Release Notes for Inpho 9.1.0

Trimble announces a new major release for all the Inpho software main products. Please note that the new main release has version 9.1.0, a version 9.0 will not be released. The reason is, that the version numbering between Inpho Trimble Photogrammetry and Inpho UASMaster should be identical.

- MATCH-AT automatic georeferencing (including inBLOCK)
- MATCH-T DSM automatic point cloud (DSM/DTM) generation
- MATCH-3DX and Meshing add-on for automatic generation of 3D point clouds, true ortho mosaics and meshes
- DTMaster Stereo interactive and automated editing of point clouds, DTM/DSM and basic mapping, including Building-Add-on, Building-Generator
- OrthoMaster ortho image generation
- OrthoVista automatic ortho mosaicking
- SATMaster satellite imagery workflow

For users that are having on-going projects and do not want to change to the new major version immediately, Trimble recommends to install the patch 8.0.10.

The new version 9.1 needs a new license. Users with valid maintenance will receive a license update file for their dongle(s). The new license is valid for the previous version 8.0.x, too.

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What is Inpho

Trimble Inpho software suite is a comprehensive workflow solution enabling photogrammetrists to rapidly produce highly accurate and quality deliverables for their clients. The modular offering provides the ultimate flexibility depending on whether large frame aerial imagery, LiDAR or Satellite data is being used. Highly automated and refined workflows deliver outstanding productivity to generate point clouds, DTM/DSM's, ortho-mosaics and other highly valuable mapping products.

What's new in Inpho 9.1

Inpho version 9 combines the classical photogrammetric software capabilities with modern 3D workflows. The suite includes two new capabilities:

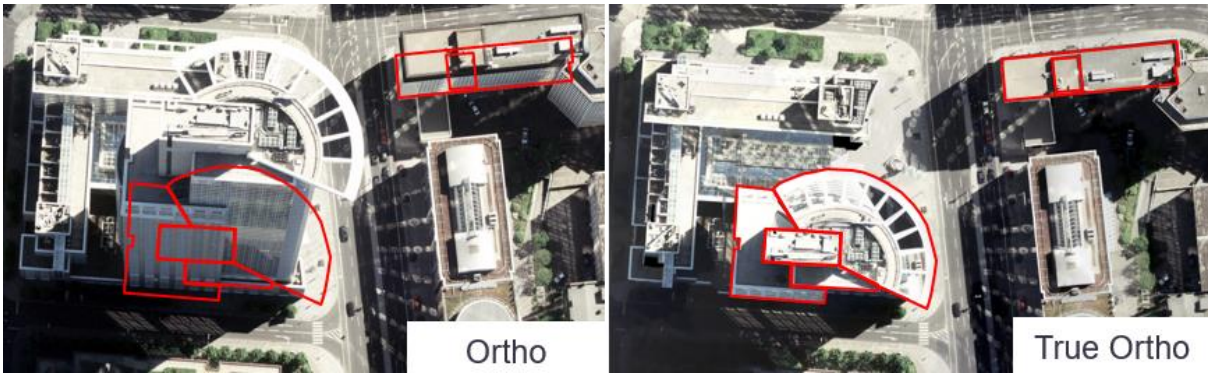
- MATCH-3DX software for the creation of rich 3D point clouds and true ortho mosaics; enabling the extraction of higher quality and precise information.
- MATCH-3DX Meshing add-on for the generation of photorealistic textured meshes; providing highly visual 3D representations of the environment (e.g. 3D City models).

The new modules, plus continued enhancements, further establishes Inpho as a comprehensive software suite available for the production of photogrammetric-based deliverables.

Additionally, MATCH-3DX offers the complete functionality of MATCH-T DSM.

True Orthophoto production

The new MATCH-3DX module in Inpho version 9 incorporates state-of-the-art Semi Global Matching (SGM) techniques that enable photogrammetrists to reach a new level of quality and precision when generating large scale point clouds and true orthophotos from aerial (frame) images. Through the high resolution data sets, photogrammetrists can more clearly identify edges of surfaces, such as building corners and roof lines, enabling the extraction of highly precise measurements, CAD objects or Digital Surface Models (DSM). The new True Orthophoto capability ensures that each image pixel is directly related to the terrain height, simplifying mapping and the overlay of GIS data, especially for urban mapping applications.



