Release Notes for UASMaster 7.0.3(Patch) and UASMaster 7.1 – 7.1.1

Trimble announces a new major release for UASMaster, Trimble's airborne UAS processing software.
For users that are having on-going projects and don't want to change to the new major version immediately, Trimble recommends to install the patch 7.0.3. This final patch for version 7.0.x is containing several important fixes that are also available through version 7.1. Release Notes for 7.0 are also part of this document.

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What is UASMaster

UASMaster is one of Trimble's UAS processing software solutions. UASMaster is engineered on the basis of the well-established Inpho advanced airborne photogrammetry / airborne LiDAR processing software suite. It offers full automatic

geo-referencing, point-cloud generation as well as orthomosaic generation including refinement and editing tools for all deliverables as well as basic mapping and value adding functionality (e.g. point cloud classification).

Trimble's alternative UAS processing solution within Trimble Business Center TBC APM (Advanced Photogrammetry Module) very much focuses on ease of use combining typical survey workflows and survey data types (GNSS, total stations, v10 data…) within one software. Within TBC, users also find the appropriate tools to add value to their generated data (e.g. calculating volumes, using the CAD module etc.).

UASMaster is outstanding through its high flexibility. UASMaster requires little more expertise but still is much easier to use than traditional photogrammetric software. It offers many more tools to refine results and edit results. More flexible parameters are available as well as pre-defined strategies for different application scenarios and accuracy/performance requirements. Another differentiator is UASMaster's ability to process data from also non-Trimble UAS manufacturers. All the input and output data as well as the complete project environment is compatible to the advanced Inpho modules, so users may step into the professional Inpho software workflow at any point. So UASMaster is the perfect UAS processing software for photogrammetric specialists as well as ambitious users adopting photogrammetry more and more as a surveying tool.

Generally, Inpho modules are highly automated, providing an outstanding level of accuracy and confidence. Inpho is suited for massive data volumes in processing, refining and editing as well as for visualization of deliverables. Inpho deliverables create the basis for a manifold of vertical applications in different markets such as survey, energy and natural resources, environmental research, cities and buildings, (urban) planning, monitoring, agriculture, cadastre and many more.

What's new in UASMaster 7.1

UASMaster v7.1 provides photogrammetrists and geospatial professionals with new tools and enhanced usability that enables you to create project deliverables more efficiently and with greater quality than before.

UASMaster v7.1 is freely available to customers on maintenance and does not require a new license to be installed, provided that a valid 7.x license is available. Major releases typically contain fixes to ensure processing workflows without interruptions and to grant for high quality results. Additionally the major release contains new major features like support for new sensors or new tools and functionality.

Direct Geo-referencing and support for high quality IMU and GNSS data

For a variety of reasons, there is an ever growing demand to support additional sensors that add to more automation or to a better stability and reliability of the whole process.
In version 7.0 Trimble added the support of high quality GNSS data in UAS processing. Now with version 7.1 the process benefits from even more stable computations supported by high quality IMU data if available from the UAS hardware. As well as GNSS dramatically reduces the need for ground control points, IMU data also keeps computations stable and reliable if only a minimum of GCPs are available. Depending on the quality of GNSS/IMU data, for some application scenarios that do
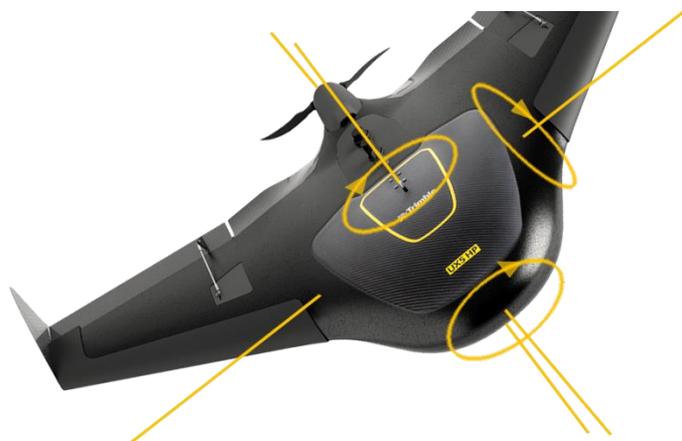
not require maximum accuracy, even projects without any ground control can be processed or for rapid response projects direct geo-referencing (directly using GNSS/IMU without performing any further adjustments) might be accurate enough for quick processing and quick decisions.

Adding to the support of additional sensors, Trimble also added a new camera template for ZX5 multi-rotor UAS platforms. Camera templates are useful to simplify the project setup with known camera types considerably.

