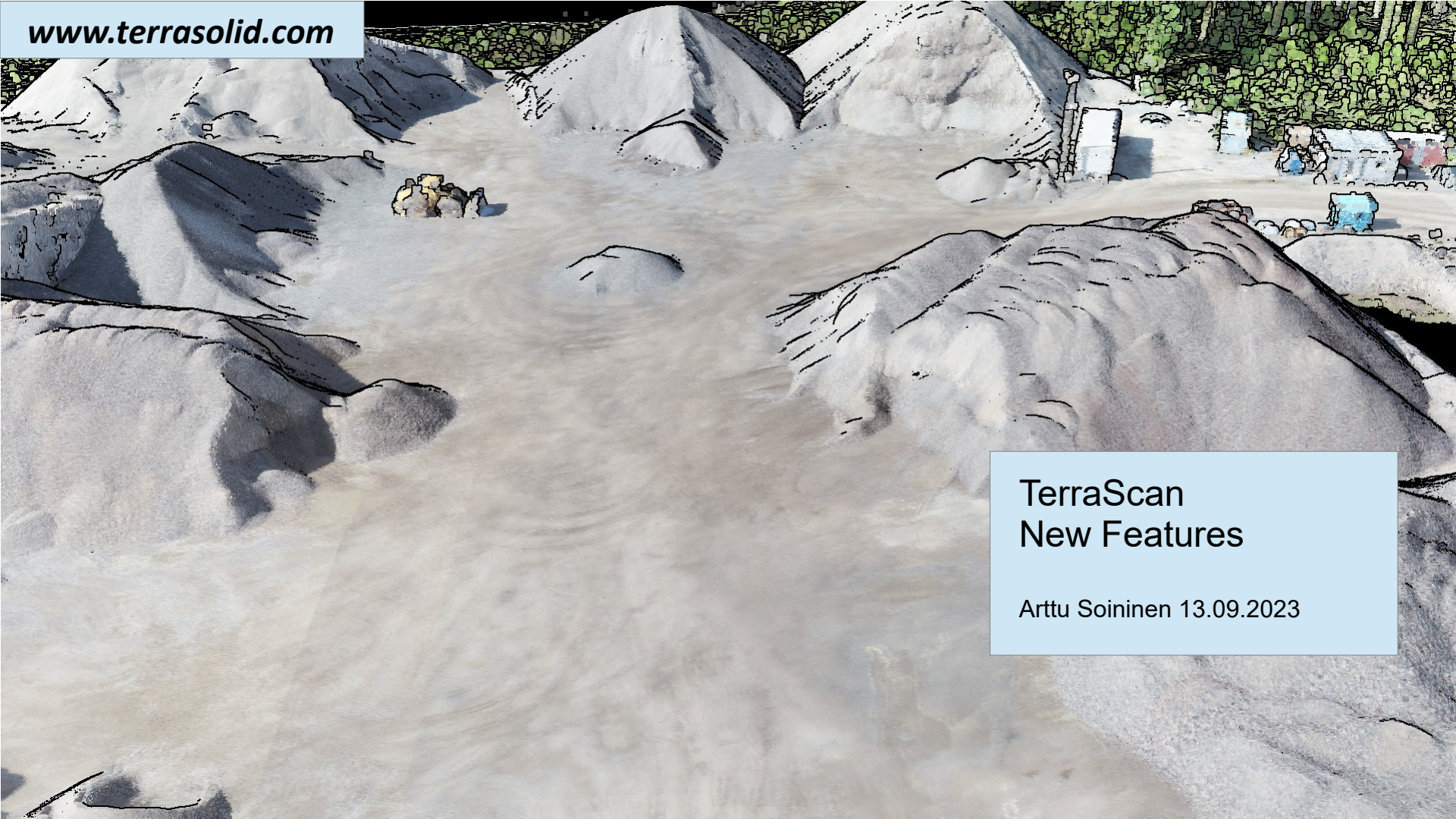
www.terrasolid.com

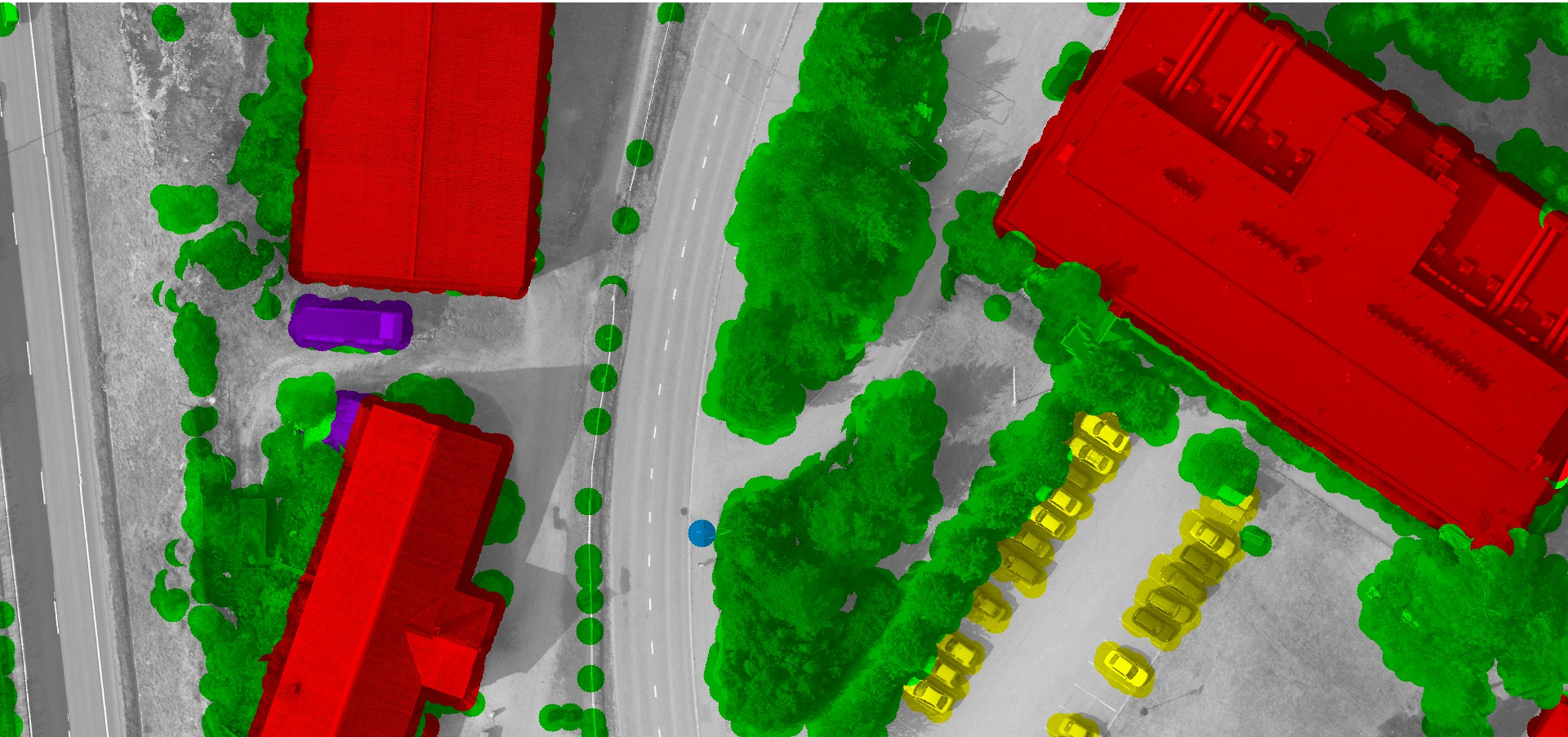


TerraScan
New Features

Arttu Soininen 13.09.2023

Color by 'Image color'

Color by 'Class + image'



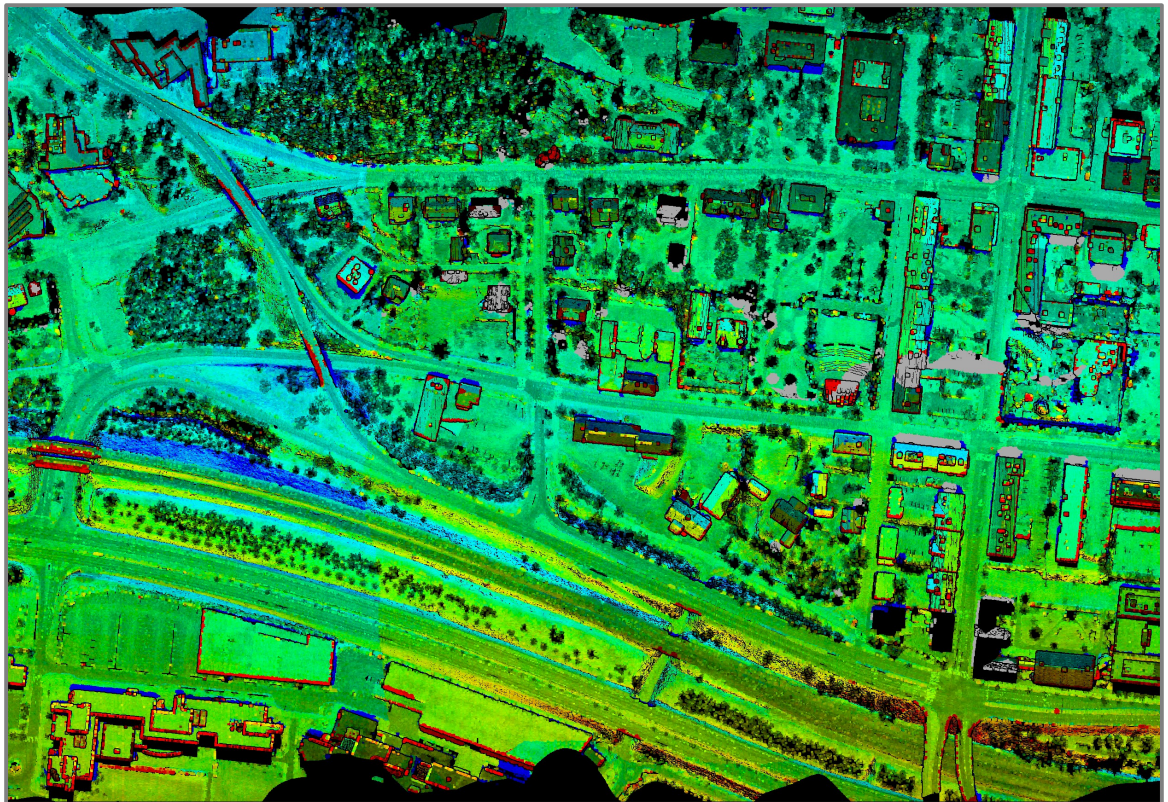
'Image color' & 'Class + image' Coloring Modes

- Preparation steps:
  - Open mission and load image list in TerraPhoto
  - Extract color from images storing image number (points get color and image number)
  - (Optional) Compute normal vectors

- TerraScan will draw points into view as 3D discs (=ellipses)
- TerraPhoto colors each pixel from images
- TerraPhoto keeps raw images in cache
- **Image Cache / Max size** in **Photo Settings / Memory usage** needs to be big enough
- First screen update is slow as software needs to read raw images

'Distance + intensity' Coloring Mode

- Distance gives color, intensity gives brightness



Reflectance & Amplitude Support in Coloring Modes

- **Class+intensity**, **Distance+intensity**, **Line+intensity**, **Time+intensity**, **Group+intensity**, **Normal+intensity** and **Color+intensity** coloring modes can use reflectance or amplitude if no intensity available
- Attribute use order: intensity, reflectance, amplitude, color

Various Improvements

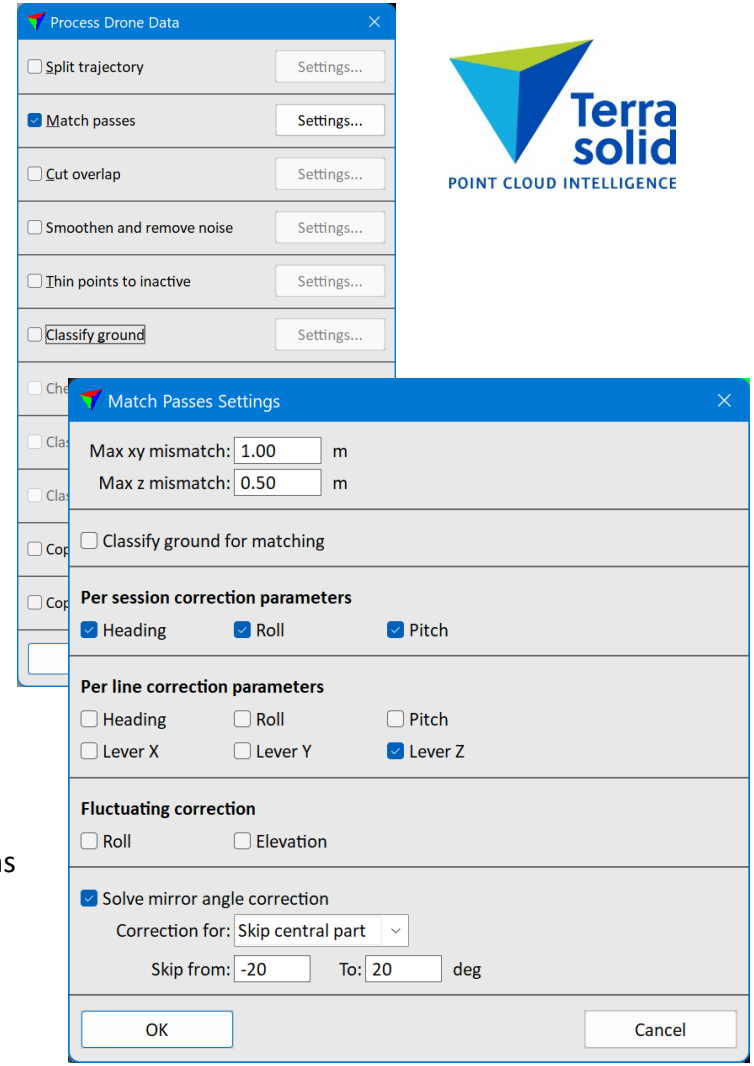
- Distance coloring scheme has setting for how to color points with no distance value
- **Classify by Echo** can classify points which have zero as echo number or as echo count
- Better bounding circle routine in **Draw Polygons**
- Scan angle field unit setting in user point file format definition (unit can be degree or integer units as defined in LAS 1.4 file format)
- **Apply / Shift** menu command in control report copies shift transformation to the clipboard so it can be pasted into TerraScan or TerraPhoto transformation table
- **Clear distance** available as macro action
- **Compute normal vectors** has **Inside fence only** option
- Multiple source classes in **Classify / By absolute elevation**
- **Extract color from images** has an option to store image number only and not modify color of points

Match Passes in Process Drone Data

- Step in TerraScan **Process Drone Data** tool
- Runs automatic matching of flight passes to each other
- Requires TerraMatch or TerraMatch UAV license to run