Photorealistic Meshes

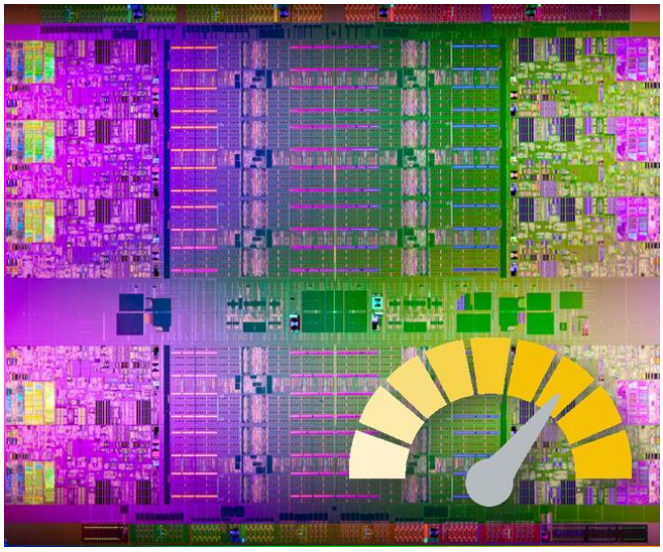
With the new MATCH-3DX Meshing add-on, photogrammetrists can generate highly accurate, photorealistic textured meshes that enable non-professionals to easily navigate and understand the real world environment. The 3D textured meshes provide an efficient data type for use within industry leading GIS systems and web-based 3D visualization services—often used for 3D city modeling, construction simulation and gaming applications.

Multithreaded Photogrammetry

The general trend in CPU development has moved from quad- or hex-core to 24 (Intel) or 32 (AMD) cores chips - parallel programming techniques can benefit from multiple cores directly. Inpho version 9 utilize the power of current workstations by using up to 24 CPU cores in parallel (was 16 threads before). This reduced the overall processing time allowing users to faster produce the results.

GPU processing in the first version of Inpho 9 MATCH-3DX is experimental and not officially supported (users can enable GPU support for tests). GPU processing can accelerate computation by 10-20% compared to CPU only processing with MATCH-3DX, depends from the graphic system.

In general, Inpho version 9 combines both classical photogrammetric processing with new true orthos and photorealistic textured mesh deliverables, all in a single software environment. Photogrammetrists can take advantage of the streamlined workflows and reduced training costs while having the ultimate flexibility to choose the workflow and deliverables best suited to their client's needs. Furthermore, Inpho version 9 offers with the extended multi core support a faster access to photogrammetric results.



The 9.1 release introduces a new workflow for True Ortho Mosaic generation based on MATCH-3DX.

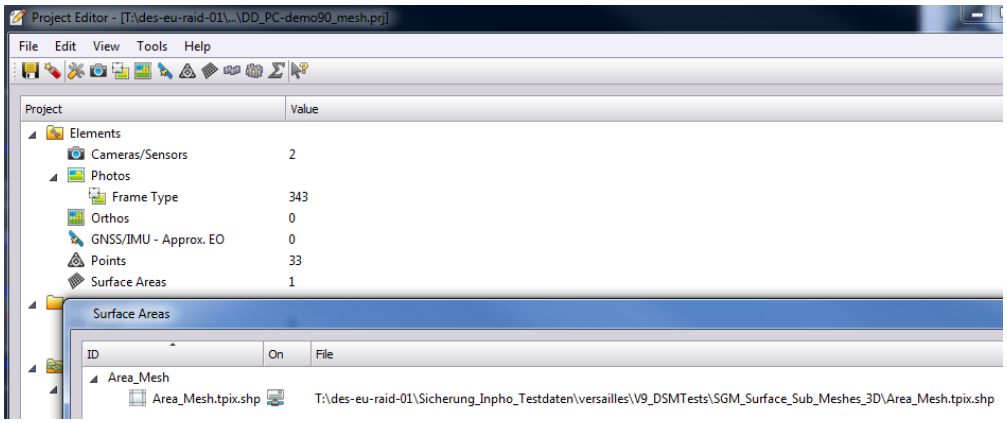
The classic orthophoto generation workflow has been brought to perfection with MATCH-T DSM, DTMaster and OrthoMaster deliver a new level of usability and productivity.