Trimble's current efforts to constantly support more flexible geometries for UAS flights is also adding to much better success with larger oblique viewing angles.

Improved visualization and productivity tools for mapping and CAD drafting

As UASMaster is based on the traditional Inpho photogrammetry modules, UAS processing highly benefits from any improvement Trimble is engineering for those high-level photogrammetric software tools. E.g. DTMaster Stereo is the INPHO module for extensive refinement and editing and visualization of massive volumes of point-cloud data as well as for basic mapping (stereo-plotting and mono-plotting). The multi-file / multi-layer CAD drafting functionality is mainly used to digitize 3D vectors for morphology information such as e.g. break-line data. So far users could generate vector maps in DTMaster via mono-plotting (digitizing in xy e.g. on top of shaded reliefs or orthos and deriving the height from point-clouds) or via stereoscopic measurements (stereoscopic 3D visualization of photogrammetric imagery). New for 7.1 is the capability to use the mapping functions also within the 3D-profile view. All selected data is visualized in a rotatable 3D-box combined with height coded and shaded views or combined with contour lines. All vector functions, snaps, horizontal and vertical movements, selection, create and edit tools can now be performed also inside the profile box. Special keyboard assignments and auto-drape to terrain functionality is used to guide the user. These new features of DTMaster Stereo are now also available in UASMaster 7.1.
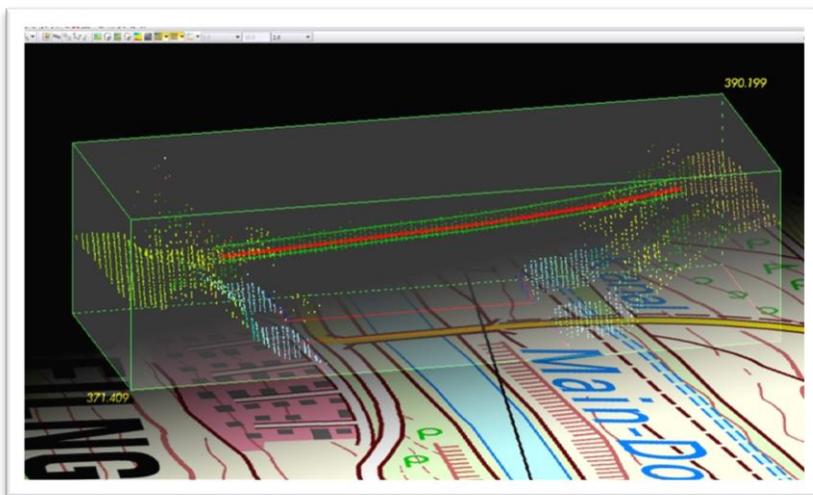
Better quality of deliverables (e.g. point clouds) without any ground control points

For photogrammetric processing, typically reference points / ground control points are used to grant for maximum accuracy and reliability. Still, the use of reference points is recommended, if accuracy really is a critical requirement. There are, however, many application scenarios for UAS survey, where it may be impossible to place ground control points or where performance matters more than perfect accuracy. In order to still be able to get the best possible quality deliverables that may be achieved without a reference, it is now possible to do basic camera calibration also with a free un-constrained adjustment. In the point cloud generation strategy has been updated to create more homogeneous point clouds.

## Improved error handling and error messaging

UAS data, depending on the quality of the hardware that was used to acquire images, depending on weather conditions, flight layouts, terrain types etc., might get very challenging for successful full automatic processing. Vignetting effects, image blur, large water areas, forests, low textured areas or of course critical input data errors, in general might cause some imagery not to be able to be processed. These are processing limitations that every photogrammetric processing tool – also competitive software - has to cope with. Therefore it is essential to provide useful information in processing reports and to automatically take correct decisions in the automatic process, if e.g. an image needs to be skipped to still finish the processing for the remaining imagery.

For UASMaster version 7.1 Trimble spent much effort in providing the right answers to any challenging situation.