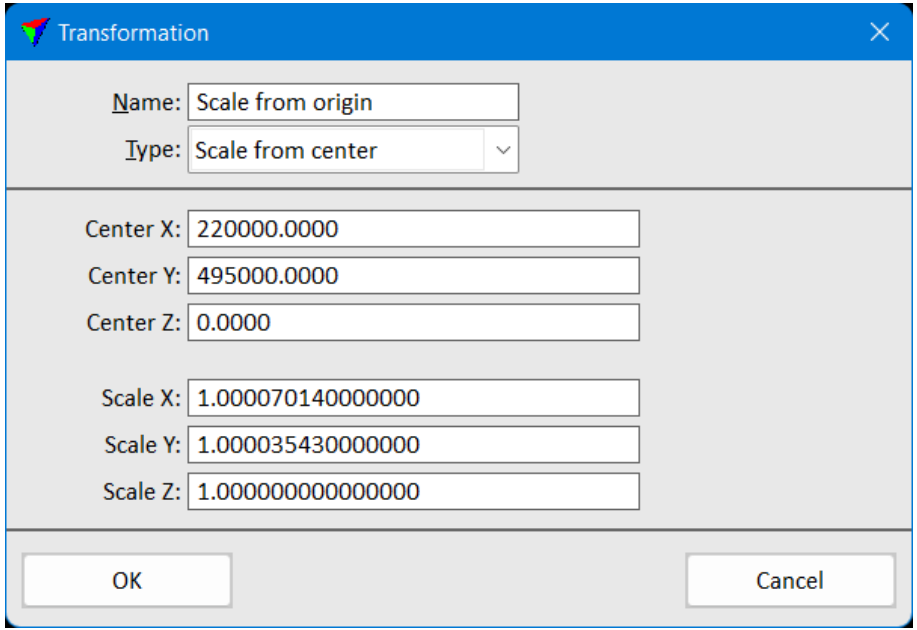
- Collects tie line observations for three different correction levels:
  - Heading + roll + pitch per flight session (=trajectory group)
  - Heading + roll + pitch + x + y + z per line
  - Fluctuating roll + z
- Solves and applies **Mirror Angle** correction curve

- Saves matching report, tie line and correction files:
- matching_report.txt
- tielines_start.til, tielines_per_session_done.til, tielines_per_line_done.til, tielines_fluctuating_done.til
- 01_per_session_hrp.tms, 02_per_line_z.tms, 03_fluct_z.tms, 04_mirror_angle.tms



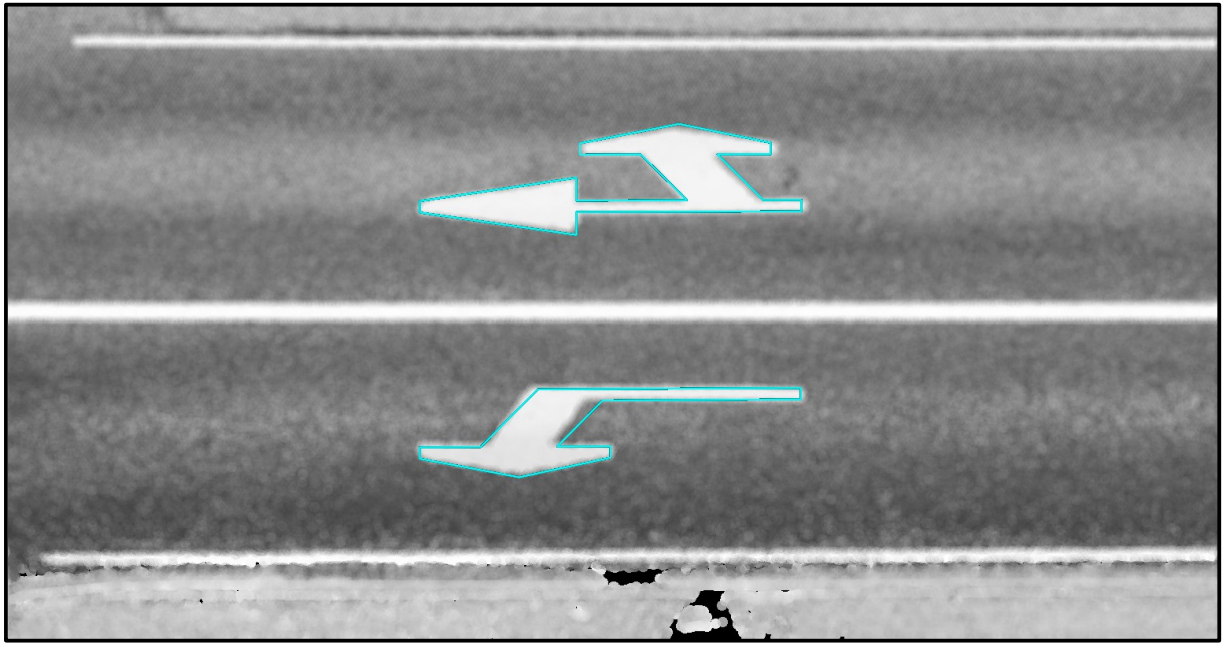
New Transformation Type

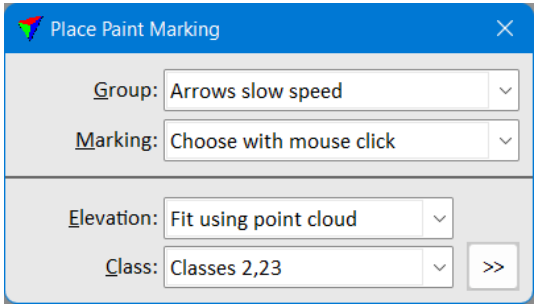
- **Scale from center** applies a scale factor to points relative to a given center point



Place Paint Marking

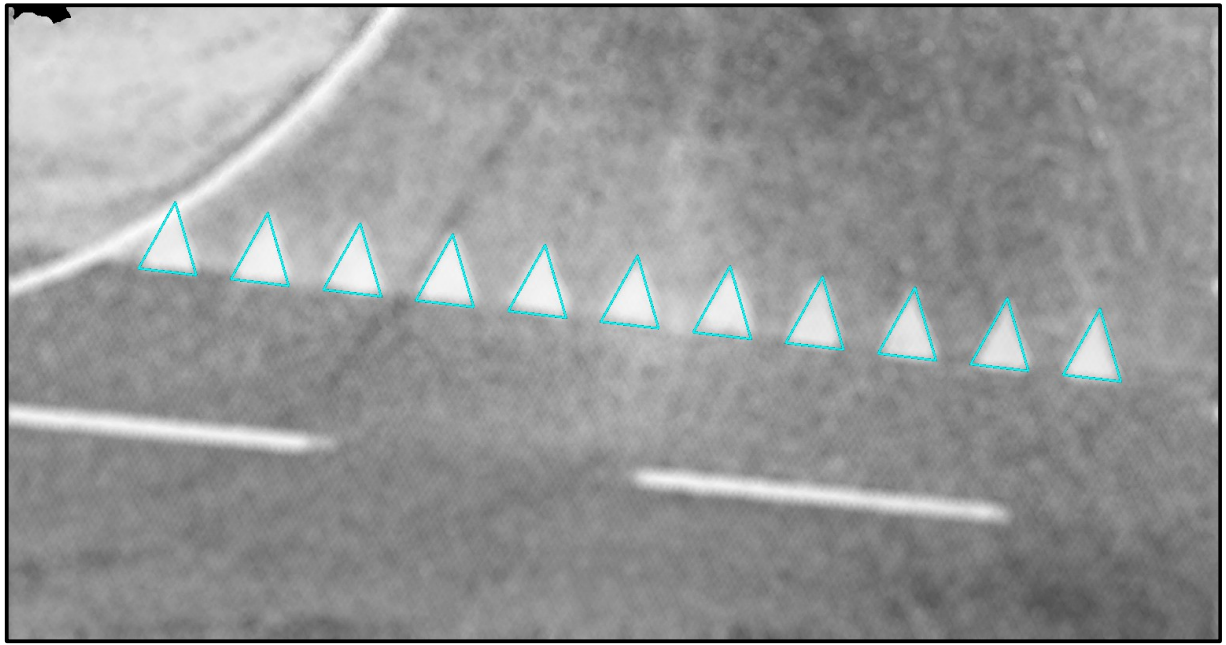
- Automatic recognition of paint marking using point cloud intensity or orthophoto

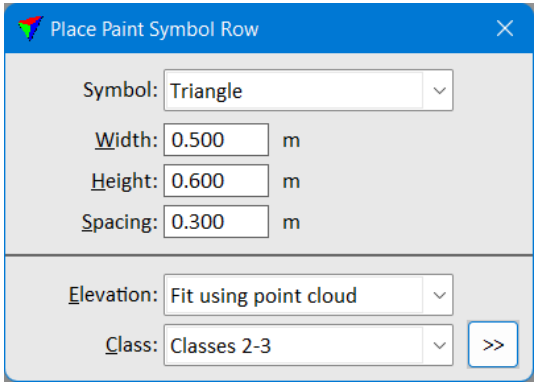




Place Paint Symbol Row

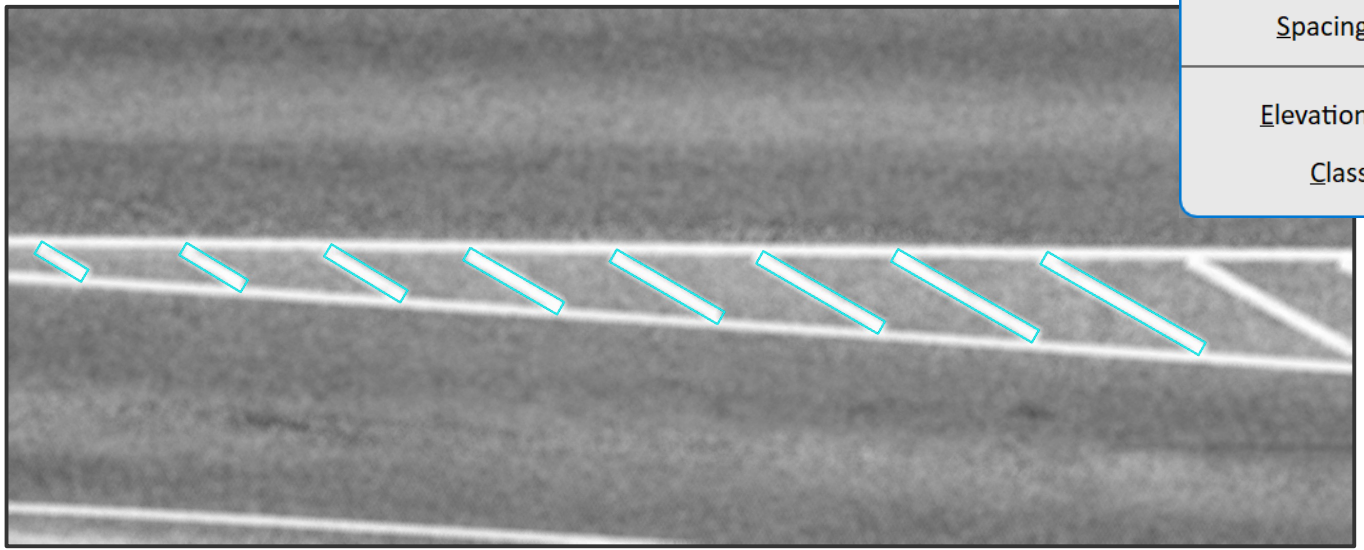
- Places a row of triangles or rectangles manually
- Can use point cloud to get elevation for vertices

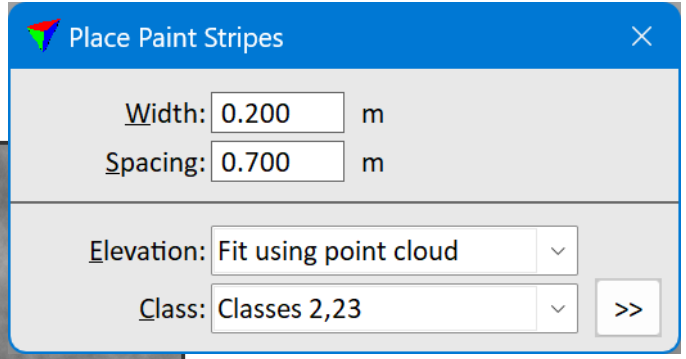




Place Paint Stripes

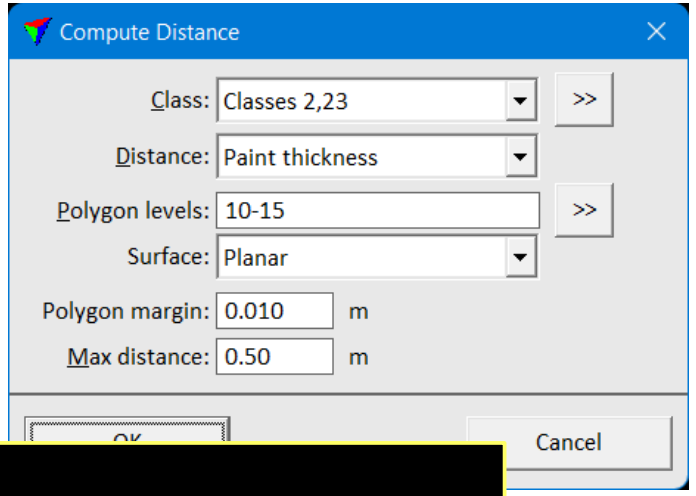
- Places a row of paint line polygons
- Can use point cloud to get elevation for vertices