List of Changes

Changes for SATMaster are aligning with changes in the Inpho components associated with satellite processing (ApplicationsMaster, MATCH-AT, MATCH-T DSM, DTMaster Stereo, OrthoMaster, OrthoVista).

Note: Version 9.1 has a new project file version therefore projects generated with the new version 9.1 cannot be opened in previous versions. Projects of earlier versions will be converted into the new format on request. The 8.0.10 patch does not use the updated project file version. If you have on-going projects, Trimble recommends to install the 8.0.10 patch until important projects are finished not to get a mismatch of project file versions.

ApplicationsMaster

Change	Description
New Feature 9.1: Editing of navigation information	With version 9.1 the GNSS/IMU and GCPs are stored in project after import in the given coordinate system. Therefore, the original input data are conserved in native coordinates. The project coordinate system will be rigorous considered. The navigation information can now be edited after the import: • Rotation sequence • Axis definition • Direction (world to image or image to world) • Switch roll, pitch, yaw to omega, phi, kappa • Meridian convergence • GNSS global offsets Note: The selected project coordinate system cannot be changed after first setup.
New Feature 9.1: The tile manager structure in Project Editor	 The Project Editor of version 9.1 is equipped with the new entry “Surface Areas”. With version 9.1 all point clouds created with MATCH-T DSM or with the new MATCH-3DX will be organized in a Tpix file structure. The folder “Surface Areas” will list the path to the corresponding Tpix shape file.

New Feature 9.1: Improved camera management

- **Transfer selected camera as template to sensor database**
- **Preset camera entries from template in sensor database**
- **Support of USGS distortion definition**
- **Support of the Applanix boresight definition**

Version 9 offers an improved camera management:

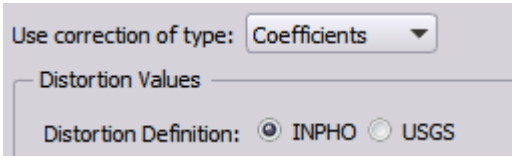
"Transfer selected camera as template to sensor database"

It is now possible to add the defined camera as template into the camera database

"Preset camera entries from template in sensor database"

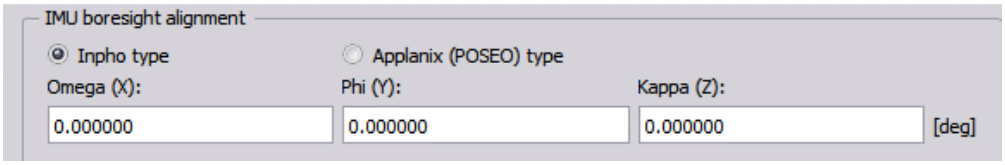
In case the current camera definition of an already set up project is not correct, the camera can be "reassigned" with another camera from the sensor database. The camera name remains so that a reassignment of the "new" camera is not necessary.