Reaching a new level of performance, stability, reliability and accuracy

UASMaster 7.1 focuses a lot on customers asking for shorter computation times, less demands on computer hardware (less need for RAM), stability and accuracy.
Even if low-cost hardware is used and good approximate photo positions might not be available, strategies to still successfully create the correct geo-reference have been greatly improved.
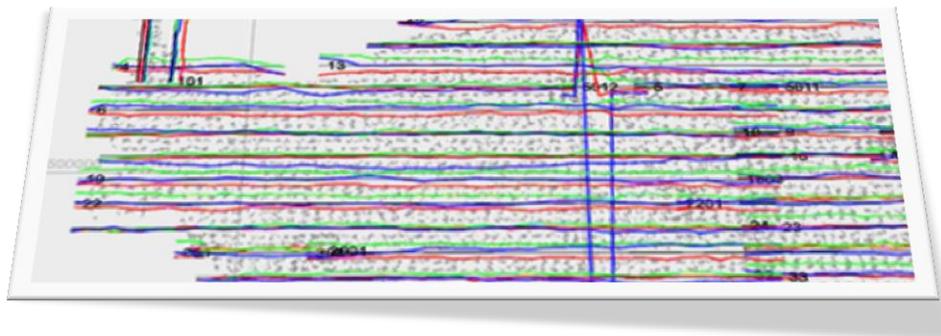
In some applications, where e.g. cameras could not be calibrated well enough due to lack of information, point-clouds might have been noisy or showed tile-effects. New refinement strategies have been embedded in the point-cloud generation process to grant for a much more homogeneous quality of the resulting surface model.
Generally a lot of processes have been optimized regarding the usage of available computational hardware and regarding I/O of data and how data is internally organized for the process. These optimizations result in a much better performance and much shorter computation times.

List of Changes

Fixes for 7.0.3 are automatically included in 7.1.

Note: Due to changes in the camera interface, it was necessary to update the project file format. Project files used in versions earlier than 7.1 will be converted into the new format on request. The 7.0.3 patch does not use the updated project file version. If you have ongoing projects, Trimble recommends to install the 7.0.3 patch until important projects are finished not to get a mismatch of project file versions.

Main window and project handling

Change	Description

Fix 7.1.1: GUI enhancements / tools / tables, icons, resizing…	The patch fixes a variety of smaller inconsistencies around the graphical user interface, e.g. when re-sizing dialogs, warnings about missing icons etc.
Update 7.1.1: Updated language support for Spanish user interfaces	Missing GUI translations have been updated for Spanish.
Fix 7.1.1: Activate/De-activate all points in the GCP dialog	7.1.1 provides a fix for the (de-) activate all points function in the points dialog of the project definition which was not working correctly in the previous release.
Fix 7.1.1: Update of footprints when IO or EO changes	After updating the interior orientation or the exterior orientation the display of footprints in the main view is now automatically updated.
Fix 7.1.1: Reset camera brand does not overwrite any settings	When changing the camera brand in the camera dialog of the project definition, all camera calibration data can now be reset to default values. This in particular has an effect when changing from camera templates with e.g. a different focal length.
Update 7.1.1: Transformations for EPSG code 3880	The patch adds support for coordinate system definitions with the EPSG code 3880
Fix 7.0.3: Processing of Project Overview	Sometimes the process to generate the project overview image seemed not to complete although the image file already was successfully generated. Stopping the process did not work either. The new release correctly starts and stops the process.
Fix 7.0.3: Project footprints display in main view	The footprints of imagery in the project main view were projected to a wrong height, therefore they typically were too large. The new version uses the correct height which is defined for the project
Fix 7.0.3: Transformations	File importers in UASMaster automatically transform the data in the files (e.g. GNSS) into the specified project working coordinate system. In cases when data had to be converted from m to ft or vice versa, the transformations failed. The new version correctly performs those transformations now.

between meters and usft	
Change 7.1: absolute camera calibration parameters	Until now, self-calibration parameters from the georeferencing process were considered being relative corrections from any already given calibration parameters – this is how they were stored in the Inpho project files. From version 7.1 on, only a single correction data set is allowed per calibration, so if the aerial triangulation computes self-calibration data e.g. using Pat-B-type polynomials, corrections are now stored as absolute values (given + self-calibration).
New Feature 7.1: Photo-importer supporting JPEG	Previous versions of the image importer did only load TIFF images when selecting the import from a complete directory. The new versions now also load JPEG images. Same goes for image import into the image commander.
New Feature 7.1: New camera interface	The camera editor is completely re-designed. Also calibration variations are no longer stored as new cameras. A new calibration is stored within the same camera assignment but with an additional camera calibration version.

