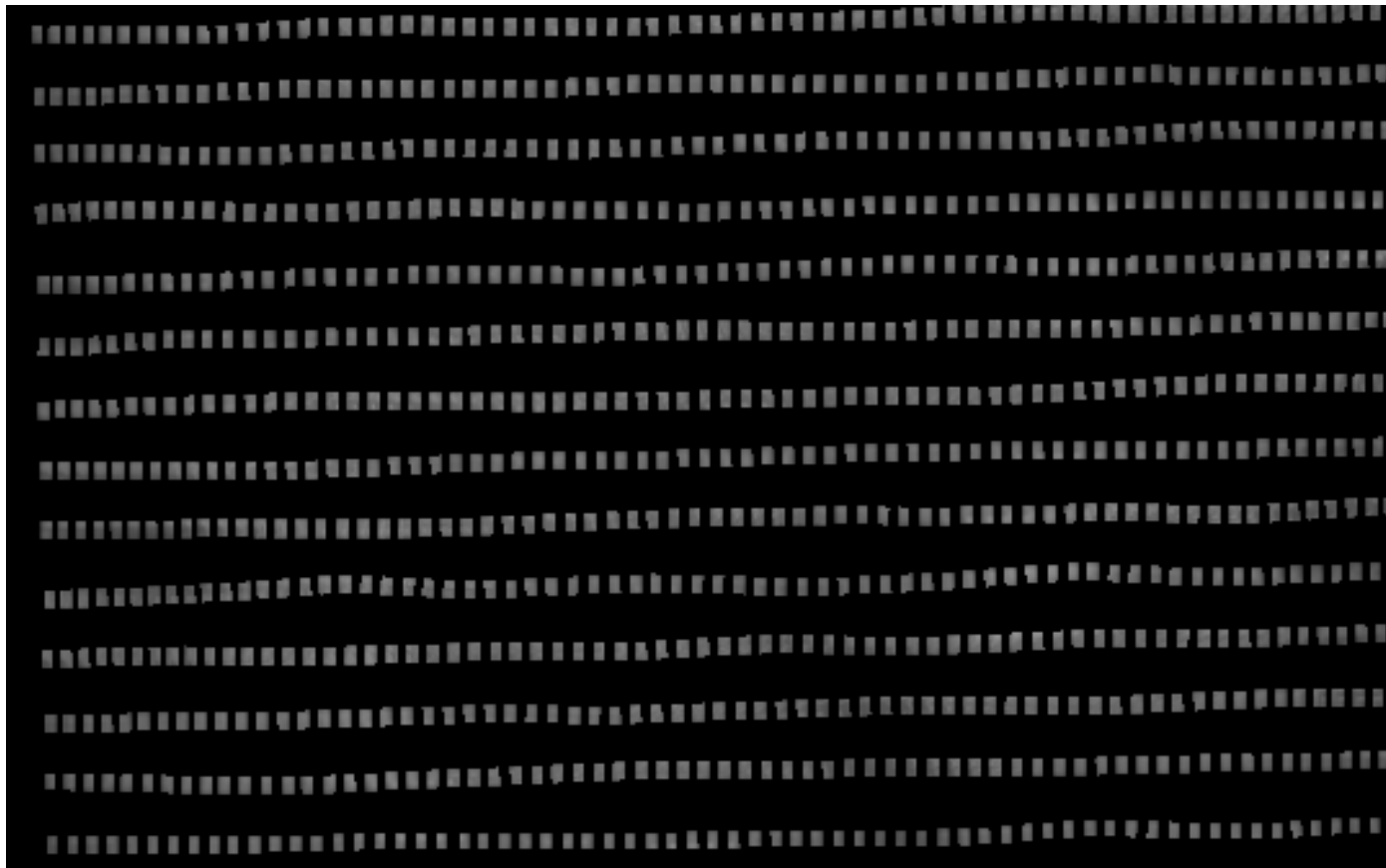
Think about ...

- 1 UltraCam-Xp image shot
 - PAN
 - 1-channel 16 bit
 - 195 Mpix resolution
 - Color
 - 4-channel 16 bit
 - 21 Mpix resolution
 - Storage
 - 550 MB image data



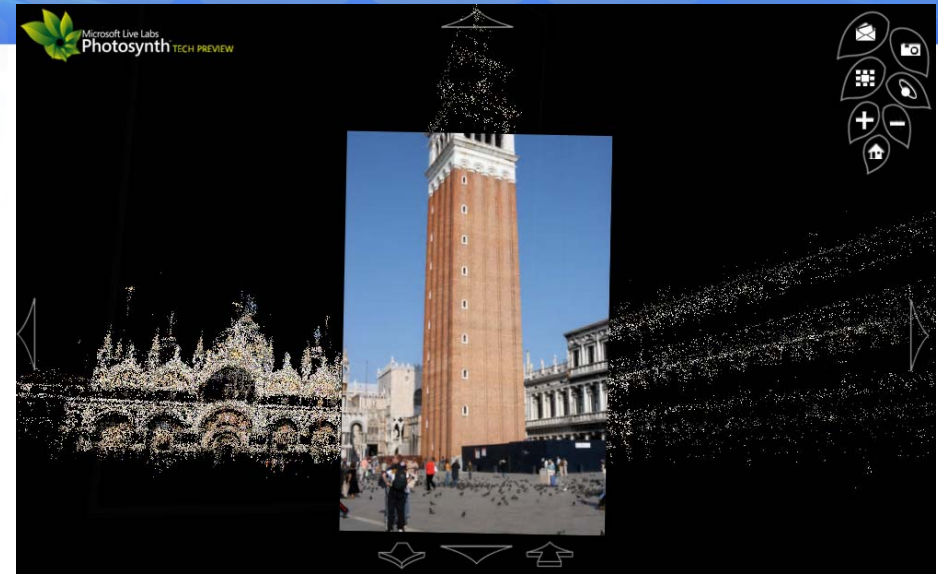
Think about ...