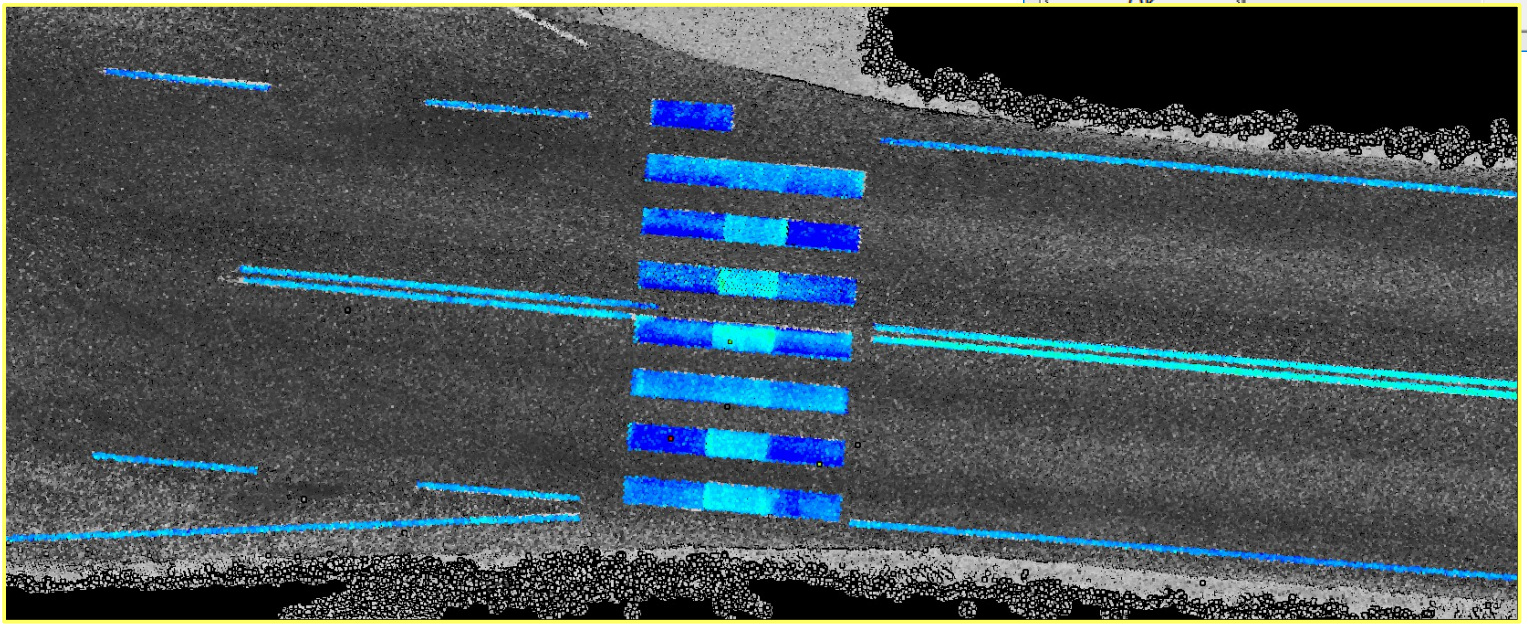




Compute Distance & Paint Thickness

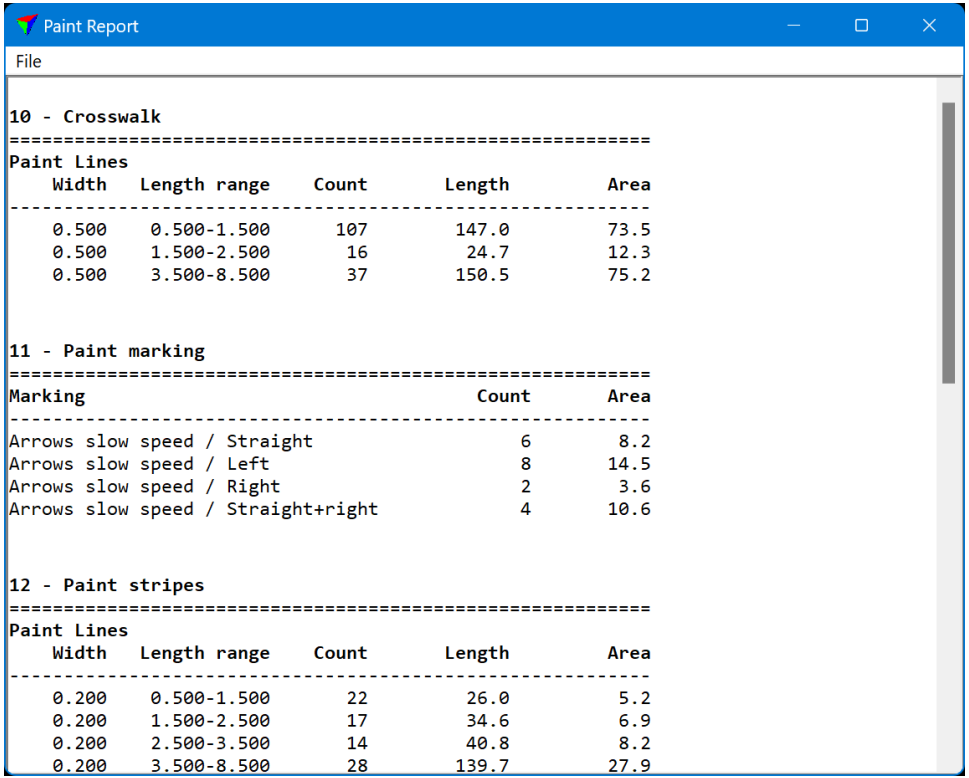
- Computes value for points inside polygons on given levels
- Fits a plane or a second degree surface to points outside polygon
- Points get height from fitted surface as distance value





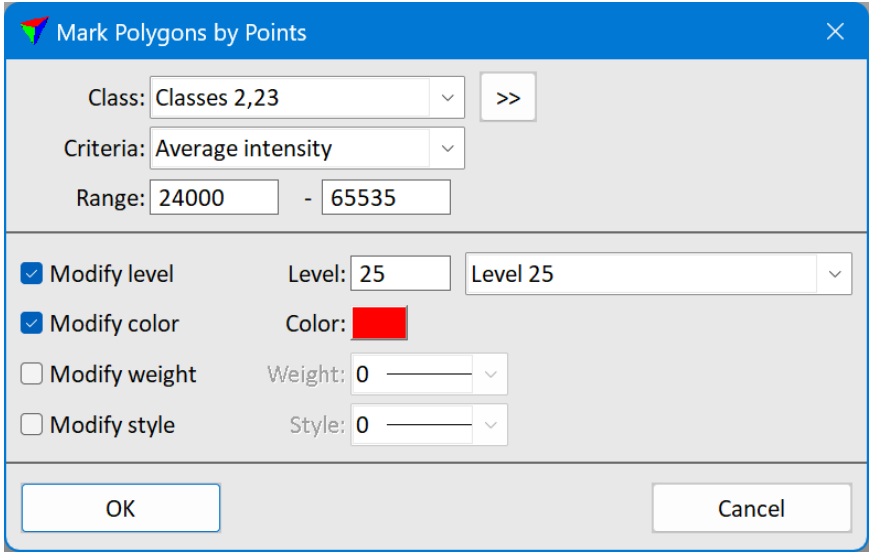
Output Paint Report

- Writes a summary report on selected paint marking and paint line polygons



Mark Polygons by Points

- Marks selected polygons by statistics from points inside each polygon
  - Presence of points (=points in specific class inside polygon)
  - Point density
  - Average amplitude
  - Average brightness (=color brightness)
  - Average intensity
  - Average reflectance
  - Smallest distance
  - Average distance
  - Biggest distance
- This can mark paint polygons by:
  - Paint brightness (Average intensity)
  - Paint thickness (Average distance)



Geoid Model Support

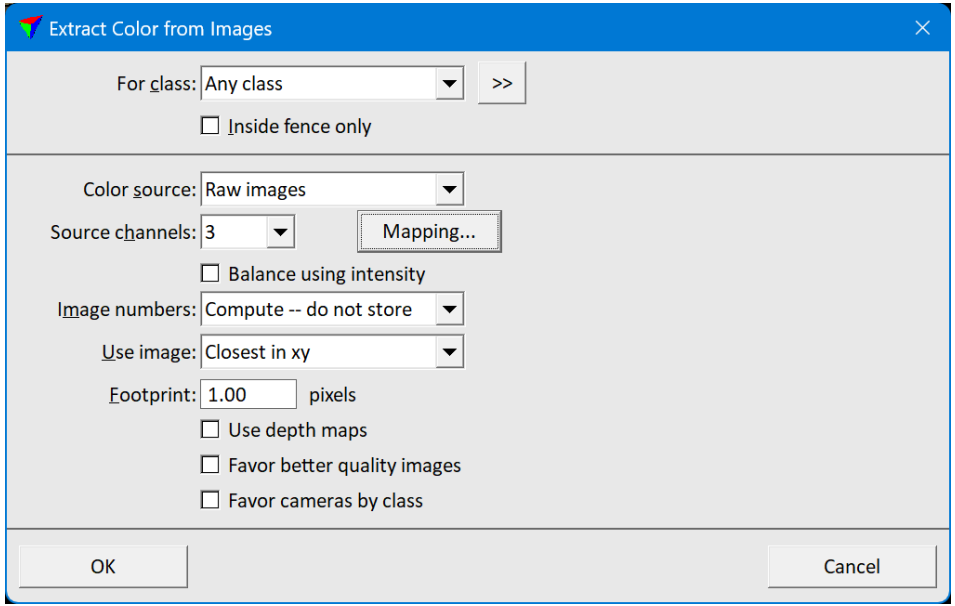
- Support for Latvian geoid model LV14
- Support for Brazilian geoid model HGEOHNOR2020
- Support for Korean geoid model KNGEOID18 (geoid file not part of setup package)
- Support for Canadian geoid model CGVD2013
- Support for German geoid model GCG2016

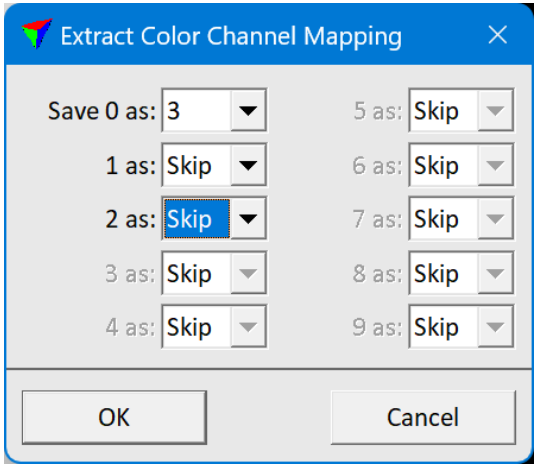
Manage Trajectories Improvements

- **Convert time** shows conversion result for first time stamp
- **View / Sort** can sort trajectories by duration
- Support for Inertial Explorer trajectory text file format

Extract Color & Channel Mapping

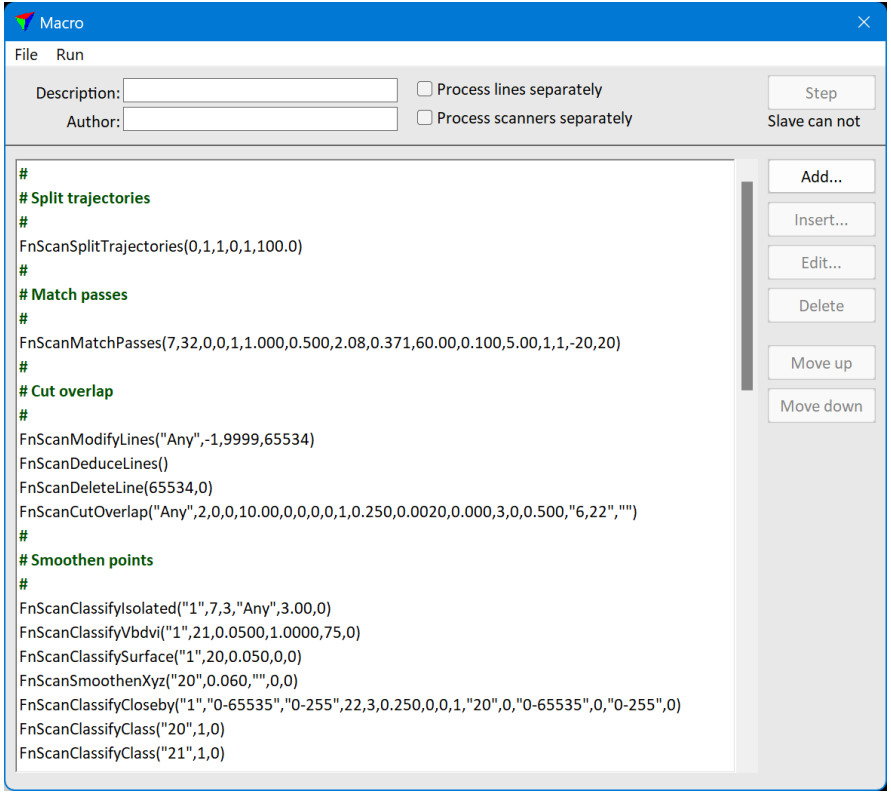
- Channel mapping makes it possible to extract RGB channels from one set of images and NIR channel from another set of images
  - Get channels 0, 1 and 2 from RGB
  - Get channel 3 from NIR

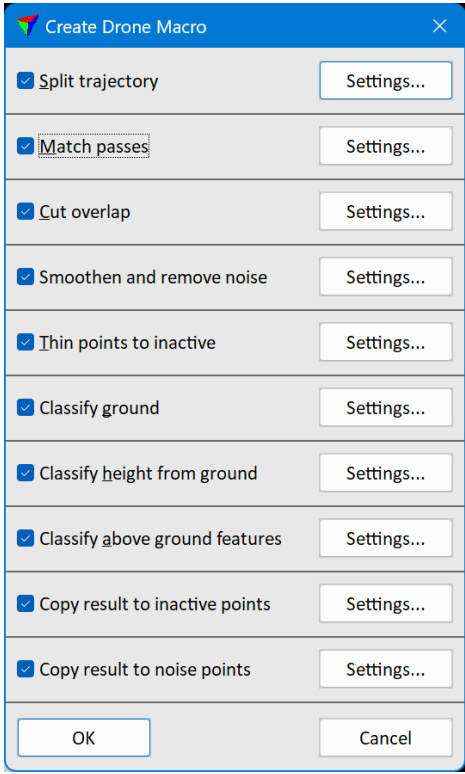




Wizard / Create Drone Macro

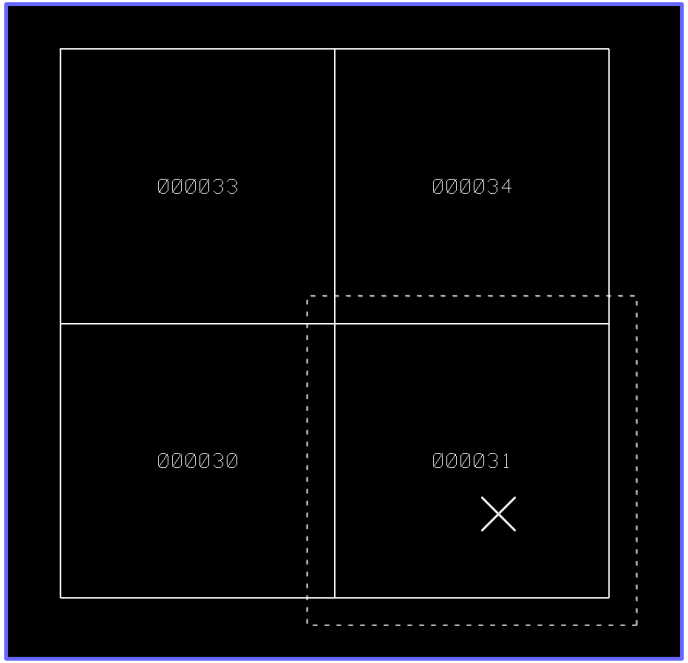
- Creates a macro for selected drone processing Wizard steps
- Makes it easier to modify processing steps

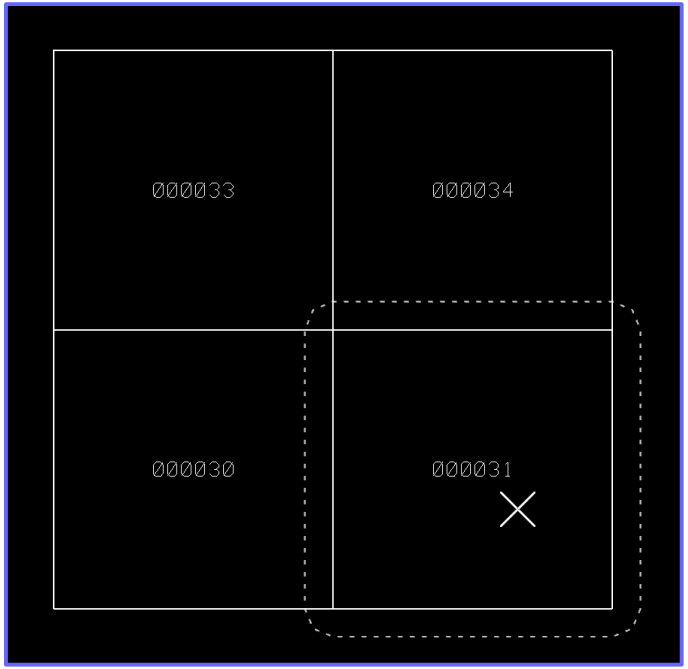




Neighbour Area Choice in Define Project

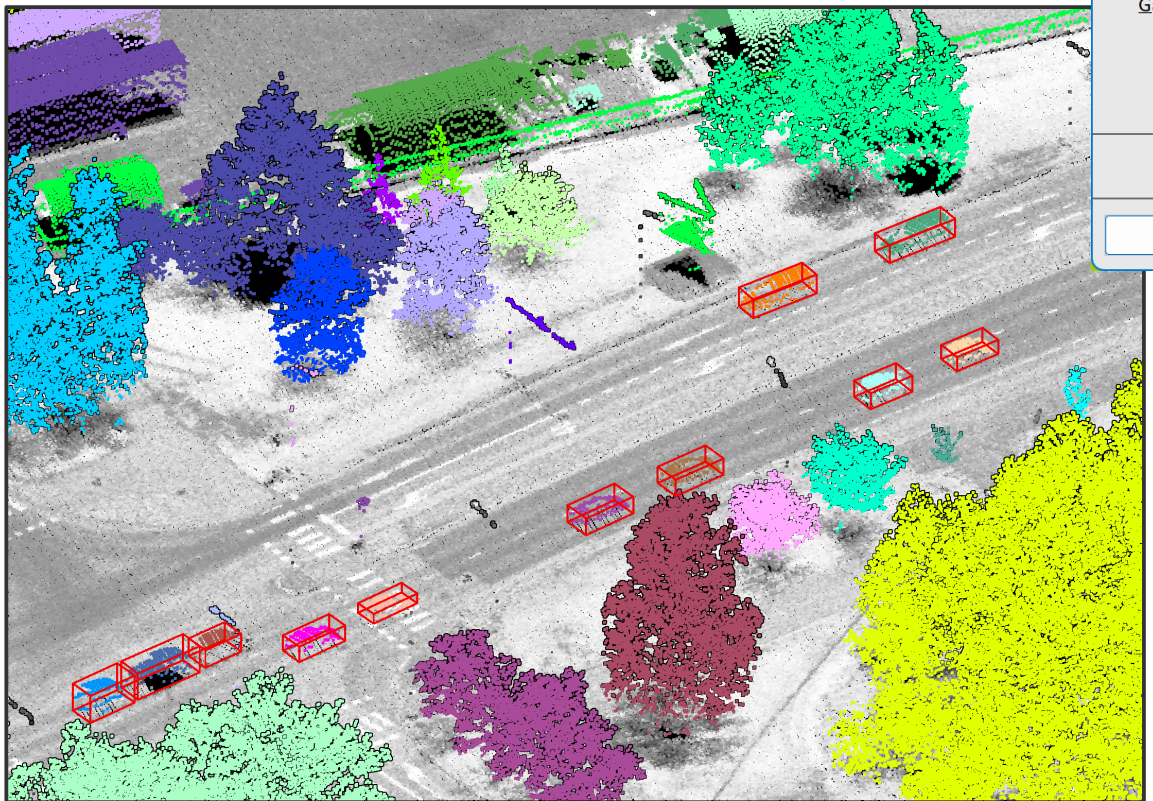
- **Neighbour area** setting in project information defines the shape of area for neighbouring points:
  - **Sharp corners** will use sharp corner polygon
  - **Rounded corners** will use rounded polygon

