



# **STEP-BY-STEP GUIDE**

## Introduction

Use GeoApp.UAS to create digital ortho mosaics, digital surface models, and point clouds from overlapping image data captured with small and medium sized frame cameras.

To produce high-quality results, consider the following best practices before starting processing:

- Use a digital camera with reasonably high resolution (5 megapixel or more). Do not mix cameras!
- Avoid ultra-wide angle and fish-eye lenses. The best choice is a lens with 50 mm focal length (35 mm film equivalent) but focal length might vary from 20 to 80 mm.
- Lenses with a fixed focal length are preferred. If you use zoom lenses the focal length should be set either to maximal or minimal value.
- Try to use the RAW data lossless converted to TIFF files. JPG compression adds unwanted noise to the images that could affect the accuracy.
- The ISO-value should be set to the lowest possible value. High ISO values will add additional noise to the images.
- Always use the original images. Do not crop or geometrically transform (for example, resize or rotate) the images.
- Rough rule for image overlap: 60% of side overlap + 80% of forward overlap
- Try to use vertical photos as base information you might add additional oblique images if needed.

### **Before You Begin**

Before you start processing UAS image data with the GeoApp.UAS workflow you must have already uploaded your datasets into a new folder in M.App Chest.





#### Start the App

1. Start GeoApp.UAS within your "MyApps".



2. A wizard will guide you through the workflow. All you need to do is follow three easy steps.





#### **Process Steps**

1. Click the **Process** button in the main menu. On the **Data Selection** tab, you find a short description to all input files. Click the Info-Icon to get more information and click again to close.

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Image data Orientation data		
M.App Chest data folder () Orientation format type ()		
Select M.App Chest data folder containing your UAV input         Select how to provide the nec           data_for_uploading your data please use M.App Chest.         your image files.	cessary orientation data for 🛛 🛞	
Select No folder selected From Exif	T	
Select image file filter () By default all supported images in the selected folder will be used for the processing. To further restrict the images, use the following options. You can see the currently used data/subset in the preview below.		
All raster formats		
Used image filter 🕄		
*.jpg *.tif		
Number of selected image files <b>()</b>		
0		
	Next	
Preview of selected image data		

2. Select your input datasets. This means that you have to select your input folder that you have created within M.App Chest. Ensure that this folder contains all the single image files that you want to process. Accept your selection by clicking the **Select** folder button.

*Hint:* Bold folder icons indicate folders that contain subfolders. Click the bold folder icon to expand the folder. Click the folder name to select the folder.



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Select your UAV input data folder on M.App Chest	# Name J: Resources: (15)	×
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4	DSC04372.jpg	-
	DSC04373.jpg	
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	DSC04376.jpg	
K     1       F     Selected folder:       Gravelpit-with-Exif	2 > H Cancel Select folde	er
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After you have chosen the folder, the contents of this folder are displayed. You should see the names and the thumbnails of all your input image datasets. You may apply additional filters to select a subset out of your datasets.

In this example, we use already geotagged images. This means that the images contain the GPS information of the UAS position during image capture in the EXIF header. If your datasets do not contain this information, follow the advanced user guide in the appendix that describes how to use your own orientation format. Additionally you might also use a GPX-track file for geocoding.



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Image data Orientation data				
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#### **Set Output Options**

The output options are defined in the **Processing Settings** tab.

- Set the processing quality for the computed surface. The option 'Low for preview' will compute a relatively rough surface, but computation time will be quite short. 'High for production' will take approximately **16 times longer**, but the computed surface will be of much better quality.
- 2. Define the output projection by entering the ESPG code of your coordinate system (visit <u>www.spatialreference.org</u> for more information about EPSG codes).
- 3. Select the output files. You are able to create an image mosaic, a dense point cloud, and a raster image of the digital surface model. You may choose any combination for the output.



