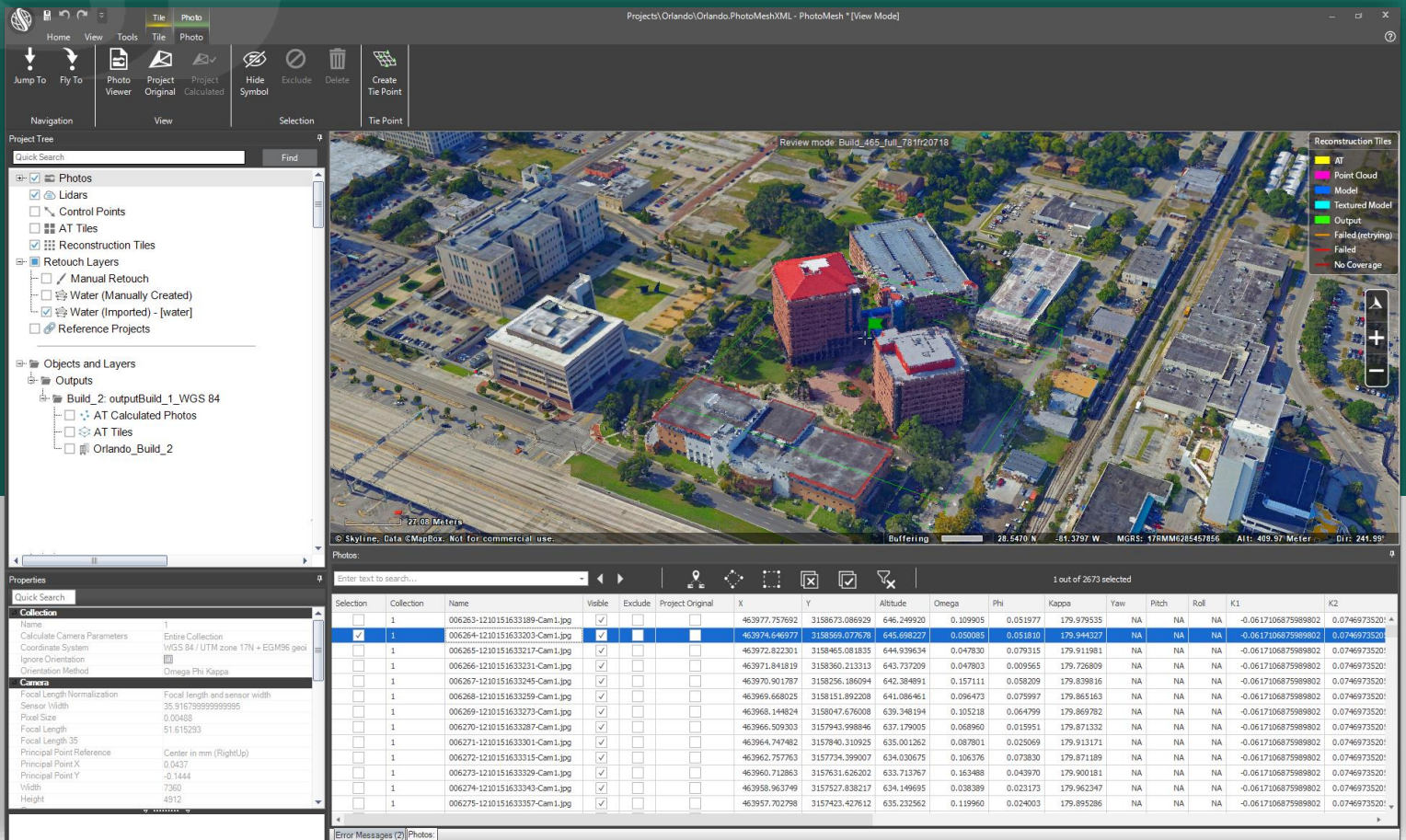# PhotoMesh

Release Notes
V 7.8.4

CONTENTS

- Overview
- Stability and Bug Fixes in 7.8.4
- What's New in 7.8.3
- What's New in 7.8.2
- What's New in 7.8.1
- What's New in 7.8
- Hardware and Software Requirements