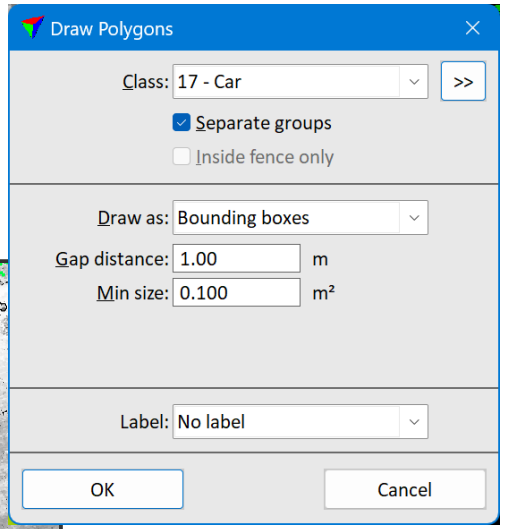




Draw Polygons and Bounding Box

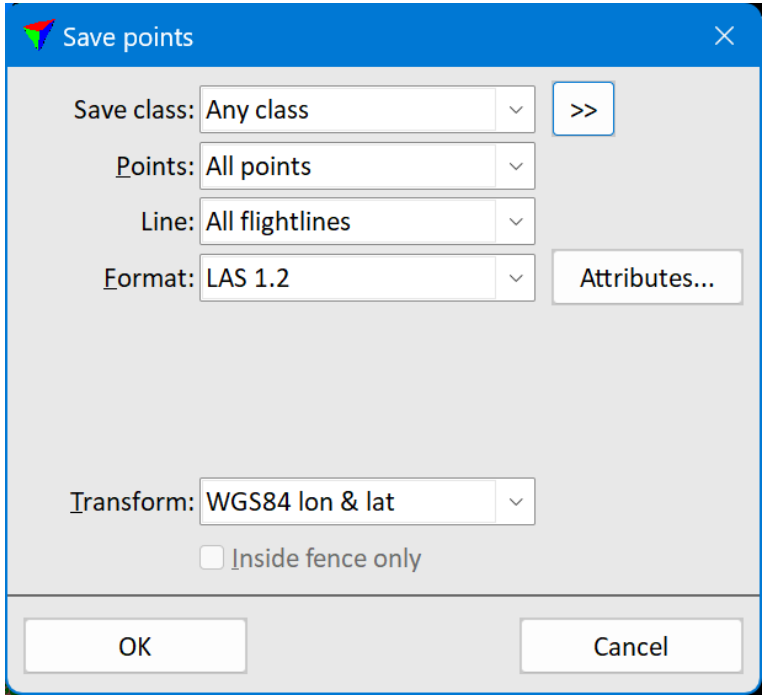
- **Draw Polygons** has B**ounding boxes** option in **Draw as** field
- Draws 3D bounding box as cell element with 6 polygons





Longitude/Latitude and Geocentric Output

- **Save As** menu command from main window can save **WGS84 lon/lat** or **WGS84 geocentric**
  - Available when active projection system is specified
- **Output points** macro step has support for **WGS84 lon/lat** and **WGS geocentric** output

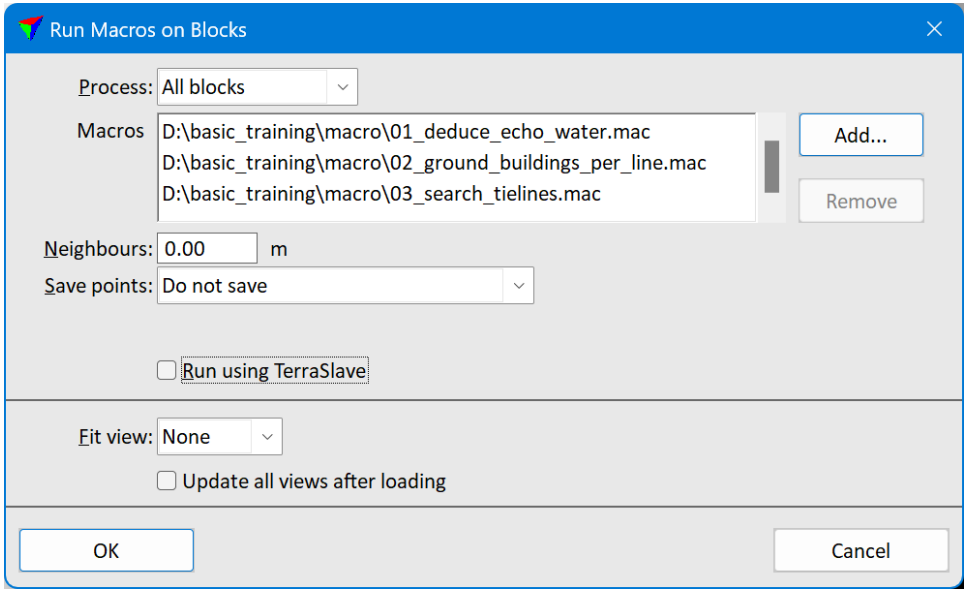


New Drone Project and Process Drone Data

- Support for new systems:
  - YellowScan Explorer
  - YellowScan Mapper
  - YellowScan Mapper+
  - YellowScan Surveyor Ultra
  - YellowScan Voyager
  - YellowScan Vx15
  - YellowScan Vx20
  - AlphaAir 450

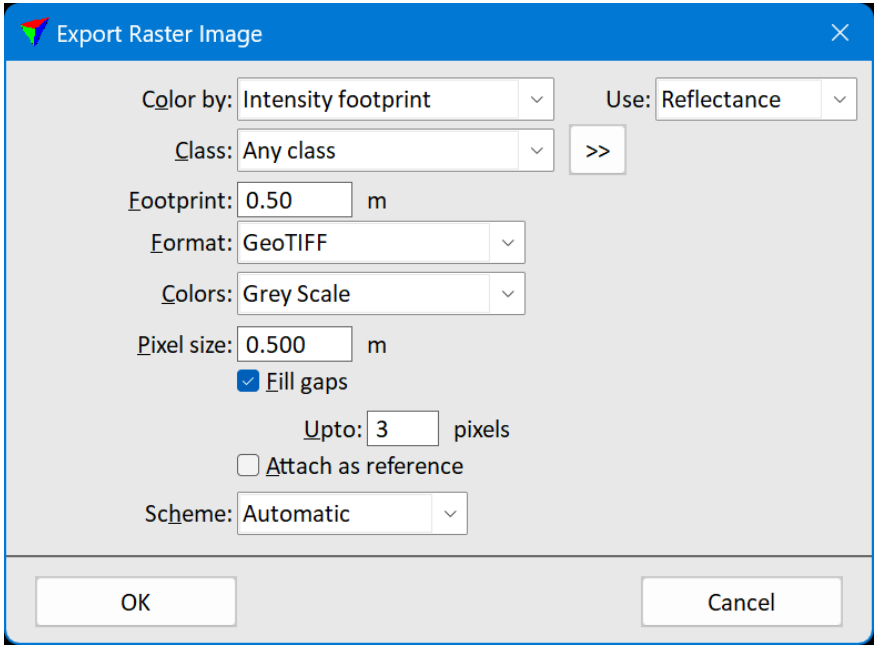
Run Multiple Macros on Project

- You can select multiple macros to run on a project
- Needed to automate matching:
  - One classifies ground (has **Process flightlines separately** on)
  - Another macro searches tie lines
- No need to save points – need to save tie lines only



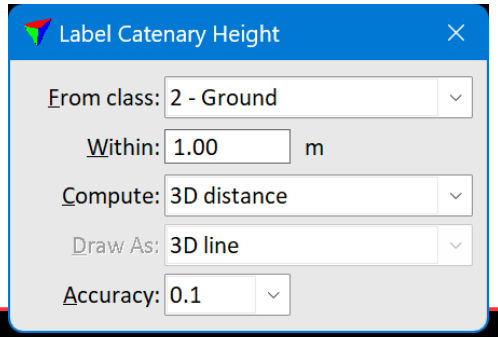
Raster Image Output Improvements

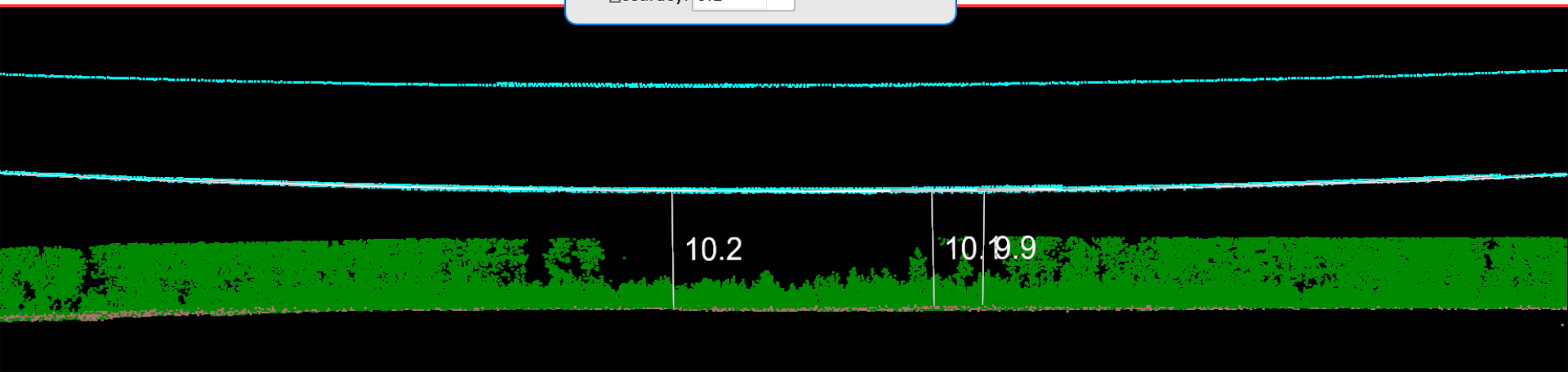
- **Output / Export raster image** menu command and **Tools / Export raster images** from project window can produce rasters with normal coloring
- **Output / Export raster image** menu command and **Tools / Export raster images** from project window can produce rasters with reflectance or amplitude based coloring



Label Catenary Height Improvements

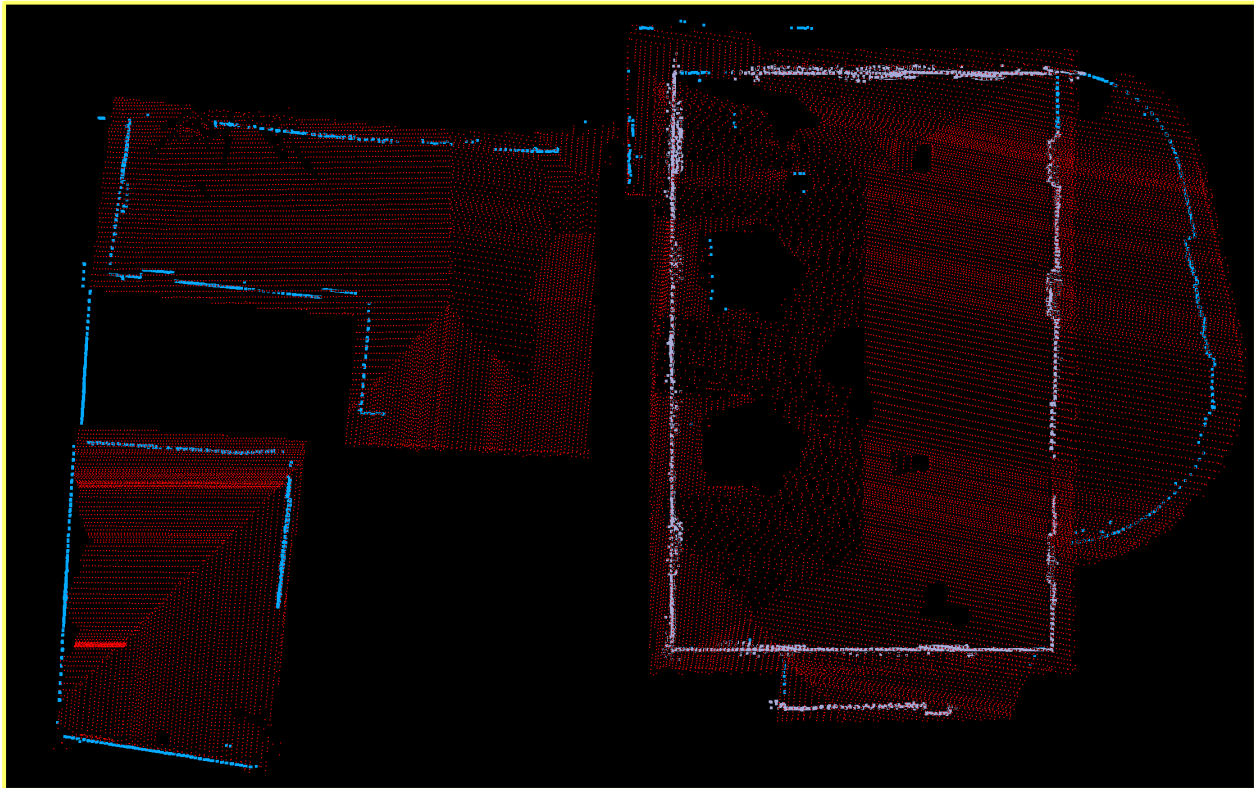
- Can label multiple wires if you select wires before you start the tool
- Option to control if reported distance should be 3D distance or vertical difference