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GeoApp.UAS Home Process My Jobs ① Output Data Selection Processing Settings Summary Start Process	en   de   User: Demo GEOSYSTEMS (logout)
General setting	DSM export
Processing quality ① Low for preview  Map projection of results (EPSG code) ① 32632	<ul> <li>Create digital surface model (DSM) <sup>(1)</sup></li> <li>Filename of DSM <sup>(2)</sup></li> <li>Enter name</li> <li>Image file format of DSM <sup>(2)</sup></li> <li>TIF format</li> </ul>
Mosaic export	
Filename of ortho mosaic  Filename of ortho mosaic  Filename of ortho mosaic  Filename of ortho mosaic file name Image file format of ortho mosaic  TIF format	LAS export  Export point cloud (LAS)  Filename of LAS  Enter LAS file name  Enter name
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4. Click the **Enter name** button to define the output names for the files that will be created within the workflow.



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K < 1	2 ) )	
Selected folder: Gravelpit-with-Exif		
Mosaic file name: Enter mosaic file name	TIF format  Cancel Use entered name	
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- 5. You are able to create new folders in your M.App chest environment directly from the following dialog. Click the small "+" sign next to the folder name. Select the output folder by clicking on the folder name. Bold folder icons indicate folders that contain subfolders. Click the bold folder icon to expand the folder.
- 6. Enter a file name for the output file in the filename field.
- 7. Select the output format.
- 8. Accept your choices by clicking the Use entered name button.



i Select M.App Chest folder and enter mosaic file nar	ne	×
<ul> <li>COT</li> <li>ergebnisse</li> <li>Gravelpit-with-Exif</li> <li>Kloster-FFB</li> <li>Open-Mine-with-Exif</li> </ul>	<ul> <li># Name 12</li> <li>dsm-low.tif</li> <li>mosaik-low.tif</li> <li>pc-low.las</li> </ul>	Resources: 3
Selected folder: Gravelpit		
Mosaic file name: gravel-pit-mosaic	ECW forma	Cancel Use entered name

In this example, we have selected to generate mosaic, DSM, and point cloudoutput files.



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Home Process My Jobs O Output	en   de   User: Dem Summary Start Processing	o GEOSYSTEMS (logout)
General setting	DSM export	
Processing quality ()	<ul> <li>Create digital surface model (DSM)</li> <li>Filename of DSM (3)</li> </ul>	
Map projection of results (EPSG code)	<b>Enter name</b> gravel-pit-dsm.img	3
02002	Output Gravelpit folder	
Mosaic export	Image file format of DSM ()	
Create ortho mosaic		
<b>Enter name</b> gravel-pit-mosaic	LAS export	
Output Gravelpit folder	<ul> <li>Export point cloud (LAS) </li> <li>Filename of LAS </li> </ul>	
Image file format of ortho mosaic 🕄	Carter name gravel-pit-pointclo	ud.las
ECW format	Output folder     Gravelpit	
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9. Review your settings. Click the **Next** button. Double check your defined processing quality. Are the right amount of images displayed? Did you choose the correct projection, image files, and output formats? If yes, click **Next**. If not, go back and redefine the settings.

Summary	
Selected data source 🥌	Gravelpit-with-Exif
Used image filter	*.jpg *.tif
Number of selected image files	15
Orientation format type	From Exif
Processing quality	Low for preview
Map projection of results (EPSG code)	32632
Create ortho mosaic	✓
Output folder 芦	Gravelpit
Filename of ortho mosaic 흐	gravel-pit-mosaic.ecw
Image file format of ortho mosaic	ECW format
Create digital surface model (DSM)	✓
Output folder 🛎	Gravelpit
Filename of DSM 芦	gravel-pit-dsm.img
Image file format of DSM	IMG format
Export point cloud (LAS)	✓
Output folder 芦	Gravelpit
Filename of LAS 🛎	gravel-pit-pointcloud.las





10. Submit the job by clicking the large **Process** button:



The process will start. First, it needs to locate a processing machine (Awaiting Executor). This might take some time. Please be patient.





Please be patient. The overall processing time depends on the amount of input datasets, image size, and processing quality. For larger projects, it may take more than 24 hours to finish.