Support USGS distortion definition

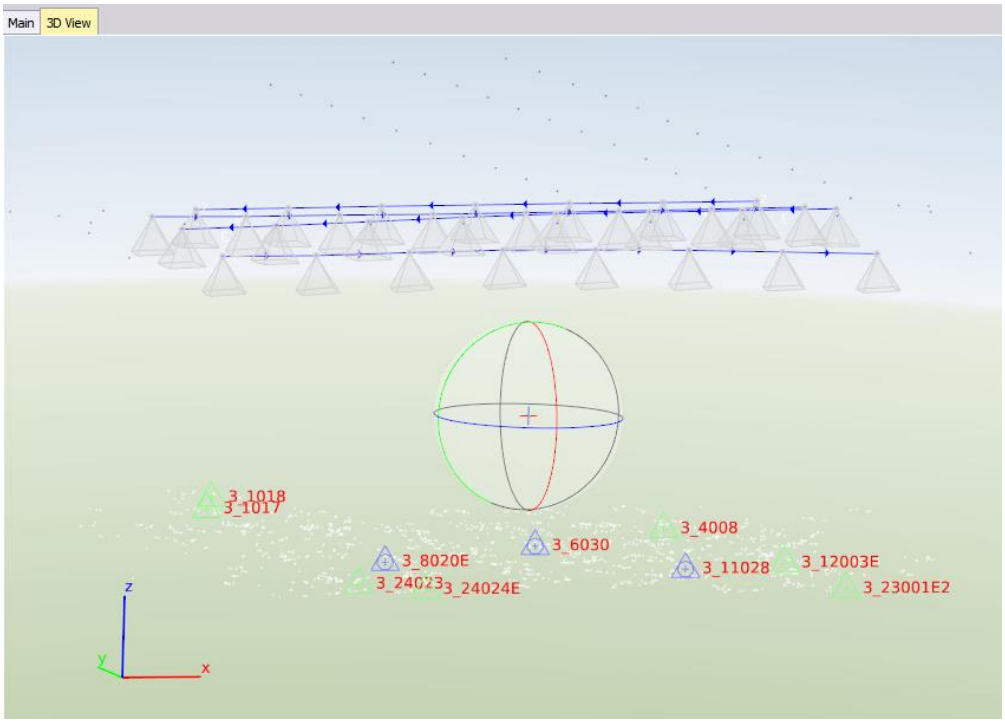


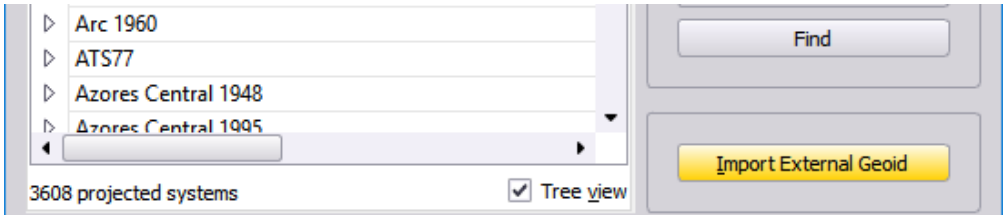
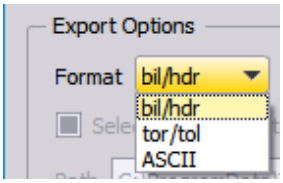
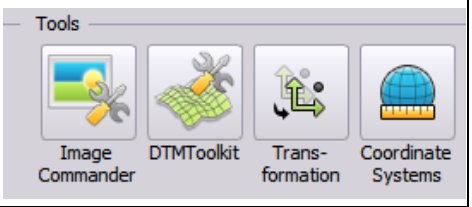
The distortion definition could be selected either as "Inpho" where the correction for the decentering and radial distortion coefficients are defined from the ideal point(s) to PPS or as "USGS" where the coefficients are defined from the measured point(s) to PPS.

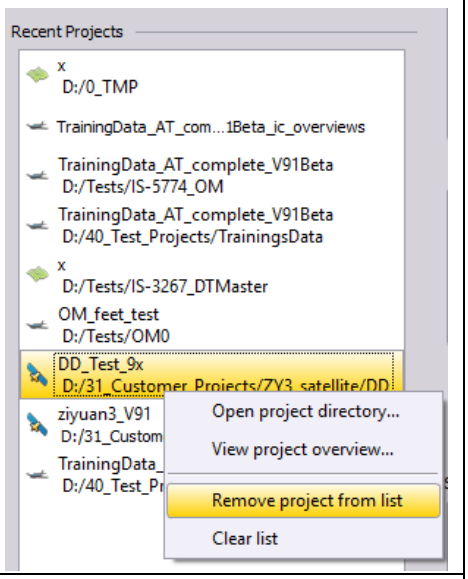
Support Applanix boresight definition



The IMU boresight misalignment angles can now be defined as Inpho or Applanix (POSEO) type.

New Feature 9.1: 3D View of project	 The ApplicationsMaster shows additionally to the Main View, which displays the imported data in 2D, now also a 3D View. With that the presentation of the project area can be rotated to your preferred view.