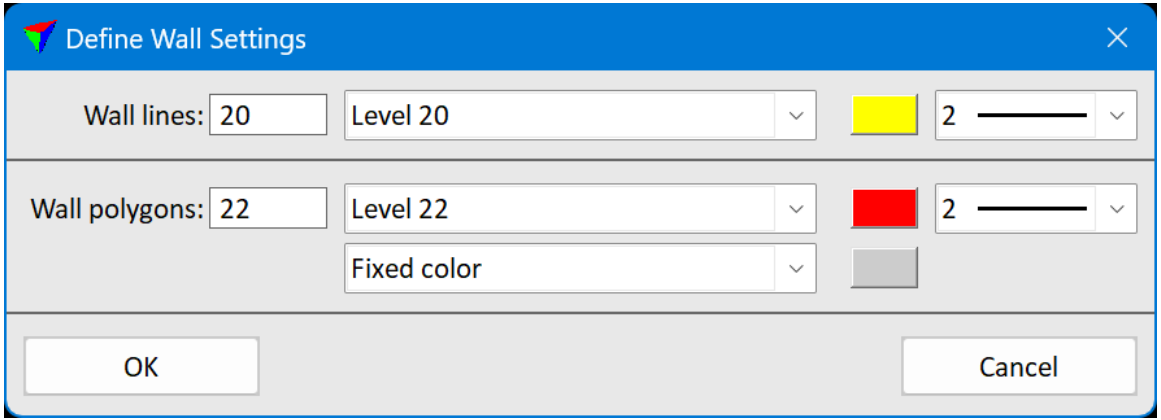
Tools for Vectorizing Walls

- New tools for creating building footprint polygons or polygons+lines for wall locations
- Source point cloud should have some hits walls:
  - UAV laser data
  - UAV photogrammetric
  - Airborne laser data
  - Mobile laser data

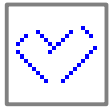


Define Wall Settings

- Define active settings for wall vectorization tools

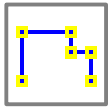


Vectorize Wall Lines



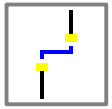
- Create line work from wall hits – whole data set or inside fence

Place Wall Line



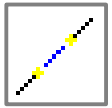
- Place wall line / line string manually

Place Wall Corner



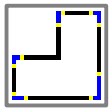
- Connect wall lines with perpendicular line segment

Connect Wall Lines



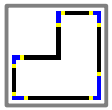
- Connect wall lines with a connecting line or by extending lines to intersection point

Build Wall Polygon



- Create closed polygon from lines
- You can select lines/line strings/polygons before you start the tool
- Or you can manually pick lines/line strings to connect into a polygon

Build Wall Polygon



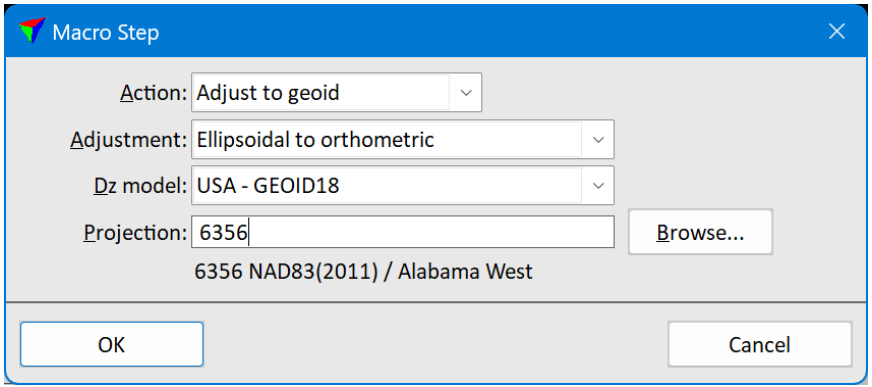
- Create closed polygon from lines
- You can select lines/line strings/polygons before you start the tool
- Or you can manually pick lines/line strings to connect into a polygon

Delete Wall Lines

- Deletes line work from given level
- Use this when you have built a polygon from line work

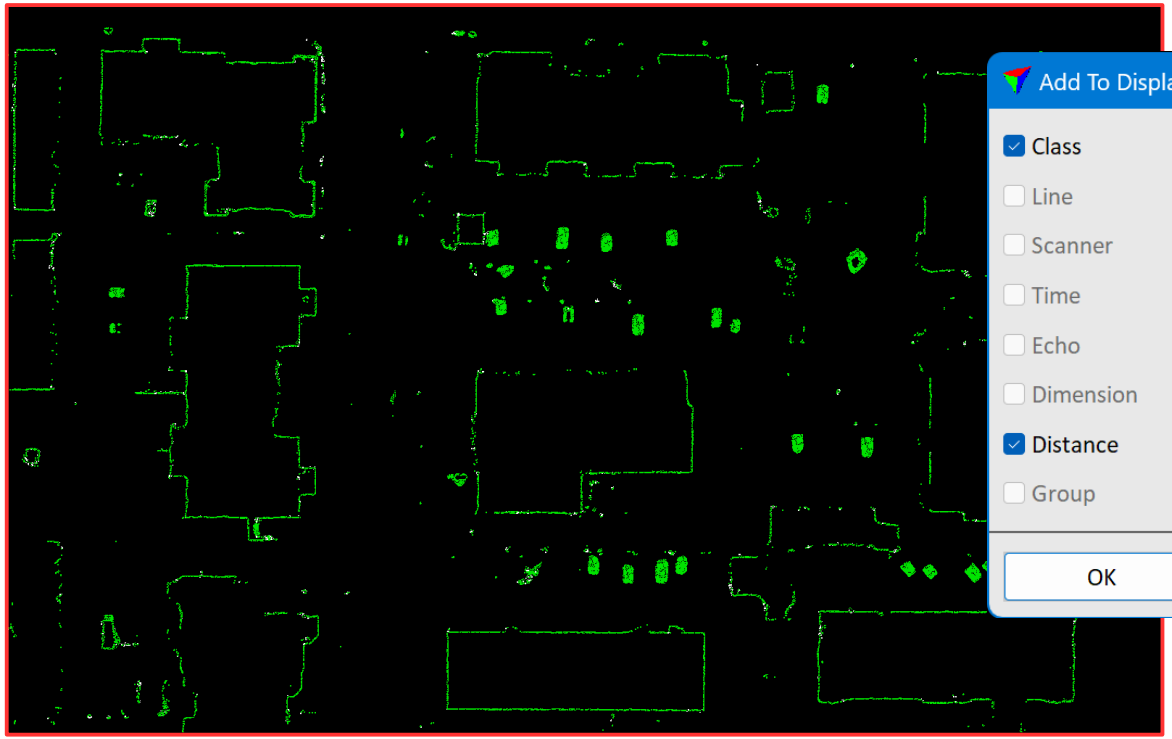
'Adjust to geoid' as Macro Step

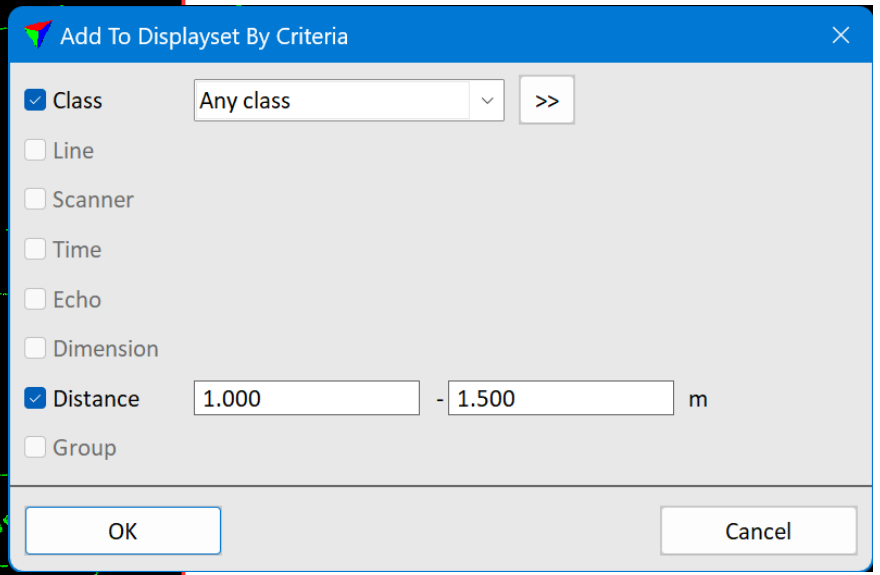
- You can run geoid correction as one of the steps in a macro
- Geoid model can be:
  - Text file (easting northing dz)
  - One of standard geoid models which come with software setup



Add to Displayset by Criteria

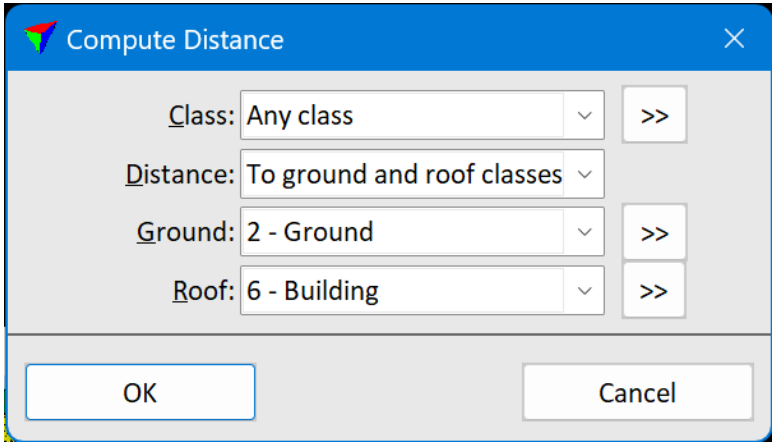
- Add points to displayset by selected criteria
- For example: add points in any class at height 1.000 – 1.500 m above ground



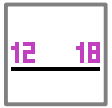


Compute Distance & To ground and roof

- Compute distance can compute height from ground or roof class
- Needed in data sets with roof top parking

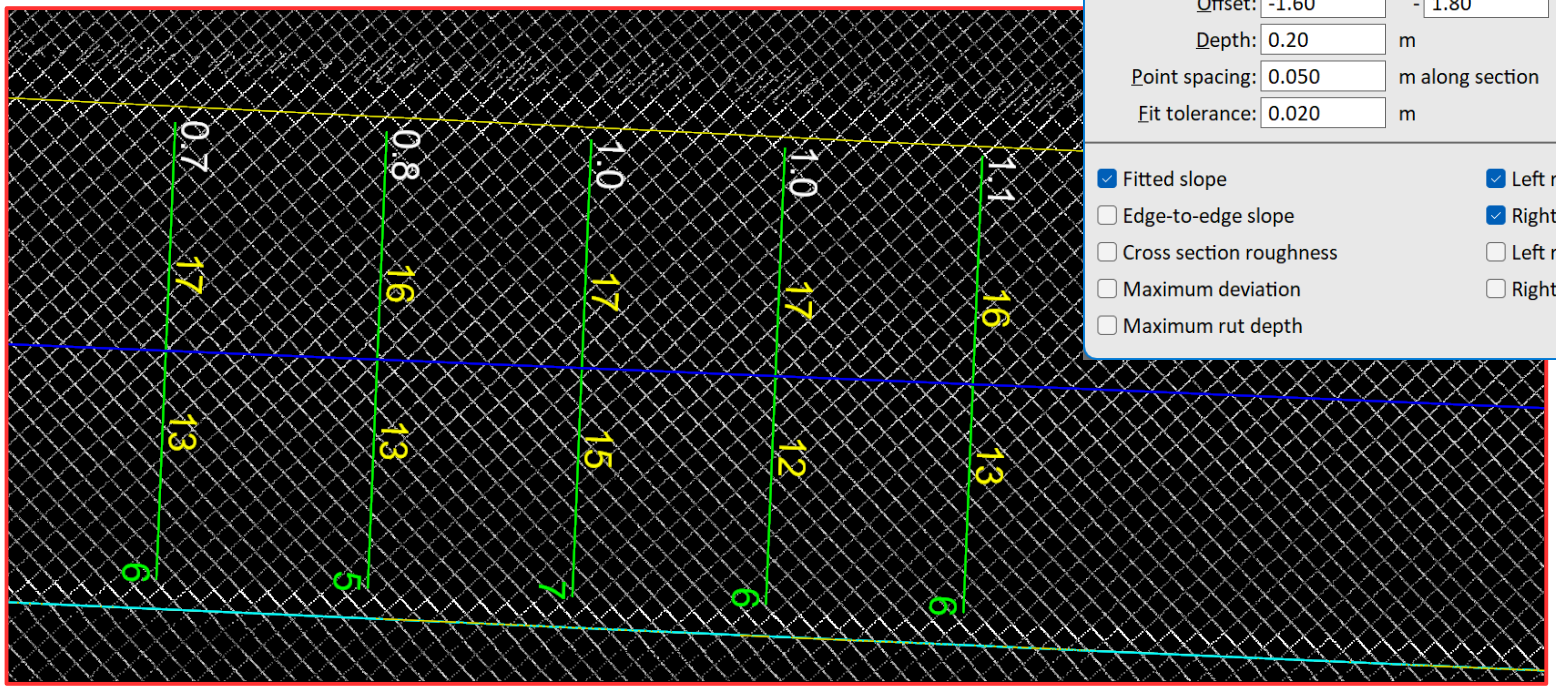


Label Section Parameters



Terra solid
POINT CLOUD INTELLIGENCE

- Tool for labeling one location at a time with road section parameters



Label Section Parameters

Class: Classes 2,23 >>

Offset: -1.60 - 1.80 m

Depth: 0.20 m

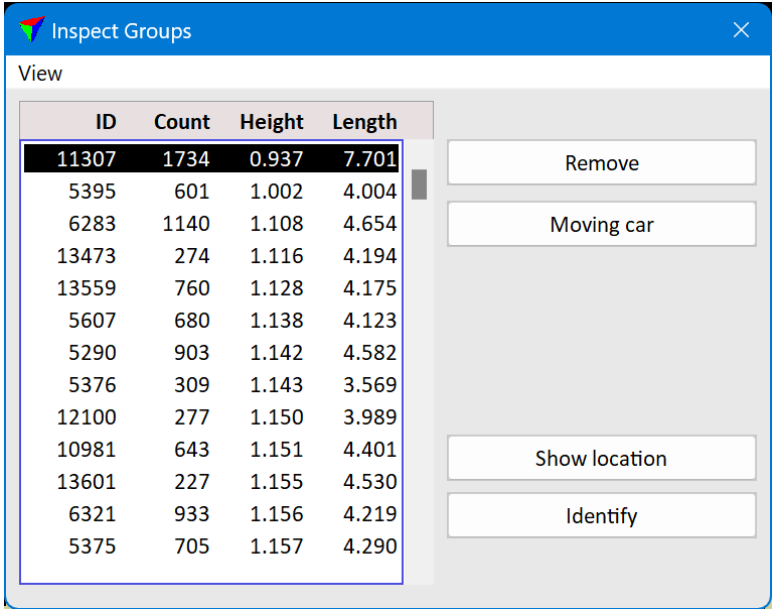
Point spacing: 0.050 m along section

Fit tolerance: 0.020 m

- [x] Fitted slope
- [ ] Edge-to-edge slope
- [ ] Cross section roughness
- [ ] Maximum deviation
- [ ] Maximum rut depth
- [x] Left rut depth
- [x] Right rut depth
- [ ] Left rut water depth
- [ ] Right rut water depth

Inspect Groups Improvements

- Can display class list, height, width, length, radius, minimum distance or maximum distance value of each group
- Can sort groups by parameters listed above