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30.10.2015 - 15:41	Executing Spatial Model					
30.10.2015 - 08:31 Completed: 30.10.2015 - 08:38	Model execution has completed successfully.					



#### **Process is Complete**

After your process has finished, you are able to use any of the following options:

- Show job results on a base map (1)
- Show the used job parameters (2)
- View the processing log (3)

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30.10.2015 - 08:31	Success Completed: 30.10.2015 - 08:38	Model execution has completed successfully.	2			
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1. Click Show job results on a base map button.

In the map display, the mosaic and/or DSM (depending what outputs you have selected) are displayed on a base map. This allows you to proof your results. You can toggle between both datasets using the layer chooser. You can use the blend tool (slider bar) on the right upper corner of the map. Click and hold the left mouse button to move within the map. Use the scroll wheel to zoom in/out.





If you want to download your geo products to your local disk, return to your M.App Chest app. Here you are also able to publish the results as WMS/WMTS for direct access using any OGC capable application.







## **Appendix: Using external orientation information**

Some UAS-devices provide images that are already geotagged. This means that the images contain the GPS information of the UAS position during image capture in the EXIF header. Check the image properties in Windows explorer:



If you do not find GPS information within the EXIF header, you need to provide another source for the orientation data.

#### Alternative 1: Using an existing orientation data definition

GeoApp.UAS has a number of predefined orientation data definitions:

Data Selection Processing Settings Summary Start Processing	
Image data	Orientation data
M.App Chest data folder 🕄	Orientation format type 3
Select zankenhausen	Known format definitions
Select image file filter 1	Orientation data format 🕄
All raster formats •	AIBOT
Used image filter 🔁 *.jpg]*.tif	AIBOT AIBOT previous version gravel-pit EEB
Number of selected image files 3	Halde_Humbert
347	

Next

If you are using the actual version of an Aibot, you can use the corresponding data format definition directly. Select "Known format definitions" in the Data selection tab, then choose





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zankenhausen

Selected resource: GeoTaggingResult.csv

AIBOT from the list. Upload the file with the orientation information into the image directory using M.App Chest. After this step, you can select it by pressing the **Select** button:

Image data   M.App Chest data folder •   • Select   zankenhausen   Select image file filer •   All raster formats   • Jpgl*.tif   Number of selected image files •   347	Data Selection Processing Settings Summary S	start Processing	
M.App Chest data folder Select zankenhausen Select image file filter Alt raster formats Used image filter (jpg]*.tif Number of selected image files 347 Select orientation data file on M.App Chest Recot remembinisse Recot remembinisse Recot remembinisse Recot remembinisse Recot remembinisse M.App Chest orientation data file on M.App Chest remembinisse Recot remembinisse M.App Chest orientation data file on M.App Chest remembinisse Recot remembinisse M.App Chest orientation data file on M.App Chest remembinisse Recot remembinisse Recot remembinisse	Image data		Orientation data
Select image file filter  Known format definitions  Crientation data format  Known format definitions  Crientation data format  AIBOT  MApp Chest orientation data file  CeoTaggingResult.csv  Select  Select orientation data file on M.App Chest  Known  Known format definitions  Crientation data file on M.App Chest  Known  Known format definitions  Crientation data file on M.App Chest  Known  Known format definitions  Crientation data file on M.App Chest  Known  Known	M.App Chest data folder 3		Orientation format type 3
Select image filer • All raster formats Used image filter • *.pg]*.tif Number of selected image files • 347 Select orientation data file on M.App Chest * Select orientation data file on M.App Chest * * ROOT * Recourses: @@	Select zankenhausen		Known format definitions
All raster formats   Used image filter •   *.jpg]*.tif   Number of selected image files •   347     Select orientation data file on M.App Chest     *     * ROOT   Reference   * Name !!     Resources: @@@	Select image file filter 🕄		Orientation data format 🚯
Used image filter ①	All raster formats	T	AIBOT
Select orientation data file on M.App Chest	Used image filter   *.jpg *.tif Number of selected image files   347		M.App Chest orientation data file Select GeoTaggingResult.csv
	<ul> <li>Select orientation data file on M.App Chest</li> <li>ROOT</li> <li>ergebnisse</li> <li>mikrokopter</li> </ul>	# Name I	Next   Resources: 349