- 1000 UltraCam-Xp images
 - Image data
 - 550 GB
 - Pixel count
 - 216,000 Mpix



Seadragon Technology

- Handles large blocks of images
- Smooth transitions
- Core technology for
 - Photosynth
 - Deep Zoom (Silverlight 2.0)
 - UltraMap *(new)*



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UltraMap-AT

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UltraCamX/Xp
Large Format Digital Camera
&
Microsoft Virtual Earth

Large Scale Urban Mapping For Virtual Earth

Flight Pattern: 80% / 60%
90% / 80% (downtown)

Redundant

Robust

Minimizing Occlusions

Large Scale Urban Mapping For Virtual Earth

GSD: 15 cm (10 cm)

Up to 5 rays per point from one flight line

Up to 15 rays per point from overlapping flight lines



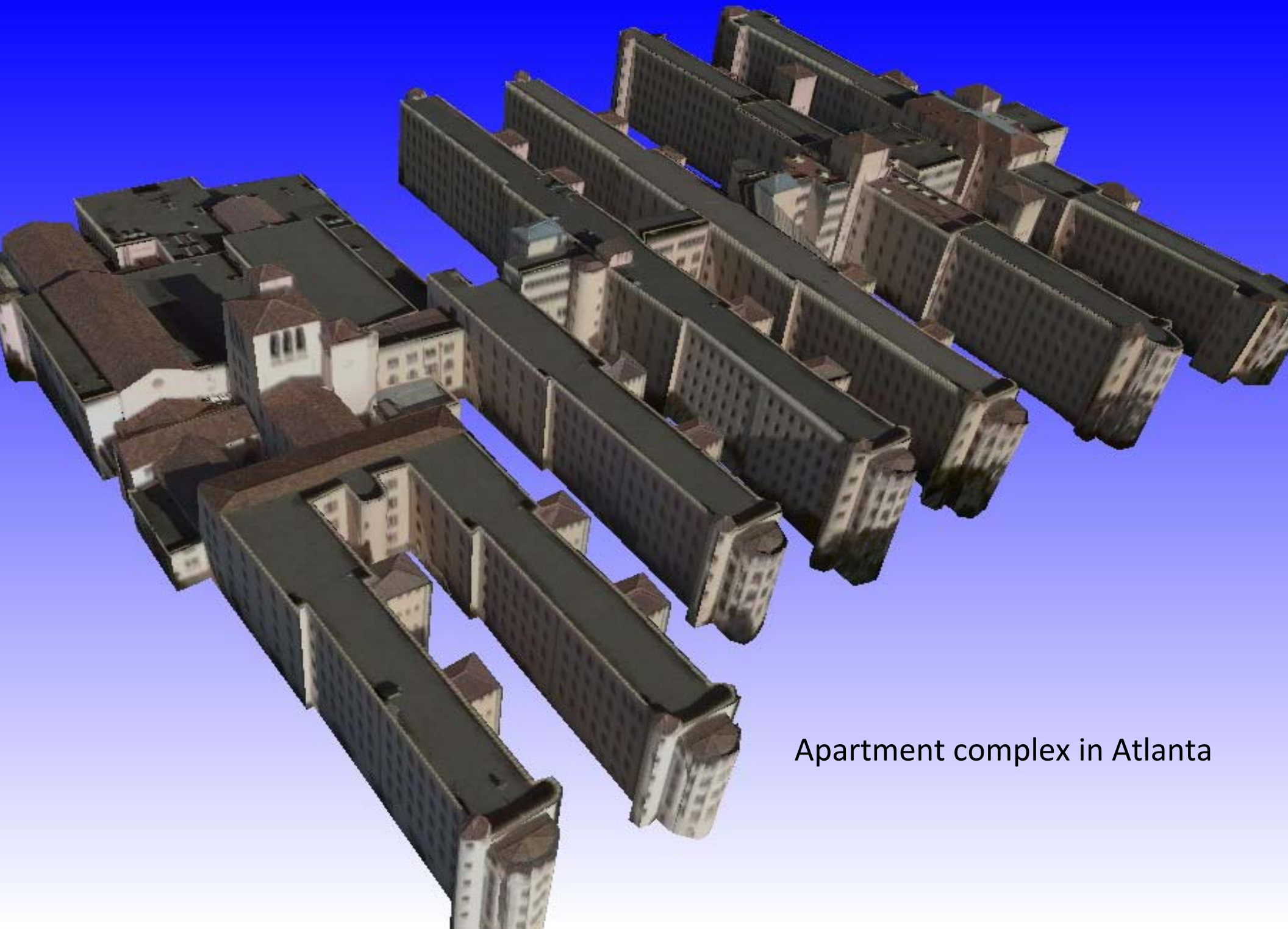
Redundancy supports automation



Multi-Spectral Classification







Apartment complex in Atlanta

**The Result:
Automatically processed photo
textured model of
Philadelphia**