OVERVIEW

Skyline's PhotoMesh application fully automates the building of high-resolution, textured, 3D mesh models. from oblique and nadir photographs and Lidar captured from street view, drones, UAV and airplanes. PhotoMesh's breakthrough technology is based on the highest-performance photogrammetry, computer vision, and computational geometry algorithms. PhotoMesh offers a range of output options including standard 3D model (3DML, OSGB, DAE, OBJ), raster (Orthophoto, DSM, DTM) and point cloud (LAS) formats. PhotoMesh's 3DML format can be transformed into powerful geospatial data that fully supports spatial operations and attribute queries, by loading it into TerraExplorer and merging it with classification information. All supported formats can be published from TerraExplorer Pro to SkylineGlobe Server for viewing in Skyline 3D viewers (TerraExplorer for Desktop, TerraExplorer for Web and TerraExplorer for Mobile) and 3rd party viewers (Cesium, ESRI, etc.).

Stability and Bug Fixes

PhotoMesh 7.8.4 provides a number of bug fixes relating primarily to retouch operations involving water bodies, enhancing model handling and output in densely foliated areas, and interaction with Amazon Web Services (AWS) fusers.

- Improved texturing of objects located on water surfaces.
- Optimized mesh output by reducing excessively-complex meshes in foliage-dense regions.
- Refined the curvature of water bodies in large projects.
- More efficient algorithms for processing of projects with a large number of cameras without position and orientation data.
- Improved stitching between tiles.
- Enhanced interaction with AWS - now capable of requesting additional fusers from AWS when the required number exceeds available machines.
- Resolved a bug that delayed the immediate application of new throttling settings, such as launch rate, during a new build process.
- Fixed a bug that hindered the Build Manager from launching fusers up to the AWS throttle limit.
- Improved internal management of AWS errors.
- Implemented additional AWS plug fixes and corrected logging information.
- Expanded AWS log file with more detailed information.

Multi-Fuser Support

PhotoMesh now formally supports the running of multiple fusers on powerful machines for potentially enhanced performance. It is recommended that a minimum of 16 GB RAM and 8 cores be available per fuser.

New Maximize Memory Preset

New preset for use in a single fuser per machine setup maximizes data preparation memory allocation for best performance.

Stability and Bug Fixes

- Fixed bug that caused the calculated principal point center value to be reported inaccurately in the build report generated from the PM API GetReport command, when input data was imported with principal point center in mm.
- Resolved Windows 11 update issue that caused the Terminal app to open upon launching PhotoMesh, and stay open, preventing PhotoMesh from starting.
- Resolved issue that prevented the loading of Lidar trajectory files if no blank line was included between the #timebase (indicating the time offset that should be added to the GPS time field in each record) and the beginning of the coordinate values in the file.

Stability and Bug Fixes

- Fixed bug that caused the model reconstruction step to fail on Linux machines.
- Corrected bug that caused the build to fail when importing images from HTTP/S with special characters.
- Resolved bug that caused gaps between reconstruction tiles in the 3D model and true-orthophoto in areas of dense foliage.
- Resolved issue that caused floating elements to be created above water polygons.
- New GCP List field added to Projects Queue Editor.
- Corrected problem in Projects Queue Editor that caused the reconstruction area parameter to be ignored when rebuilding a project.
- Fixed bug preventing control points from automatically displaying on the terrain after project generated using the Project Queue Manager.
- Fixed bug that caused PhotoMesh to apply gigapixel credits to a build and build the project without a watermark even when user selected the Continue to Watermark option.

Enhancement of AT Reports with Visual Graphs

PhotoMesh 7.8.1 features a set of reports with a range of graphics that help you to easily visualize and identify issues with data collection or the aerotriangulation solution:

- **Distance Map** – Graphically depicts the vertical and horizontal distance between every photo's original input position and the position computed through aerotriangulation.
- **Photo Matches and Projection Error** – Provides a graphical representation of the projection error - median of the triangulation errors of all the features in the photo.
- **Connection Map** – Color-coded map that enables you to evaluate the number of matches between photos.
- **Ground Resolution Map** – Color-coded map that provides information on the features' level of detail, in cm per pixel, in the photos in which they were identified.
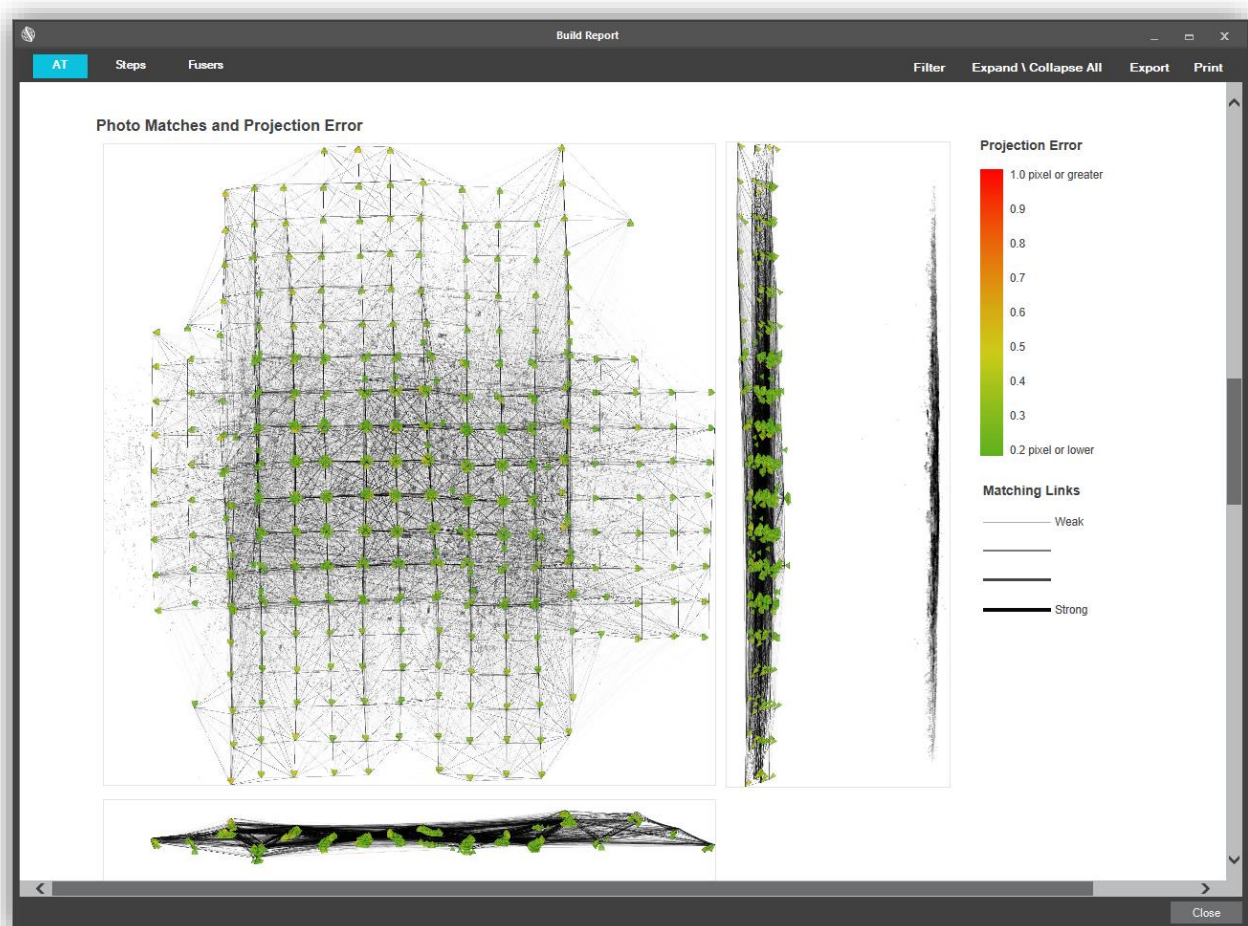
Model Quality Improvements

PhotoMesh 7.8.1 features a set of algorithm adjustments that improve overall model quality:

- Noise reduction around edges of model
- Noise reduction above water polygons
- Improved model quality across all levels of resolution pyramid

General Enhancements

- New option to deploy additional vertical datum grid files (GTX), during installation
- Support for Lidar datasets with additional LAZ formats
- Accelerated production when working with fuser machines with 32 cores or more
- Optimized photo selection in projects with non-rectangular AT areas ensures that only photos that overlap with the AT area are included in the build
- Gigapixel credit licensing mechanism is now also supported when using REST APIs for automating PhotoMesh project and queue tasks

Stability and Bug Fixes

- Fixed bug that resulted in unnecessary repeat conversions of Lidar datasets to PhotoMesh's internal format (CPT)
- Resolved issue that caused the "Enhance Trees" preset to be ignored
- Corrected bug that in some cases cropped tree's top when working with Lidar datasets
- Fixed bug that caused a texturing phase to fail for a very diluted tile