DSC\_0733.jpg

DSC\_0734.jpg

DSC\_0735.jpg
 DSC\_0736.jpg
 DSC\_0737.jpg
 DSC\_0738.jpg
 DSC\_0739.jpg
 GeoTaggingResult.csv

 Image: Wight of the state of the

After applying the existing orientation data definition, continue with the steps described in the Processing Step section above.

Cancel

Select resource

OrientationDataFormatsCloud.xml



#### Alternative 2: Create your own orientation data definition

If your orientation data format does not appear in the list, you can create your own definition. First you must download the **editor executable** application from the download link in the **M.App Chest orientation data format file** description. This entry will become active after selecting the option **Custom format definitions**:

Data Selection Processing Settings Summary Start Processing	
Image data	Orientation data
M.App Chest data folder 🕄	Orientation format type <b>0</b>
Select zankenhausen	Custom format definitions •
Select image file filter () All raster formats Used image filter ()	M.App Chest orientation data format file Select the XML-file with your custom orientation data format definitions. To create such format definition file, download (editor executable) and start the editor (no installation required). After creation, you'll need to upload the format file to M.App Chest before selecting it here.
.jpg, .u	Select     No orientation data file selected
347	Orientation data format 🕄
	•
	M.App Chest orientation data file 3
	Select No orientation data file selected

Download and start the application. Ensure that your Virus scanner or the Windows smart screen does not block the access to the executable. It is safe to run.

<b>Virustota</b>	al	
SHA258: 19ac463f0ac1011c83841 File name: OriDataFormatEditor.exe	0a15022ca4a515e93d0c7f0e1548e7a37b88b52d1de	
Detection ratio: 1/54		
Analysis date: 2015-11-02 17:38:20 UTC	( 1 minute ago )	
Analy Q File detail O Additional	information PComments Q Votes	
Antivirus	Result	Update
ClamAV	Win Adware.Outbrowse-1167	20151101
ALYac	0	20151102
AVG	0	20151102
AVware	0	20151102
Ad-Aware	0	20151102
AegisLab	0	20151102
Agnitum	0	20151101
AhnLab-V3	0	20151102
Alibaba	0	20151102
Antiy-AVL	0	20151102
Arcabit	0	20151102
Avast	0	20151102
Baidu-International	0	20151102
BitDefender	0	20151102
Bkav	0	20151102
ByteHero	0	20151102
CAT-QuickHeal	0	20151102
CMC	0	20151102
Comodo	0	20151102
Cyren	0	20151102
DrWeb	0	20151102
ESET-NOD32	0	20151102
Emsisoft	•	20151102
F-Prot	0	20151102
F-Secure	0	20151102
Fortinet	0	20151102
GData	0	20151102
lkarus	٥	20151102
Jiangmin	0	20151101

To use the orientation information stored in a text file, define the structure of your input files:





1. Analyze your orientation file format. To do so, open the data file in any text editor. This is an example:

CI CI	Users\Public\GEOSYSTEMS\UAV\examples\gravel-pit\image_positions.txt - Notepad++ 🗕 🗖 🎫
Datei	Bearbeiten Suchen Ansicht Kodierung Sprachen Einstellungen Makro Ausführen Erweiterungen Fenster ? X
🗄 imag	ge_positions.bt 🖾
1	id, name, x, y, z, omega, phi, kappa
2	1, DSC04367.JPG, 11.4447656, 48.1143331, 655.016, 0, 0, 83.3
3	2, DSC04368.JPG, 11.4447733, 48.1141304, 654.936, 0, 0, 82.6
4	3, DSC04369.JPG, 11.4447635, 48.1139336, 655.056, 0, 0, 82.7
5	4, DSC04370.JPG, 11.4447659, 48.1137339, 654.79, 0, 0, 82.4
6	5, DSC04371.JPG, 11.4447698, 48.1135317, 654.744, 0, 0, 83
7	6, DSC04372.JPG, 11.4443952, 48.1134912, 654.494, 0, 0, 82.3
B	7, DSC04373.JPG, 11.4443394, 48.1136503, 653.983, 0, 0, 83
9	8, DSC04374.JPG, 11.4443379, 48.1138485, 654.489, 0, 0, 84
10	9, DSC04375. JPG, 11.444324, 48.1140484, 654.691, 0, 0, 83.2
11	10,DSC04376.JPG,11.444343,48.114251,654.481,0,0,82.6
1.2	11, DSC04382.JPG, 11.4439038, 48.1145309, 656.508, 0, 0, 82.7
13	12, DSC04383.JPG, 11.4439131, 48.1143313, 655.98, 0, 0, 82.2
14	13, DSC04384. JPG, 11.4438935, 48.1141304, 654.943, 0, 0, 82.2
15	14,DSC04385.JPG,11.4439184,48.1139322,654.377,0,0,82.4
16	15,DSC04386.JPG,11.4439049,48.1137292,653.959,0,0,82.8
17	16,DSC04387.JPG,11.4439095,48.1135308,653.706,0,0,82.5
18	
Normal	I text file length : 907 lines : 18 Ln : 1 Col : 1 Sel : 0   0 Dos\Windows UTF-8 w/o BOM INS _

- This plain text file contains comma separated values.
- The actual data values start from the second row. The first row is a header that identifies each value.

Note that the filename (column 2), and the image center coordinates X, Y and Z (column 3, 4 and 5). Since the algorithm used during image orientation is intelligent, you can skip the camera rotation angles (omega, phi, kappa) for most of the cases. In order to project the final results correctly, you must know which coordinate reference system is used. In this case, Lat/Lon values are based on WGS84, and so the EPSG code of the underlying coordinate reference system is 4326.

With all this information you are able to define the orientation format using the **Edit** orientation formats dialog.



2. Use the Orientation editor to create a new format definition in the **Orientation Format Editor** by clicking the "+" icon next to **Available formats**. A new row is added to the formats list. To rename the new entry, double click on it. In this example, the new entry has been renamed to Gravelpit.