New Feature 9.1: Coordinate Systems Admin - allows import of external geoid files	The Coordinate Systems Admin includes the possibility to “Import External Geoid” formats.  Supported geoid formats for import are: - GGF (Trimble Geoid) - BYN (Natural Resources Canada) - ASC - TXT - GSF (Carlson Geoid)  These format can be converted to bil/hdr (Inpho) tor/tol ASCII Remark: The coordinate systems administration is organized in version 9.1 as independent tool. 
New Feature 9.1: Adding China Geodetic coordinate system 2000 (CGCS2000)	The Chinese geodetic coordinate system 2000 (CSCS2000) is added to the coordinate system database.
New Feature 9.1: Adding Lithuania geoid	The Lithuania geoid definition can now be selected from the list of geoids in the Coordinate System database.
New Feature 9.1: Adding Google Maps projection (EPSG 3857)	In the Coordinate System database the pseudo Mercator projection from Google Maps can now be selected - EPSG code 3857.

New Feature 9.1: Consideration of additional NTv2 transformation grids	The grid files are not included in the installation of version 9.1 because this will blow up the size of the MSI installer. Australian GDA94_GDA2020: The file can be downloaded from: **https://github.com/icsm-au/transformation_grids/** The original name has to be shortened from GDA94_GDA2020_conformal_and_distortion.gsb to GDA94_2020_CD.gsb Copy the renamed file to "C:\ProgramData\Trimble\ Trimble Photogrammetry9\CoordinateTransformations\ProjLib". Germany BWTA2017: The file can be downloaded from: **https://www.lgl-bw.de/lgl-internet/opencms/de/05_Geoinformation/Liegenschaftskataster/ETRS89-UTM/** This file should be copied to "C:\ProgramData\Trimble\ Trimble Photogrammetry9\CoordinateTransformations\ProjLib".
New Feature 9.1: Remove projects from "Recent Projects" table	Selected projects can be removed from the „Recent Projects" table. Pressing the right mouse button will open a menu where „Remove project from list" can be selected. 
Update 9.1: NAD83(2011)	The coordinate systems library is updated and contains now NAD83(2011). So far only NAD83(2007) was offered.

Update 9.1: Russian language package	The Russian language package for the user interface is updated.
Fix 9.1: Converting satellite project into new version	Converting satellite projects into version 9.1 is now assigning the internal paths correctly.
Fix 9.1: Updating EPSG codes	The EPSG codes in “Coordinates Systems” were reviewed, wrong codes are corrected and missing ones added.
Restriction 9.1	**We are really sorry but the ADS workflow will not work with version 9.1. We will offer a patch soon, where this should be possible again.**

DPMaster Distributed Processing

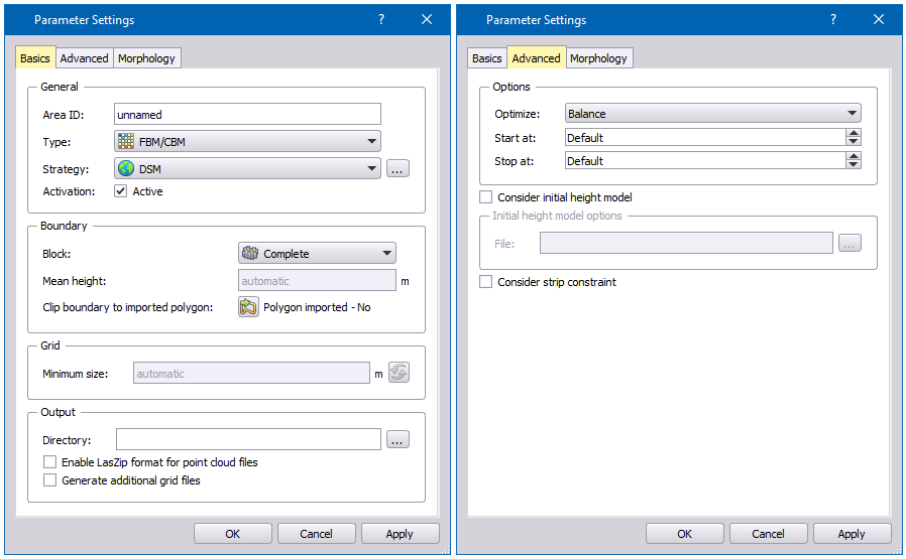
Change	Description
Improvement 9.1: Copy xpf file during job generation	DPMaster now copies also the *.xpf file (tie points) in the Condor job folders. Therefore, it can be used for the MATCH-T DSM process on the corresponding processing node.