Quality Improvements to Support High-Resolution, Close Range Projects

With PhotoMesh 7.8, you can build ultra-realistic, close range 3D models such as towers, bridges, factories and more. The latest PhotoMesh features several enhancements for working with close range, sub-centimeter data collections:

- Modifications of aerotriangulation process to support data collection of close-range objects such as towers and antennas.
- Automatic identification and cleaning of sky background
- Better sharpening and modeling of thin elements such as poles and pipes to produce higher quality, detailed point clouds and mesh models
- Noise reduction around edges of complex models
- Improved model quality across all levels of resolution pyramid

New Option to Use Reference Projects to Improve Project Alignment

This mechanism automatically geo-references a new project based on the aerotriangulation results of a previously built project, to ensure both projects are completely aligned.

- This tool can be particularly useful for multiple flights over the same area. Ground control points, or high accuracy GPS locations (RTK, PPK) can be used for the first flight and then the Reference Project mechanism can be used to accurately register the other flights, even without GCPs or accurate location information.
- The Reference Project mechanism can ensure perfect horizontal and vertical alignment for visualization and difference comparison tools.
- The Reference Project can also be used with partially overlapping projects. For best success, the same sensor and flight pattern should be used for both projects although the Reference Project mechanism can support different sensors and patterns.
- Reduced noise

Export Undistorted Photos

New option to save the undistorted photos created in the AT process when exporting AT results. During the photo preparation steps, PhotoMesh calculates the photos' distortion parameters (that result from most cameras lens properties) and uses these parameters to undistort the photos so that feature matching, AT, and 3D reconstruction can be performed properly.


Performance Improvements

- Close range project memory usage optimized for 16GB machines
- Optimized production time for close range projects
- Overall performance improvements accelerate production

Quality Report API

PhotoMesh provides a REST API for PM Production to automate the production phases, e.g., load photo files or list, set AT and reconstruction areas, begin and manage a build, and create new build versions. PhotoMesh 7.8 features the addition of a new method to the API for generation of a report in JSON format with information about the general project, photo collections, AT results, control points, reference projects and reconstruction results.
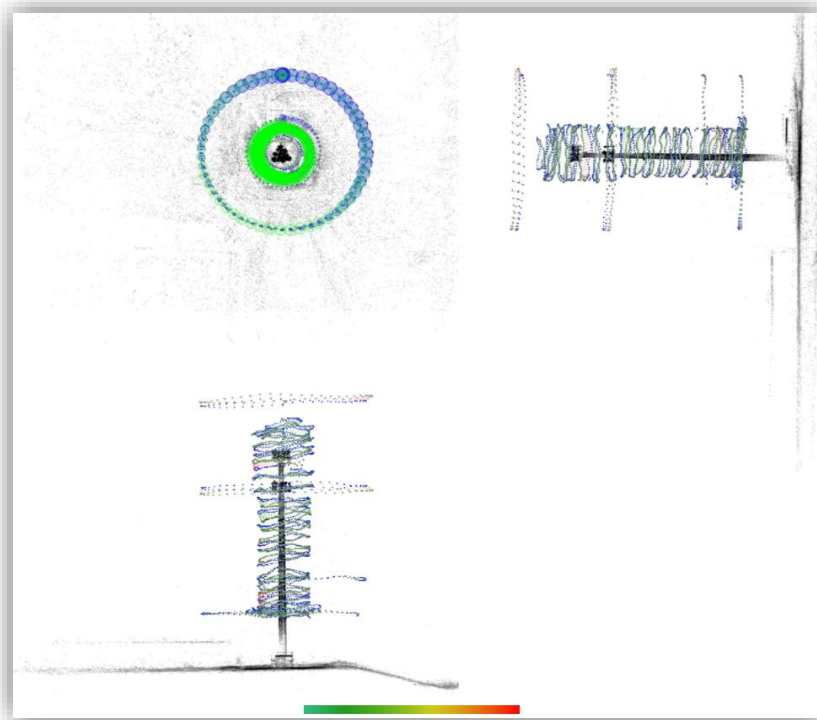

Usability Improvements

- Close range navigation - Improved 3D navigation to support close range and vertical objects
- Relative path – Project can be copied or moved to a new folder or drive location after any build step. It can then be resumed from any step from its new location