alable formats:   ibotix (computed)   ibotix (recorded)   ravelpit     Filename:   1   Position:   EPSG:   4326   Column   Apply Correction   Offset   Scale   Decimal delimiter   Longitude:   2   0,00   1,00   2:   4   0,00   1,00   2:   4   0,00   1,00   2:   4   0,00   1,00   1   Column   Apply Correction   Offset   Scale   Decimal delimiter   Longitude:   2   1   0,00   1,00   1    1   1	ilable formats:   ilable formats:       botix (computed)   botix (recorded)   avelpit     Filename:   1   Position:   EPSG:   4326   Column   Apply Correction   Offset   Scale   Decimal delimiter   Latitude:   3   0,00   1,00   2:   4   0,00   1,00   2:   4   0,00   1,00   2:   4   0,00   1,00   2:   4   0,00   1,00   2:   4   0,00   1,00   2:   4   0,00   1,00   2:   4   0,00   1,00   2:   4:   0,00   1,00   2:   4:   0,00   1,00   2:   1:<	ols		6					?
ibotix (computed) ibotix (recorded) ravelpit       Orientation elements       Delimiter and line to ignore         Filename:       1         Image:       1         Position:       EPSG:         4325         Image:       1         Image:       1         Image:       1         Image:       Image:         Image: <th>botix (computed) botix (recorded) avelpit Position: EPSG: 4326 Position: EPSG: 4326 Position: EPSG: 4326 Column Apply Correction Offset Scale Decimal delimiter Longitude: 2 Column Apply Correction Offset Scale Decimal delimiter Longitude: 3 Column Apply Correction Offset Scale Decimal delimiter Longitude: 2 Column Apply Correction Offset Scale Decimal delimiter Longitude: 3 Column Apply Correction Offset Scale Decimal delimiter Column Apply Correction Offset Scale De</th> <th>vailable formats:</th> <th>÷ 🗶</th> <th>Format</th> <th></th> <th></th> <th></th> <th></th> <th></th>	botix (computed) botix (recorded) avelpit Position: EPSG: 4326 Position: EPSG: 4326 Position: EPSG: 4326 Column Apply Correction Offset Scale Decimal delimiter Longitude: 2 Column Apply Correction Offset Scale Decimal delimiter Longitude: 3 Column Apply Correction Offset Scale Decimal delimiter Longitude: 2 Column Apply Correction Offset Scale Decimal delimiter Longitude: 3 Column Apply Correction Offset Scale Decimal delimiter Column Apply Correction Offset Scale De	vailable formats:	÷ 🗶	Format					
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Column       Apply Correction       Offset       Scale       Decimal delimiter         Longitude:       2       2       0,00       1,00       2       2         Latitude:       3       2       0,00       1,00       2       2         Latitude:       3       2       0,00       1,00       2       2         Z:       4       2       0,00       1,00       2       2         Z:       4       2       0,00       1,00       2       2         Angles:       Use       Type:       RPY       Unit:       Degree       7         Omega:       14       2       0,00       1,00       2	Column       Apply Correction       Offset       Scale       Decinal delimiter         Longitude:       2       2       0,00       1,00       2         Latitude:       3       2       0,00       1,00       2         Z:       4       0,00       1,00       2       2         Angles:       Use       Type:       RPY       Unit:       Degree       7         Omega:       14       2       0,00       1,00       2<	Gravelpit		Position:	EPSG:	4326			
Longitude:       2       1       0,00       1,00	Longitude:       2       1       0,00       1,00       1         Latitude:       3       1       0,00       1,00       1         Z:       4       0,00       1,00       1       1         Angles:       Use       Type:       RPY       Unit:       Degree       1         Omega:       14       1       0,00       1,00       1 <t< th=""><th></th><th></th><th></th><th>Column</th><th>Apply Correction</th><th>Offset</th><th>Scale</th><th>Decimal delimiter</th></t<>				Column	Apply Correction	Offset	Scale	Decimal delimiter
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- 3. Click the **Delimiter and ignore line** tab.
- 4. Ensure that Comma is selected as column delimiter.
- You want to ignore the first line, since it contains column descriptions rather than data. To do so, add a new ignore line entry by clicking the "+" icon in the Lines to ignore group. This adds a new skip entry starting from 1 and ending with line 1.

Entries can easily be modified. Select the ignore option and modify the start and end options. Alternatively, you can specify a comment character or characters. All lines starting with this character are skipped. You may add any number of skip options. For our example, the settings in **Delimiter and ignore line** tab are as shown:

I Orientation data formats	<u></u>		? ×
Tools			
Tools          Available formats:       Image: Computed (Computed) (	Format Orientation elements Delimiter and line to ignore Delimiters	Lines to ignore    Lines to ignore	to line:
Preview	Combine consecutive delimiters		
		Save as	Cancel



6. Assign the column numbers to the needed processing values and specify the coordinate reference system of the input values.

The image filename is stored in column 2 of the input data. Find the image center coordinates X, Y and Z in column 3, 4 and 5. Since you are not using the rotation angles, keep this option disabled. The EPSG-code of the coordinate reference system is 4326. This creates the following final settings:

e: 2 i ngitude: 3 .atitude: 4 Z: 5 Omega: 14 Phi: 13	EPSG: Column ¢ ¢ Use	4326	Offset 0,00 0,00 0,00	Sc ↓ 1,00 ↓ 1,00 ↓ 1,00		Decimal del	miter
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ngitude: 3 atitude: 4 Z: 5 Omega: 14 Phi: 13	Column Column	Apply Correction	Offset 0,00 0,00 0,00 0,00	Sc 1,00 1,00 1,00	ale	Decimal del	miter
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Omega: 14 Phi: 13	+		1.21	Y	Unit:	Degree	Ţ
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	3		0,00	÷ 1,00	*		
Kappa: 12	2		0,00	\$ 1,00	*		