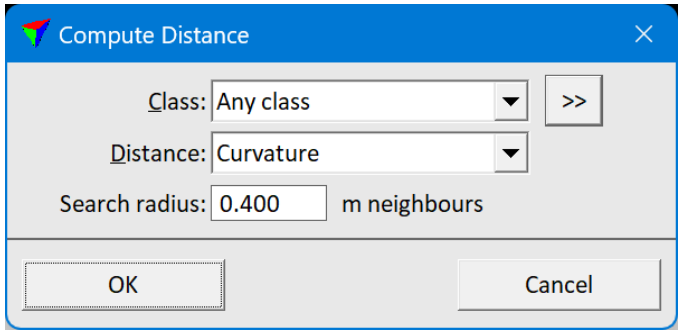


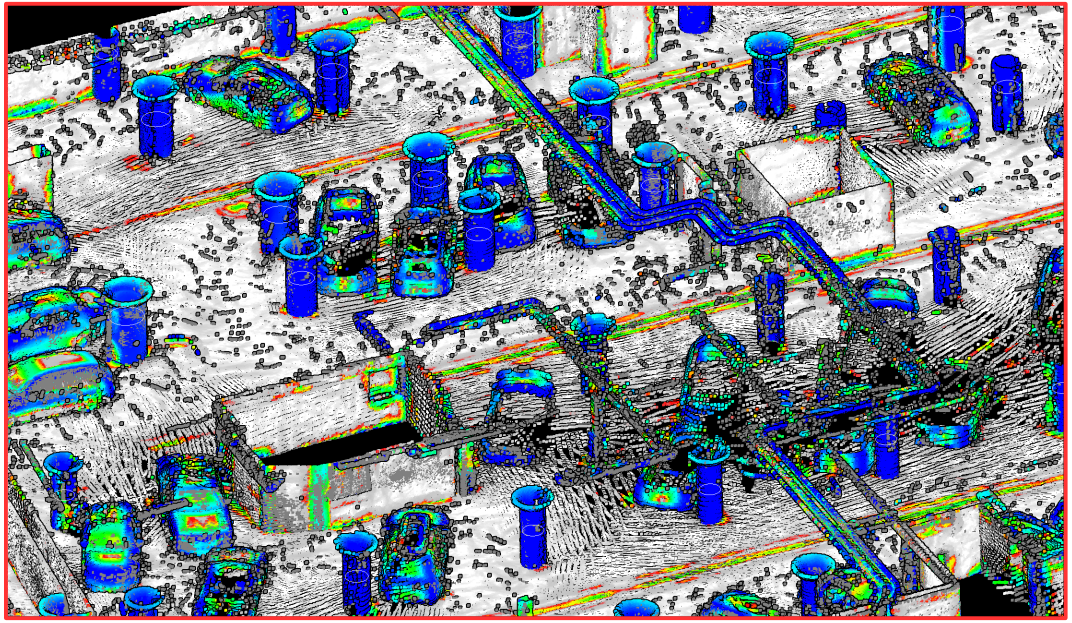
Color by 'Depth'

- Grey scale display mode which needs only xyz
- Automatically fits grey scale color scheme to depth range of points

Compute Distance & Curvature

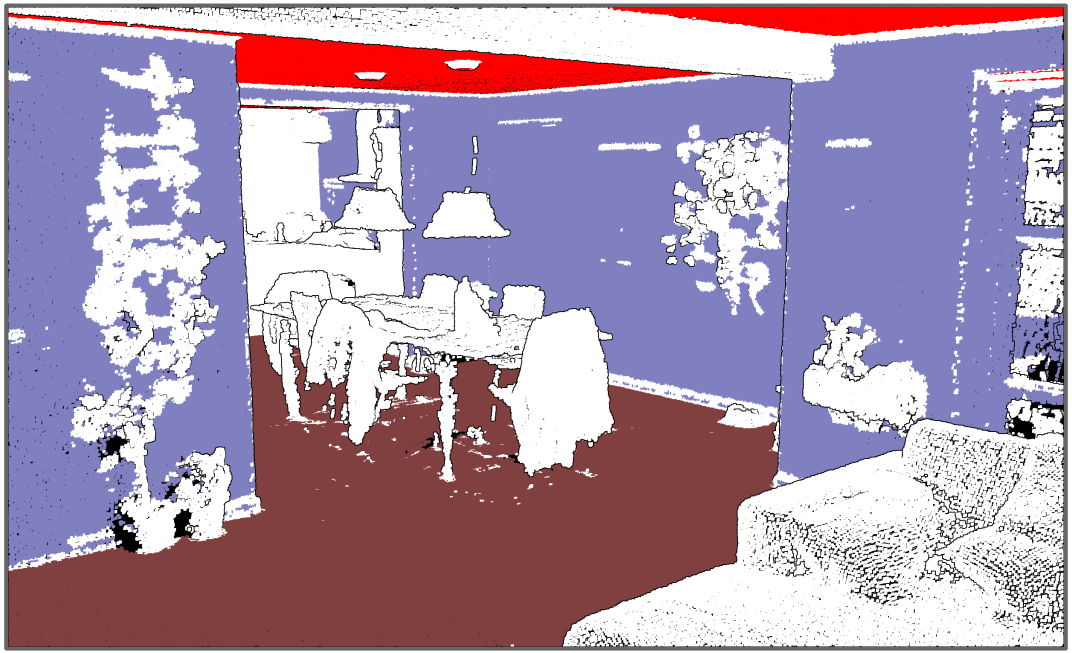
- **Compute Distance** has new option: **Curvature**
- **Compute normal vector** computes local planarity – hits on a large planar wall and hits on a pillar both get planar dimension
- **Curvature** option in **Compute Distance** lets user specify neighbourhood radius
- Hits on a pillar get small radius matching radius of the pillar
- Hits on large planar wall get big radius value

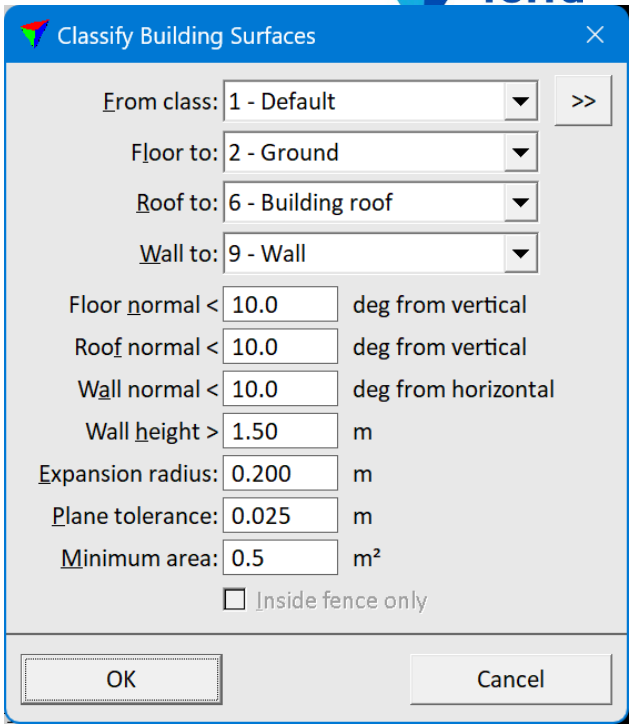




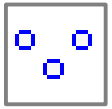
Classify / Building surfaces

- Classifies points into floor, roof and wall classes
- Requires normal vectors
  - Floor has normal vectors pointing up
  - Roof has normal vectors pointing down
  - Wall has horizontal normal vectors

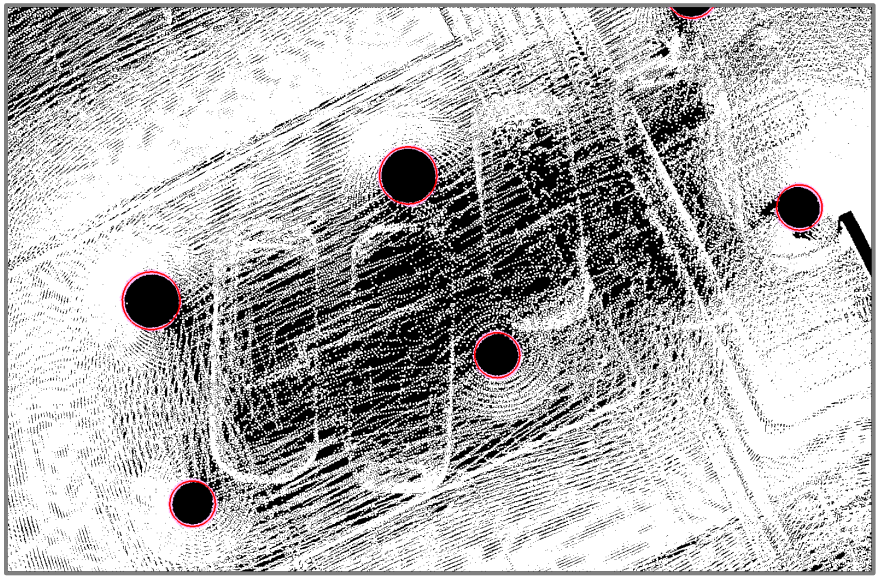


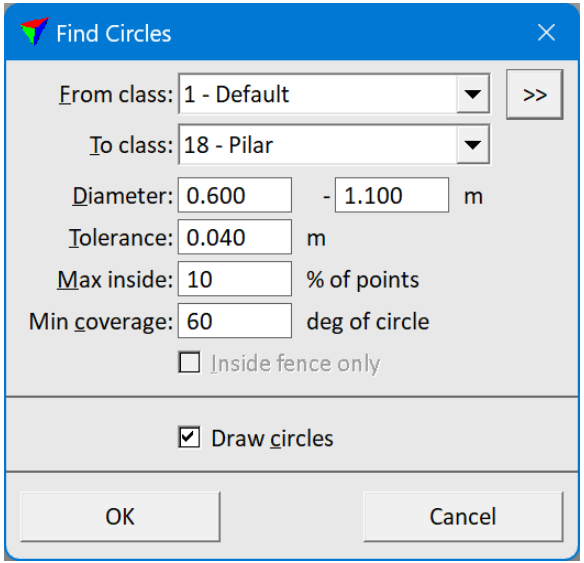


Find Circles

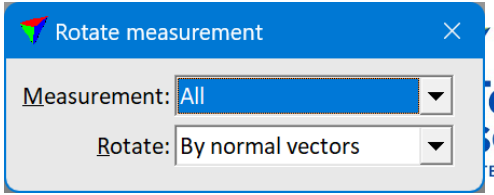


- Finds 2D circles from loaded points
- 2D circle has:
  - Several points within given tolerance distance from circle edge
  - Clearly fewer points inside circle than close to edge
- Tool classifies points and optionally draws circles

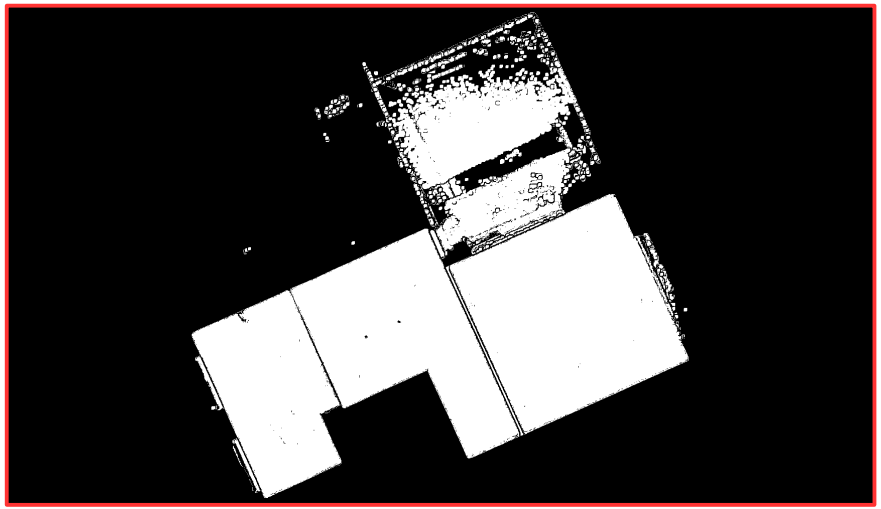


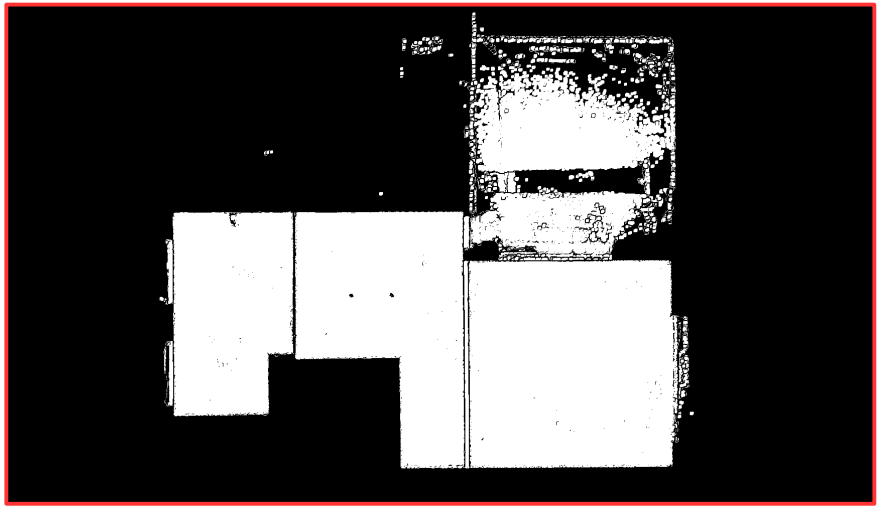


Line / Rotate Improvements



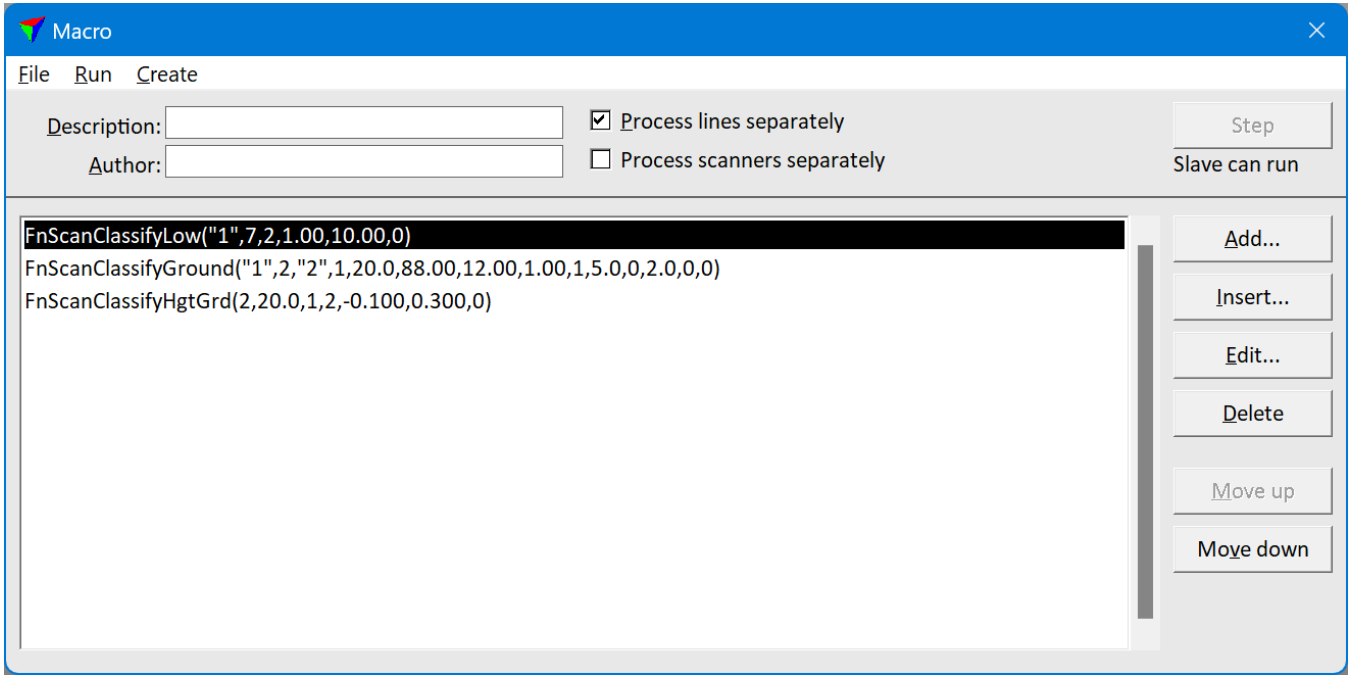
- Can rotate point cloud based on dominant normal vector direction
- Can rotate point cloud 90 degrees clockwise, 180 degrees or 90 degrees counter clockwise





