DMC – PPS and new Features

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Presentation Outline



- Introduction
- Air Borne Sensor Management
- Post Processing
- Outlook
- Summary



Mission Planning



- Transform contract items into most economical mission plan
- > Typically requirements defined for:
 - Image Scale or resolution on ground (GSD) or altitude above ground
 - Resulting mapping accuracy
 - Shadow length or sun angle
 - Maximum length of flight line
 - ≻ ...
- > Typical input:
 - Topographic maps
 - Vector information of project boundaries or infrastructure
 - Elevation information (3D)



Mission Planning





Mission Planning



What makes a good mission plan?

- > Full project area coverage
 - Checked for overlap between images and strips (3D)
 - Restricted areas?

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- Considers sensors and aircraft specifics
 - Min / max aircraft speed
 - Minimum sensor release cycles

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- Considers geometric block stability
 - Cross strip layout or/and IMU
 - Control information needed

▶ ...

- In general
 - Best economical choice
 - Start point for overall Project plan / tracking / accounting ...





Photo Flight



- Ready, steady, go …?
- Prepare Mission
 - Define final flight route
 - Load planned mission onto Sensor Control System (ASMS)

> ...

- A closer look into the Aircraft
 - Camera and Navigation Control (ASMS / Pilot Display / Telescope)
 - Imaging Sensor(s) (DMC / RMK-Top)
 - Positioning Sensors (Trimble GPS / Applanix IMU)
 - Stabilized sensor mount (T-AS)
 - ≻ ...

The cr

ne crew	Navigation	Select next strip	Start/stop exposure	Change altitude	Monitor sensor	Invalidate strips/photos	
Pilot	X	Х	X	Х	Х		
Operator		Х	Х	Х	Х	X	

Photo Flight



In the Aircraft

- > Quality Check in the Air
 - Invalidate function based on video Thumbnails (ASMS-QC)
 - Check image histograms / exposure settings (FDSV)
 - Mission overview based on Thumbnails (AOPV)
- New ASMS Functionality
 - Exposure Range
 - Serial mode
 - Video Contrast
 - Store mission files onto FDS

… External Drift control

> ... Feed T-AS angular position into POS (Gimbal information)







Adjust Video	X
Brightness (0)	-
Contrast (255)	
	Ŷ
Default	OK Cancel

Exposure Range



- Maintain Mission Plan right in the air
- Split planned flight lines
- \succ
- Define:
 - Number of exposures to cut off
 - Number of strips to correct
- Features:
- Easy to operate
- Pilot guided to new line start/end
 ISPRS Hannover Workshop 2005



Serial Mode



Free serial exposure controlled by v/h

- Define:
 - > Overlap
 - Number of images
- > Support for:
 - Unplanned exposures
 - Re-fly parts of a strip
 - Usefull for RMK-A ISPRS Hannover Workshop 2005



External Drift Control



Use POS IMU trajectory for drift control

Image alignment adjustable to track direction



Mission Report

- Mission successful …?
- First Mission Quality Report
 - Check planned vs. actual situation
 - Mosaik of mission area
 - Project overview based on Video thumbnails



- Prepare Shipping (outbound mission)
 - ASMS Mission information has been copied to FDS already!
 - Field data copy process (Copy data to less expensive disk drives)





Post Processing



What's the Idea?

- Bulk Processing
- Create 1 distortion free virtual, central perspective image out of the 8 camera heads
- Flexible output:
 - Various image products (Format, Compression, Pixel resolution, ...)
 - Rescue original sensitivity measurements (LUT optional)



How does that work?

- Calibration of all Camera Heads mandatory:
 - Geometry
 - Radiometry
- Defined relative position of the 8 cameras in the mount

BUT:

- Camera housing is not stable
- Sensor sensitivity depends on environmental conditions

For each exposure



- Tie point measurements and computation of platform geometry
- Adjustment of sensor sensitivity based on environmental measures and patches along seam line

Tie point measurements

- x,y coordinates in images space





Camera position

- x,y,z and κ are fix for each camera

(mechanical design)

Online Calibration (Geometry)

Adjustment models
 x,y movement
 into φ,ω

Online Calibration (Radiometry)

- gain/offset adjustment for each camera





Usage of DMC virtual images

- Central perspective images
- Fixed interior orientation
 - > 13768 x 7680 pixel (row, column)
 - > 12 µm pixel size (quadratic)
 - Nominal focal length
 - ≻ PAN 120.0000 mm
 - ► MS 25.2632 mm (120/4.75)
- Distortion free images
- For direct use in all photogrammetric standard software



DMC Image Post Processing						
RAW	INTERMEDIAT	E CO - REGISTER	RECTIFICATION	ΟυΤΡυΤ	PRODUCTS	
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Sector Contraction of the sector of the sect	ALIBRATION	$ \begin{array}{c} NIR \rightarrow R \\ R \rightarrow G \\ B \rightarrow G \\ G \rightarrow PAN \end{array} $ $ \begin{array}{c} IBRATION \\ G \rightarrow PAN \end{array} $ $ \begin{array}{c} Ksho \\ Sho \\ S$			Image: Second	

Summarize DMC Post Processing



- Central perspective images for direct use in standard photogrammetric software suites
- DIA to generate LUT
- Final Processing:



PPS DP - Environment



• Sample Configuration







• PPS Version 4.5.0

Key – Features

- 4 Band High Resolution images (no JPEG 2000 compression possible)
- Distributed Processing
- Advanced Settings

... and some more "minor" changes



Advanced Settings



Adva	nced Settings	×			
Pan	Pan Sensitivity Miscellanious Dodging			Advanced Settings	X
	NIR compensation (RGB)	NIR compensation (pan)		Pan Sensitivity Miscellanious Dodging	- 1
	0% 10%	Advanced Settings Pan Sensitivity Miscellanious Dodging	_	Dodge after post processing Settings	
	Blue compensation (only CIR)	_ Sharpen		Use Intensity Range Intensity Adjustment Parameters	
	0 % 10 %	- /- · · · · · · · · · · · · · · · · · ·		Minimum 0 Kemel Size Maximum 0 Image: Subtile Size	
	Blue reduction (haze)		_	Use an input overview Darken Maximum 0	
	0% 10%	- Processing Order		Target Average Intensity Darken Minimum Image: Auto Calculate	
		 Exposure Order Photo File Order 	_	Intensity 0 Transparency 0	
	ок			Defaults	
				OK Abbrechen Übernehmen Hilf	e
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