MATCH-AT (inBLOCK) / Satellite Georeferencing

Change	Description
Improvement 9.1: Performance	MATCH-AT provides an improved performance. The default limits in the .cnt file are updated.
Update 9.1: Limit for GNSS observations	A hard coded internal limitation for GNSS observations is extended from 25000 to 50000.

Improvement 9.1: inBLOCK limits	The limitations of inBLOCK are enlarged. Large blocks can now be processed with camera calibration. Previously a block with 3000 images and 5 camera heads (multi-head system) failed.

MATCH-T DSM

Change	Description
Improvement 9.1: Revised GUI	The whole GUI of the Parameter Settings dialog was revised.  The option for generation of LAZ files is now directly available

MATCH-3DX / Meshing add-on

Requirements/recommendations:

We recommend an up-to-date computer with at least 32 GB RAM (better more). Furthermore, we recommend an additional hard disk for production only, the needed disk space will be about 2-5 times of the space that the input data requires.

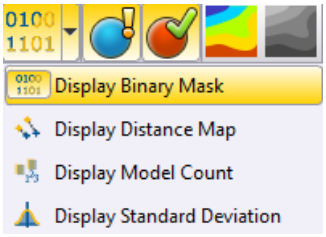
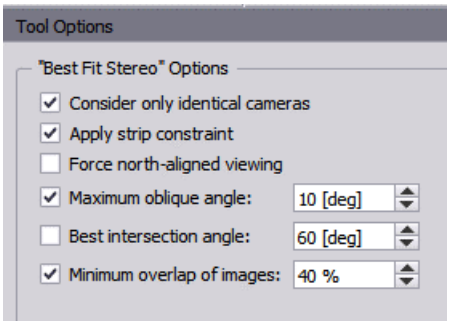
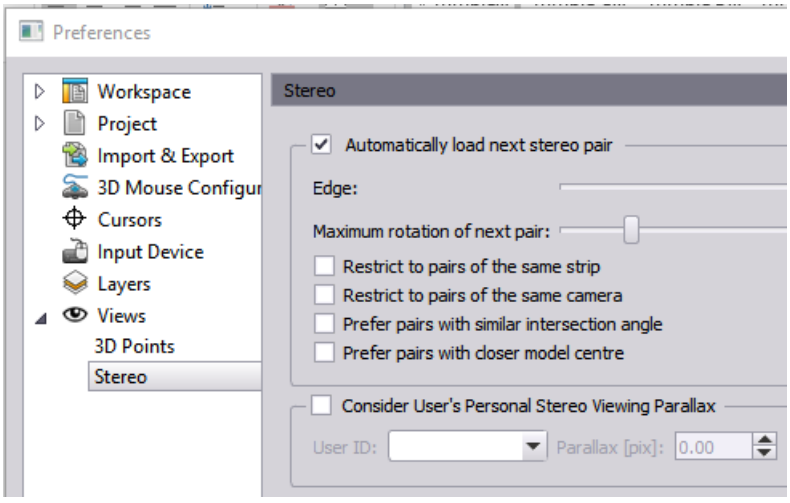
Change	Description
New Features 9.1	• New dense point cloud matching technology (SGM) for urban mapping • New technology and data handling for True Ortho Mosaic generation • Improvement of point cloud quality concerning completeness and noise Input • Aerial images (no limit for the number of images) • Multi-head system (no limit for the number of Stations) • Optionally computation inside “Area of interest(s)” • Optionally use of sub-block of images • Multi-head system (no limit for the number of stations) Output • Organized in tiles: > 2.5D colored point clouds in las or laz format > 3D colored point clouds in las or laz format • True ortho-mosaics (computation in native resolution, radiometric corrections applied) • Metadata information for quality assessment of true ortho-mosaics (Easy review of mass data, high performance graphical overlay, precise information about data quality)
New Features 9.1: Meshing add-on	The MATCH-3DX Meshing add-on creates textured high quality meshes in 2.5D or 3D. The mesh can be exported in the following formats: • Native OpenSceneGraph Binary (OSGB) • Wavefront (OBJ) • Cesium 3D Tiles • COLLADA - Digital Asset Exchange (DAE) • Native OpenSceneGraph Binary (IVE) Since we do not offer any Mesh viewer from our side we recommend free available 3rd party viewers, e.g. the “OpenSceneGraph Viewer” or the “Cesium Web Viewer”. The Meshing add-on requires an additional license!