Georeferencing

Change	Description
Fix 7.1.1: Over estimated quality reports on check points	When in some cases image observations have been eliminated for check points, the quality stated in the quality report was too optimistic. The patch corrects this and provides the correct estimates.
Fix 7.1.1: Stability with manual image measurements	In some cases picking manual image measurements in the photo measurement tool resulted in a crash of the tool. The patch provides a necessary fix.
Fix 7.1.1: Delete single image measurements might take long for large projects	Tested with a project about 8000 images, deleting a single image measurement in the photo measurement tool took considerably long. The patch uses a performance-optimized approach.
Fix 7.1.1: Rescaled Q/A symbols	Especially the sector analysis symbols were much too large to be used in high resolution UAS projects. Those have been rescaled to much more useful sizes.
Change 7.1.1: Added checkbox for using IMU data as constraint	If high quality IMU data is available in UAS projects, users can now activate to use these observations for the adjustment by clicking into the appropriate check box.
Fix 7.0.3: Visualization of statistics	The fix corrects displaying statistics information with point ID's containing special characters like "."
Fix 7.0.3: Change/delete ground control point types from within photo	It is now possible to edit the control point type and to delete ground control points as well as photo assignments from within the photo measurement tool.

measurement tool	
Fix 7.0.3: image access over network	In some network configuration it might have happened that image access is lost for very short moments, thus, tie point matching especially for large projects that take long to process might not have run successfully. The fix provides a solution that is tolerating short network instabilities.
New Feature 7.1: Selection for LSM reference image	Constant improvement of the automatic image matching routines required a revision of the strategy for reference image selection. The new criteria provides for a more complete set of measurements for all overlapping images
New Feature 7.1: free (non-constrained) adjustment and calibration	For situations where no control points are available for georeferencing including sensor calibration, now a real free bundle adjustment can be performed. The availability of ground control points to achieve maximum precision in aerial project remains being a strong recommendation, however.
New Feature 7.1: Improved automatic alignment with weak approximate photo centers	Working successfully through projects with very weak approximate photo centers has been considerable improved. The georeferencing strategies: "Default" tie-point extraction, "Refine EO" for adjustment are automatically using special strategies to align images with weak approximations.

Point Cloud Generation

Change	Description
Fix 7.0.3: Performance of point cloud generation	Constant improvement of performance of automatic matching routines required an update of the image selection strategies for point cloud matching. The new strategy results in a much faster computation.
New Feature 7.1: More homogeneous point clouds	Ever growing demand for more precise point clouds with less noise and of homogeneous quality made it necessary to revise the point cloud generation strategy. The new strategy creates a much more homogeneous point cloud that much better represents the terrain according to data from the aerial triangulation.

Point Cloud Editing, CAD Functionality

Change	Description
Fix 7.1.1: Stability during classification	In some cases, the classification tools were not running stable. 7.1.1 provides fixes for those stability issues.
Fix 7.1.1: Toggle on Ctrl+Alt to (de-)activate snapping functions	As activating and de-activating the snapping functions in DTMaster, the software now allows to toggle on or off snapping with Ctrl+Alt pressed.

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Fix 7.1.1: Shortcuts working also in un-docked windows	Previous releases did not allow for keyboard shortcuts within un-docked dialogs. 7.1.1 provides support for shortcuts also in un-docked windows.
Fix 7.1.1: Measure lengths/distances possible with 3D mouse	With 7.1.1 the measuring tool for length and distance is also available to be used with a 3D mouse.
Fix 7.0.3: Contour lines display	In some cases it might have happened that elements like contour lines could not be hidden from the display any more once they were activated. The new release provides a fix.
Fix 7.0.3: Grid spacing for DTMaster point cloud generation	The "Create Point Cloud" function inside DTMaster and UASMaster Point Cloud Editor now correctly reads the tool option settings for generating a regular grid.
New Feature 7.1: Digitize / edit vectors in 3D profile view	The line measurement and edit functions have been added to the 3D profile view. The 3D profile is rotatable and can be used to easily measure e.g. break-lines. In order to be able to drape the cursor to the terrain, users have to activate the shading.
New Feature 7.1: Display lines on top of the shaded display	In association with the new function to be able to digitize and edit lines in the profile view, it was required to display lines on top of the shading. The recommended setting for digitizing in the profile view is to have the shading activated in order to interpolate any measurement into a virtually computed mesh.

For more information

For more information contact your Trimble Inpho Support Team at imaging_support@trimble.com and register at https://community.trimble.com in order to track all news on Inpho.

Note: the 7.1 release does not require a new license to be installed. Users with a valid license for 7.0.x are entitled to download and use the new release.
Also note that inpho's WiBU licensing system also is updating their libraries constantly. To guarantee for stable license access, Trimble strongly recommends to update the WiBU libraries (available for download on above mentioned site