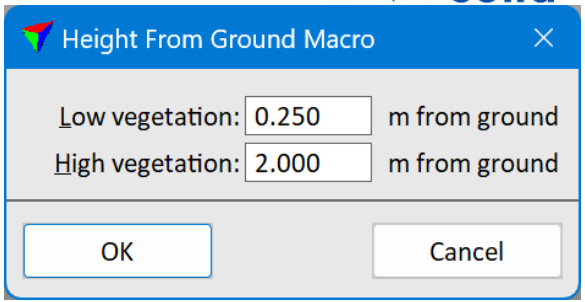
Create / Ground per line macro

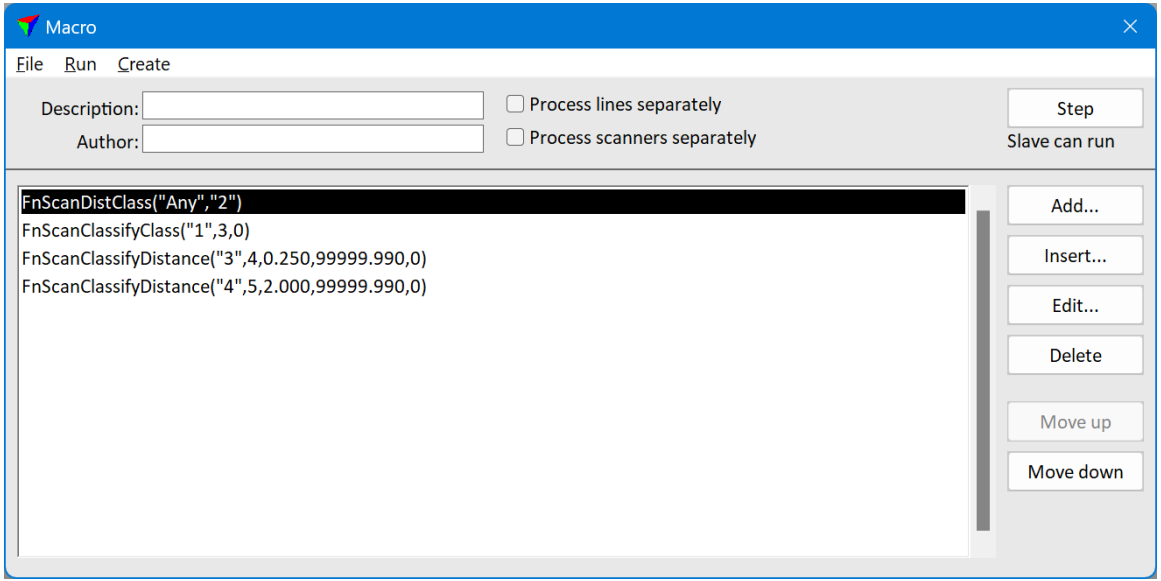
- Menu command in macro window
- Creates a macro for classifying ground per line
- Macro steps are identical to what **Match points** step does in **Process Drone Data**



Create / Height from ground macro

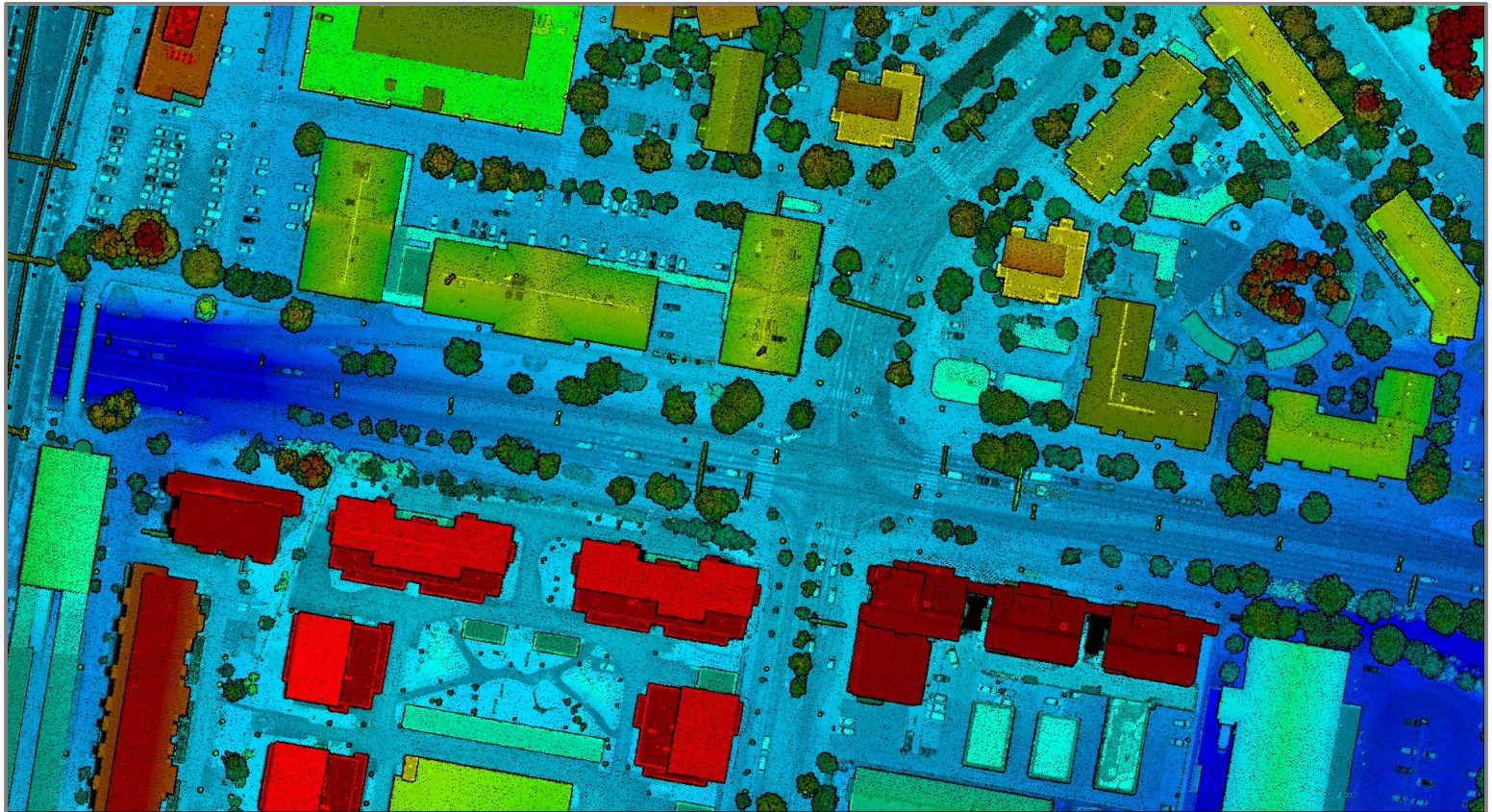
- Menu command in macro window
- Creates a macro for classifying low, medium and high vegetation





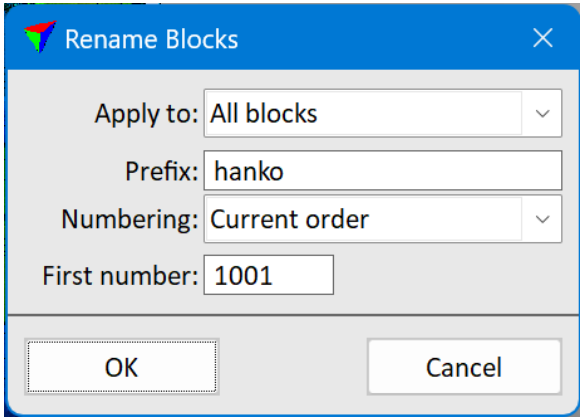
'Elevation+intensity' Coloring Mode

- Elevation gives color, intensity gives brightness

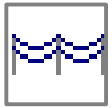


Rename blocks

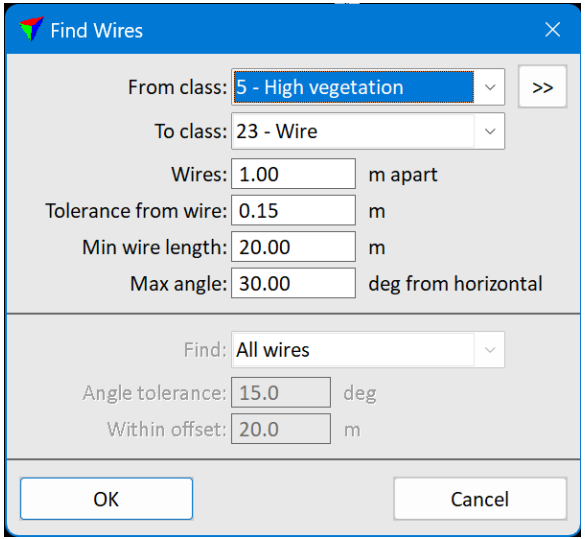
- Menu command in project window for renaming/renumbering blocks
- Renames information in project definition and renames file



Find Powerline Wires

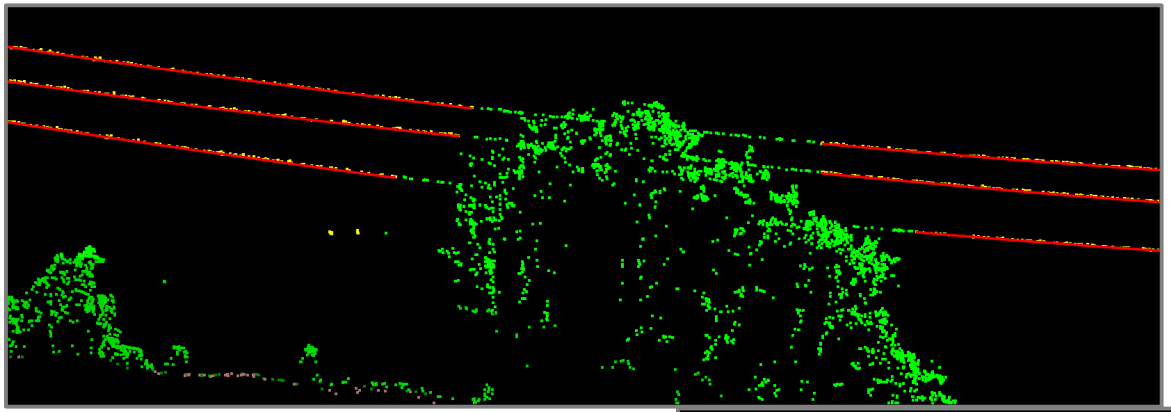


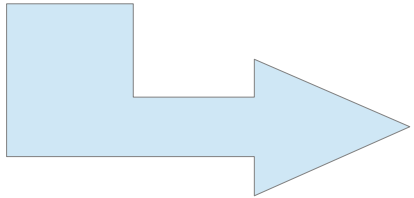
- Tool for finding powerline wires without tower string
- Only needs high vegetation classification done