7. Use the Preview to check your settings. Click **Preview** and select your orientation data file. It should now be displayed correctly. All columns must contain the correct values:

ale	ientation	n data formats				$\searrow$				ſ	
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ibot	tix (recor	rded)	Filename:	2	÷	-					
rave	elpit		Position:		EPSG:	4326					
					Column	Apply Correction	Offset		Scale	Decimal delin	niter
			Longi	tude: 3	<b>•</b>		0,00	*	1,00		
			Lati	tude: 4			0,00	*	1,00		
				Z: 5	-		0,00	*	1,00		
			Angles:		Use	Type:	RPY	7	Unit:	Degree	$\nabla$
			Om	nega: 1	4		0,00	*	1,00		
				Phi: 1	3 🔹		0,00	*	1,00		
			Ka	appa: 1	2 +		0,00	*	1,00		
revi	ew										
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8. Click Save as to save your format definition as new definition file (\*.xml).

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← → • ↑ 📘	$\ll$ Benutzer $ ightarrow$ Öffentlich $ ightarrow$ GEOSYSTEMS $ ightarrow$ UAV $ ightarrow$ examples $ ightarrow$ gravel-pit	√ Ū	"gravel-pit" durchs	uchen ,	p
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Ordner ausblende	n		<u>S</u> peichern	Abbrechen	

- 9. Upload your data file and the newly created format definition file into the image folder using the M.App Chest upload functionality.
- 10. Reference both files (orientation data file and orientation definition file) in the GeoApp.UAS workflow. The orientation definition file (1) fills the list of available orientation data formats (2). Choose your own definition. Now select the uploaded orientation data file (3).

Orientation data		
Orientation format type 🕄		
Custom format definition	S	•
M.App Chest orientation	data format file 🕄	
Select	OrientationDataFormatsCloud.xml	0
Orientation data format		
Gravelpit		2 •
M.App Chest orientation	data file 🕄	
🥏 Select	GeoTaggingResult.csv	3

Continue with the steps described in the Processing Step section above.



#### Alternative 3: Using a GPX-track file as orientation source

If you are using a UAS system that records a GPX track file (GPS coordinates with time stamps), you can choose this option.

- 1. Upload the GPX-track file with M.App chest into the image folder
- 2. Select From GPX track as the Orientation format type. Cummon

Image data	Orientation data				
M.App Chest data folder 3	Orientation format type 1				
Select mikrokopter	From GPX track				
Select image file filter 🟮	M.App Chest orientation data file 3				
All raster formats •	Select the orientation data file for your UAV input data on M.App Chest.				
Used image filter 🕄	<b>Select</b> 13070202.GPX				
*.jpg *.tif	Time offset between image recording and GPS time 3				
Number of selected image files 3	Time zone      UTC (Dakar, Dublin, Lisbon, London)				
107	Enter Sign Hours Minutes Seconds				
	manually $(\bullet)$ + $(\bullet)$ 0 2 15				
	Applied correction to image recording time 3				
	-00:02:15				

#### 3. Click **Select resource** to select the uploaded GPX-file.

Select orientation data file	on M.App Chest	×		
ROOT ergebnisse mikrokonter	Refresh	# Name ↓ <sup>8</sup>	Res	ources: 108
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	<b>K (</b> 1 2 3	11 > N		
Selected resource: 13070202.gpx			Cancel	Select resource

- 4. Define a potential time offset between image recording and GPS time. In case of an offset, specify the time difference between the two times. How much later or earlier have the images been recorded with respect to the GPS time? This is necessary to determine the correct position data from the provided GPX file.
- 5. Select the time zone used when the images were recorded to synchronize your camera time stamp with the GPS recording time. GPS time typically refers to UTC. NOTE: Daylight saving time must be manually applied.

Continue with the steps described in the Processing Step section above.



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