AT/Reconstruction Area Buffer

New options make it easier to set the appropriate area for aerotriangulation, especially in close-range projects. The area of the project on which PhotoMesh should perform aerotriangulation can now be calculated automatically by PhotoMesh based on all the project's photos plus a buffer in meters that is either based on the collections' maximum effective range or a set value that you define.
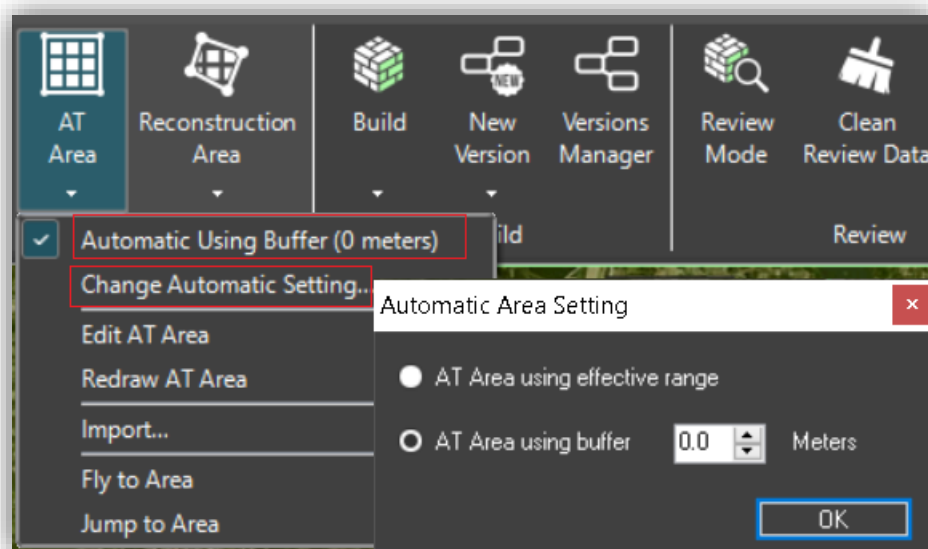
AWS Improvements – Fuser Throttling and Tagging

- **Throttling** – New Launch Rate setting lets you control the maximum number of fuser instances launched per minute, e.g., if Maximum Instances was set to 200, and the Launch Rate to 50, the Build Manager will spread the launch of the fusers over 4 minutes. This prevents a potential bottleneck that could be caused by a large number of fusers attempting to read the build data at the same time.
- **Tagging** – New user-defined tags added to fuser properties to help you easily identify a fuser instance in the Amazon EC2 console after it is launched.

Bug Fixes and Stability Improvements

- Resolved issue causing Lidar bounding box to float above point cloud data
- Resolved issue causing orthophoto generation to fail when tile size exceeded 50,000 pixels.
- Resolved issue causing build to fail in projects with more than 4,000 Lidars
- Fixed bug that caused Lidars to disappear from project after changing their coordinate system and then reopening the project
- Fixed bug that resulted in control point editor sometimes opening showing an "Overflow error"
- Corrected issue that caused a build to fail when generating orthophoto output with 'Mesh Vertical Bias' preset
- Failed photos are now included in the calculated lists of the Control Point Editor, with their name marked in red and a tooltip to inform the user that they were not calculated in the AT process.
- Resolved bug relating to control point sampling error variance
- Fixed bug affecting display of table in CSV/TXT Importer
- Fixed bug affecting display of orthophoto on white background
- Corrected bug causing white dots to display on PhotoMesh window when using the shortcut keyboard combination to open a tile's folder

REQUIREMENTS – PHOTOMESH

Operating System

Windows® 8 / 10 / 11, Windows® Server 2012 R2 / 2016 / 2019 – 64-bit required.
Ubuntu 18.04 and Debian 10.0 – 64-bit required (Only for PhotoMesh fusers)

System Memory

16 GB RAM (32 GB recommended)

Video Card

1GB of video memory (2GB or more recommended). Pixel and vertex shader v3.0.

Processor

4 cores (8 cores recommended). PhotoMesh works best in a multi-core environment and can utilize multiple CPU's and hyper-threaded processors

Additional Software

.Net Framework 4.6.1 required

For additional information, check out the SkylineGlobe Server section and TerraExplorer Fusion section of our knowledge base.

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