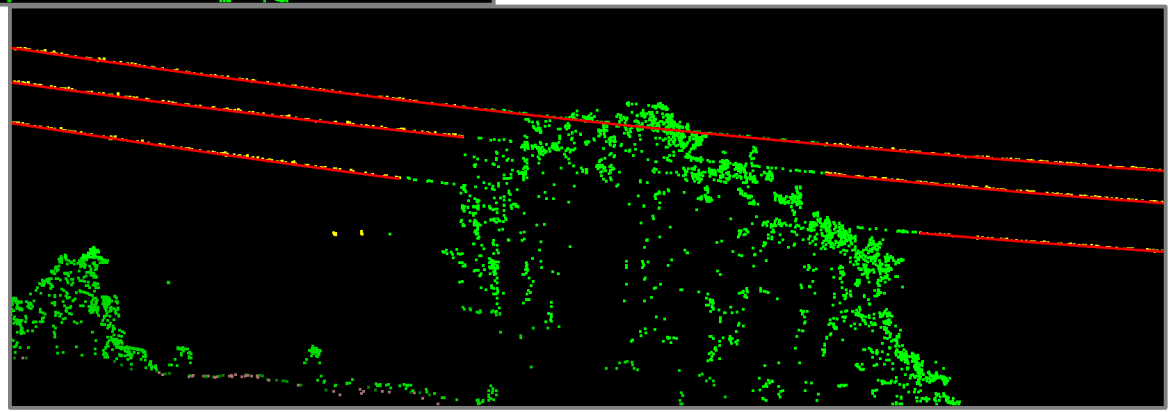


Merge Wires

- Tool for merging two wire fragments into one vector

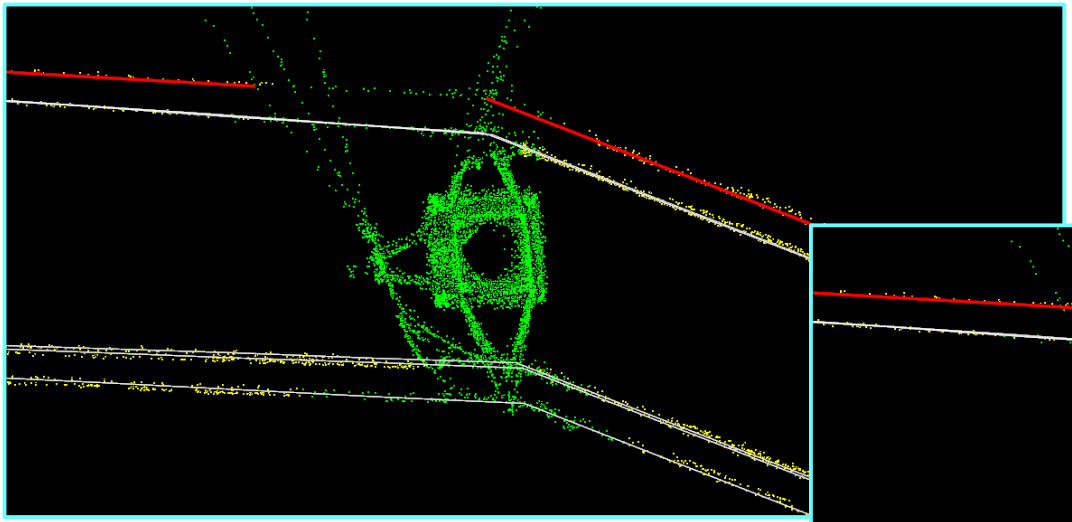


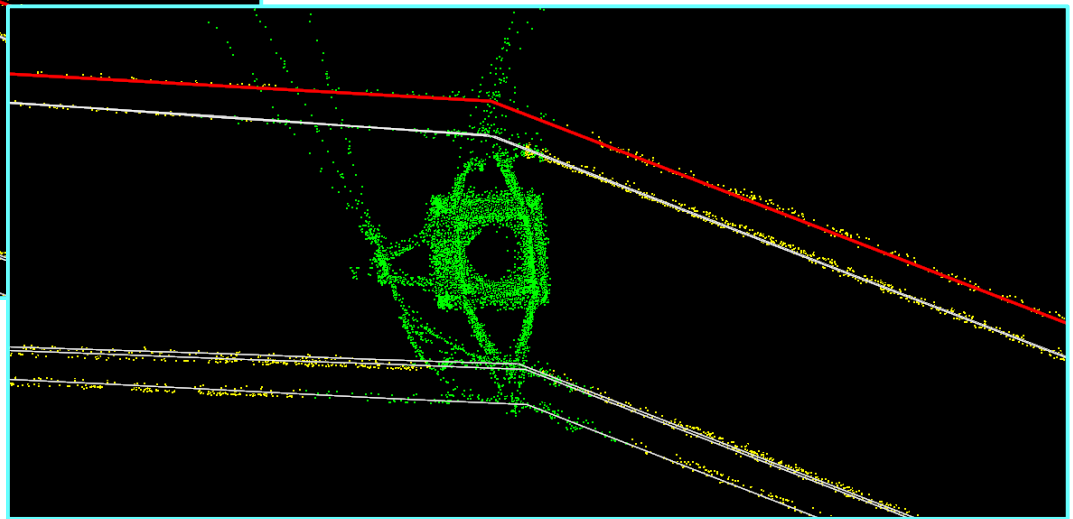




Connect Wires

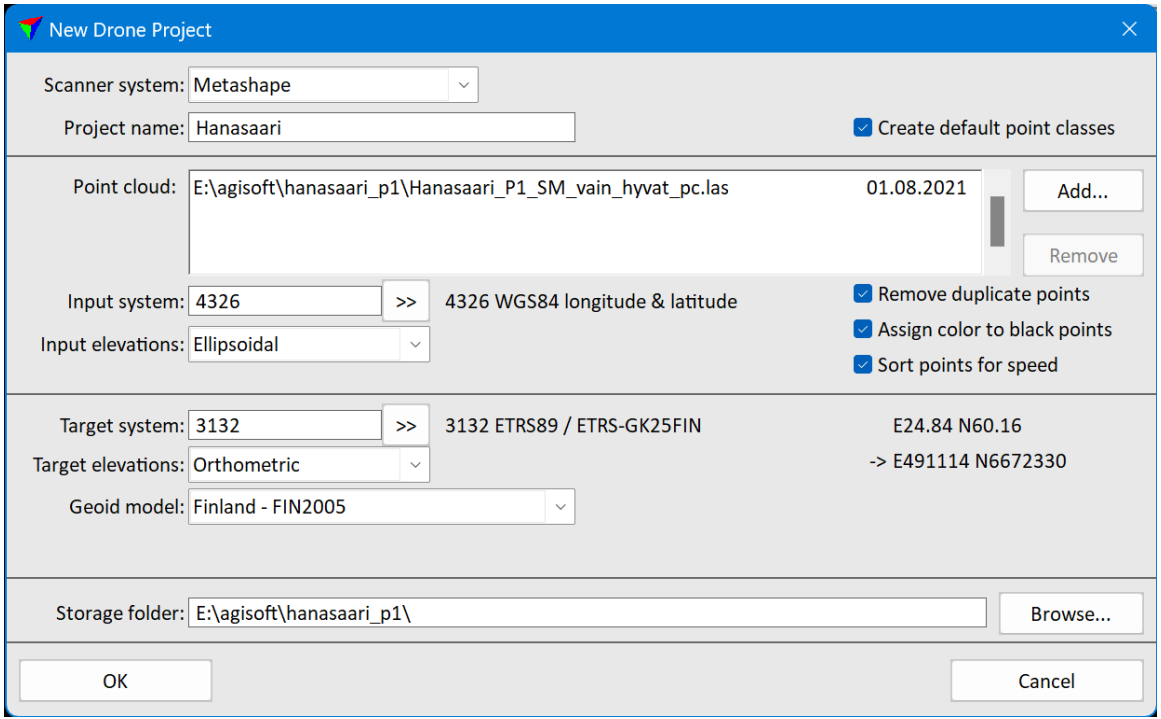
- Tool for connecting two wire vectors at meeting point
- Adjusts wire line equations so that match is perfect

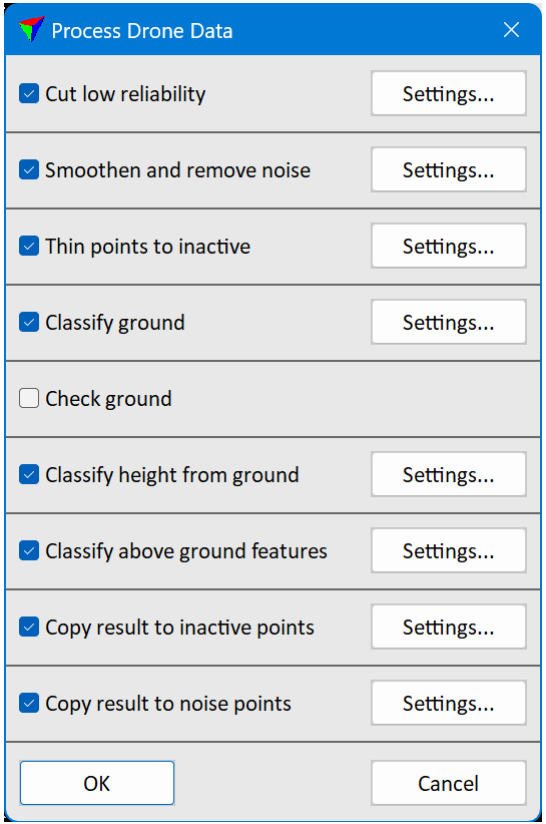




Pix4D and Metashape in Wizard

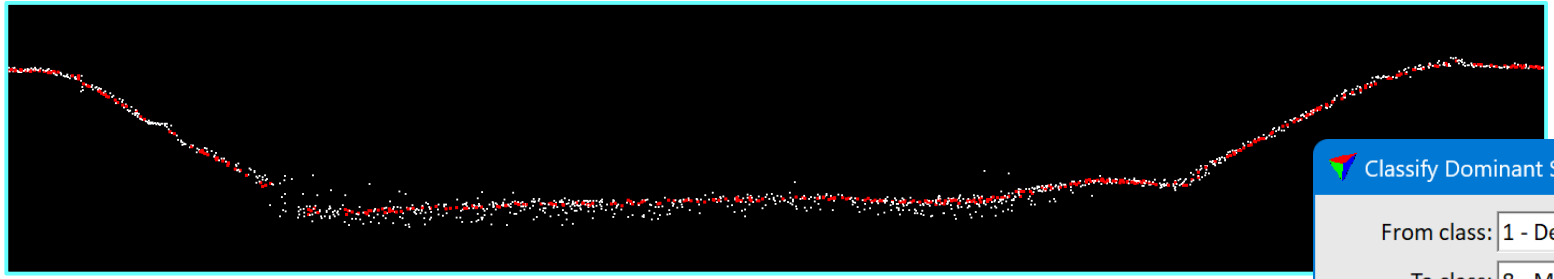
- Support for photogrammetric point clouds added to wizard

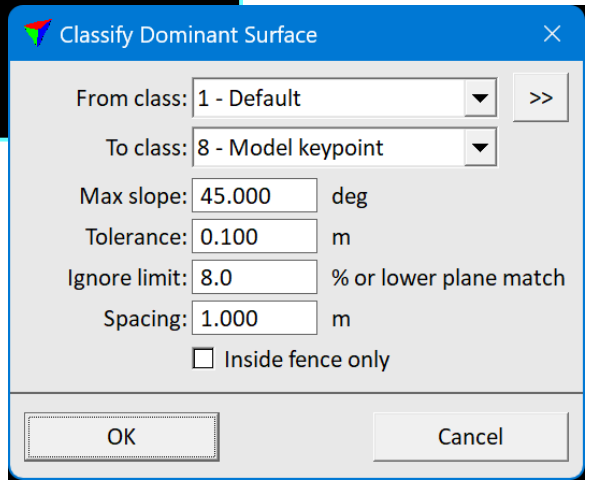




Classify / Dominant surface

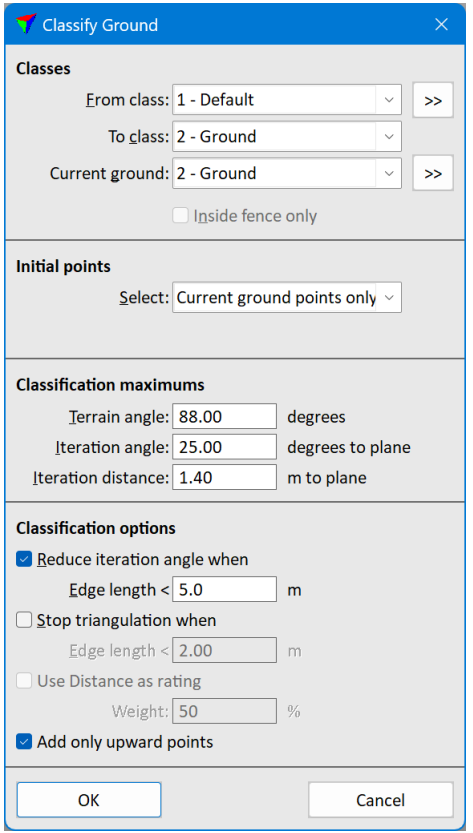
- New ground classification routine
- Classifies dominant surface or points which have the biggest number of neighbours matching some plane equation going thru that point
- Classifies median points of strongest surface in data which may have noise below and above the surface





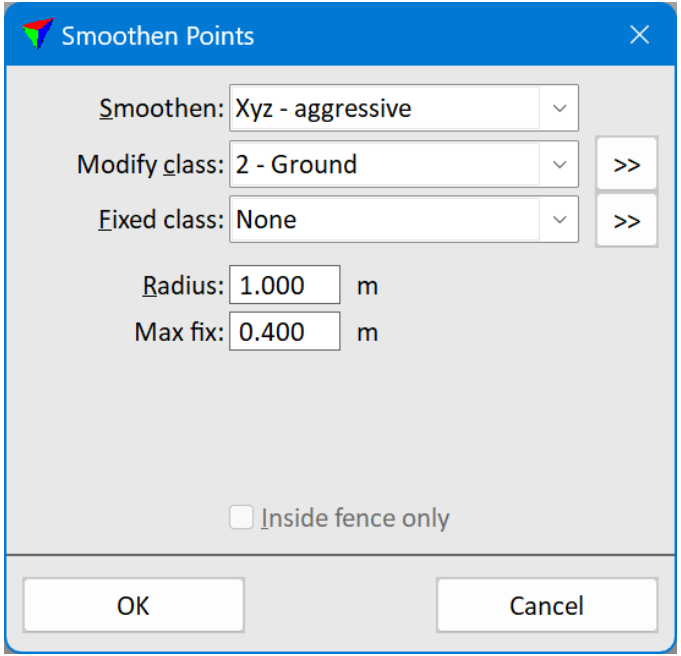
Add only upward points

- New setting in ground classification
- Useful when you want to add points to already classified ground only molding surface upwards



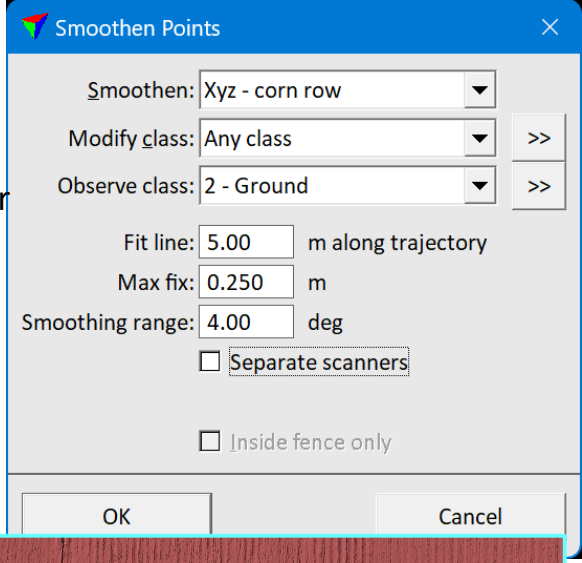
Smoothen Points / Xyz – Aggressive

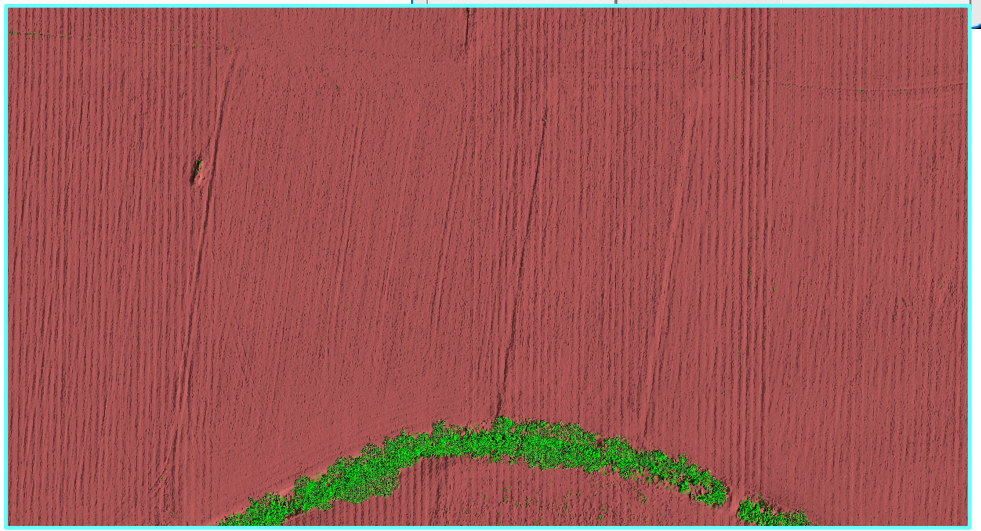
- New smoothing routine
- Can produce a really smooth surface removing bumps which have a high number of points
- Use only if:
  - Data has bumps which are not real
  - Or you are OK with losing terrain features

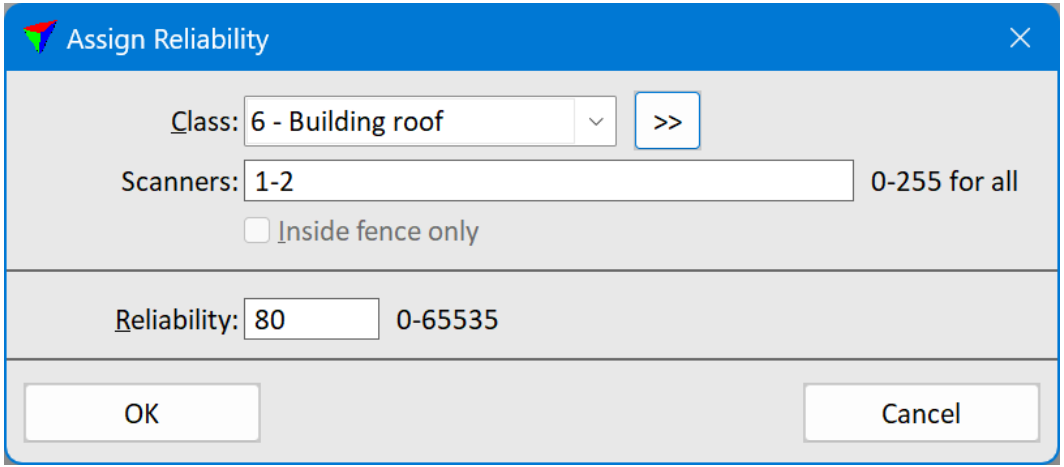


Smoothen Points / Xyz – Corn Row

- Smoothing written for data where consecutive scanlines do not match each other
- Computes a roll/mirror angle correction for points
- Observations built by fitting a line to a narrow cross section along trajectory
- Applies smoothing to correction values along scanline (given mirror angle range)
- Requires:
  - Trajectories
  - Mirror angle values
  - Ground classified per line





Assign / Reliability

- Menu command for assigning reliability values to points by class
- Makes it possible to modify what gets removed in **Cut low reliability**