DTM/Point Cloud Processing - DTM Toolkit

Change	Description
New Feature 9.1: Gap filling inside defined polygons	For gap filling it is now possible to define border lines (morphological data import). Then the gap filling takes place inside the area only. In previous versions this was not possible, gap filling was always done for the complete area.
Fix 9.1: Wrong display of units for contour lines	The contour line dialog showed always the unit Meter. Now the unit (e.g. Feet) gets displayed correctly.

DTMaster Stereo

Change	Description
New Feature 9.1: DTMaster Viewer	Version 9.1 offers a new license-free DTMaster Viewer. Its key features are: • Stereo View • Profile View • Metadata View from SGM results (MATCH-3DX) • Shading on-the-fly, contour lines etc. Editing, exporting or DTM check tools are not available.
New Feature 9.1: Integration Tile Manager data (Tpix)	Version 9.1 offers an improved integration of the Tile Manager data in DTMaster, see new Surface Areas tab: • Load and unload Tile Manager file directly from project • Ortho-mosaic update for MATCH-3DX True ortho-mosaics directly in DTMaster • DTM update is now also directly available in DTMaster (without opening DTMToolkit) • Handling of data management in Tile Manager (menu: File - Import - Tile Manager…)

New Feature 9.1: Visualization of SGM Metadata (MATCH-3DX)	New visualization of SGM metadata for the corresponding point cloud. This helps to review the results of the SGM process and can indicate problematic areas. 
New Feature 9.1: Additional parameters for Best-Fit-Stereo and automatic model change	To improve stereo measurement with high overlap projects, DTMaster is equipped with additional options to allow the selection of preferred stereo models which are not "neighboring" images. Additional parameters for the automatic stereo model change are introduced (see Preferences – Views - Stereo). <u>Tool options – Best-Fit Stereo</u>  <u>Settings for automatic model change</u> 

New Feature 9.1: Added columns to the Terrain tab	In the Terrain tab two new columns can be added: 1. NrPL: Number of points (sorting is possible) 2. Type: the type for points and lines are added
Improvement 9.1: Additional Vector File Info for LAS files	The Vector File Info dialog shows additional attributes for LAS files.
Change 9.1: Default setting "Overview window"	The "Overview window" had a very bad influence on the performance of panning and zooming. Therefore by default the display of the "Overview window" is turned off.
Fix 9.1: Export LAZ	The LAS header definition for the Global Encoding is now correct after export.
Fix 9.1: 3D mouse snapping	The problem that the 3D mouse snapping jumps to the previous measured vertex is fixed.

OrthoMaster

Change	Description
Improvement 9.1: Better interface to DTMaster	With the introduction of the Surface Areas OrthoMaster provides now an improved support of the Tile Manager data structure (for DTM). This provides a smoother workflow when coming from other modules (MATCH-3DX, Match-T DSM and DTMaster Stereo).
Fix 9.1: Corrupt XML file	Saving the project caused several times that the XML file gets corrupt. This is fixed.

OrthoVista

Change	Description
Change 9.1: Prefer non-JPG images	In case of multiple image formats non-JPG will be preferred, e.g. if TIF and JPG images are available the TIF images will be loaded.

Fix 9.1: Rotated SHP tiles resulted in additional background color	For non-rectangular SHP tile definitions, a max. bounding box will be created. Using the option to rotate the project, it seemed that the original bounding box of the tile definition was be used and a second bounding box was calculated instead of the initial SHP polygon. This resulted in additional background areas. This works now correctly.
Fix 9.1: Empty areas along map edge	Sanity checks for inclusion/exclusion area polygons are added to avoid empty maps in case the area of interest runs along the map edges.
Fix 9.1: SHP tile extent not correct	It could happen that the calculation of the cutout region created a half pixel offset which leaded to random borders with wrong image content. This is fixed.
Fix 9.1: Log file entry for valid RGN	Version 9.1 shows now the correct percentage for the region pixel count.

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 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 (check www.imaging-download.com).