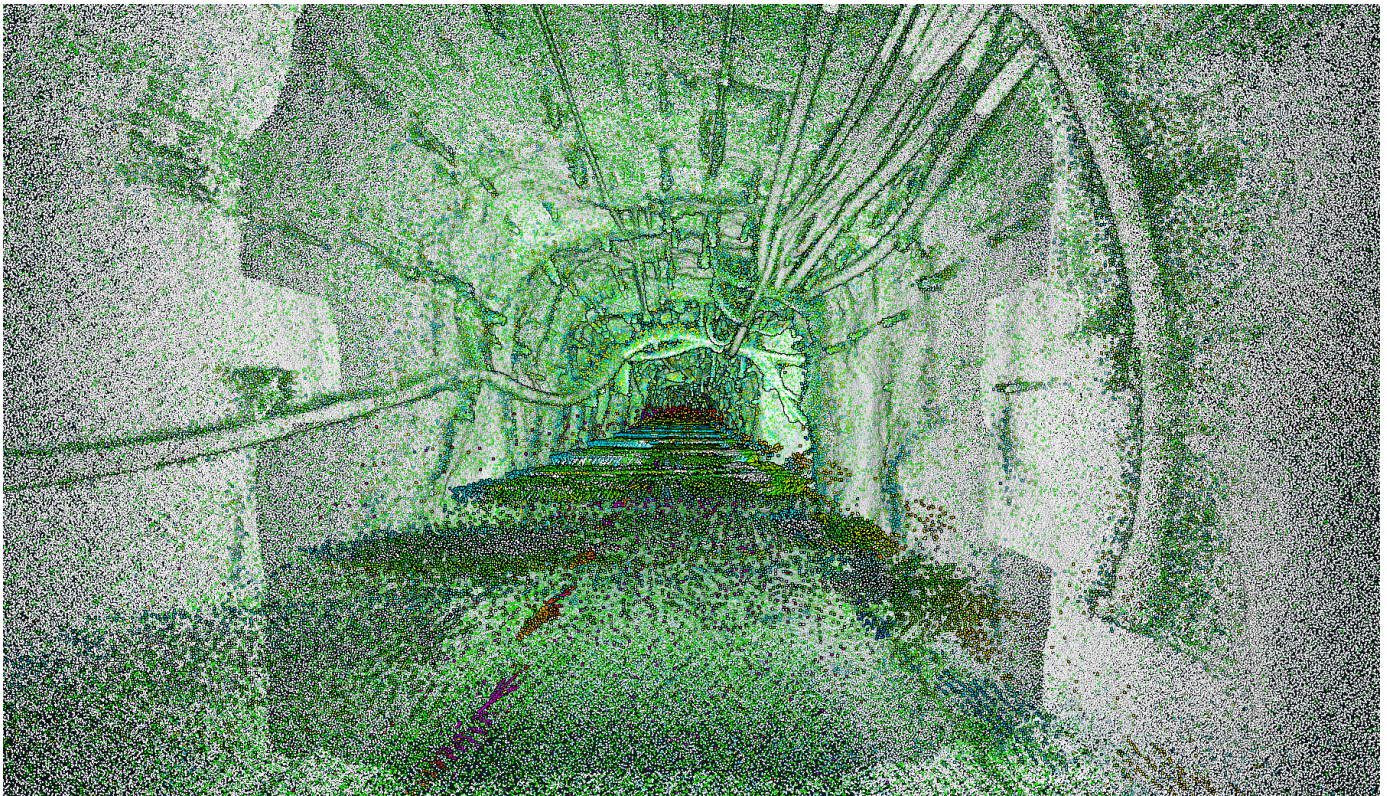


JOINT MAPPING. SEPARATE SURVEYS. MEANINGFUL COMPARISON.

Orbis Atlas

Change detection.

Merge. Optimise. Split. Detect change along the route.



West Fringe Drift · native Orbis view inside the mapped corridor. Only change_map.las is visible; colours belong to the change product.

Solve together

Address differential drift through one joint Atlas solution.

Keep both surveys

Export each recording separately in the same solved frame.

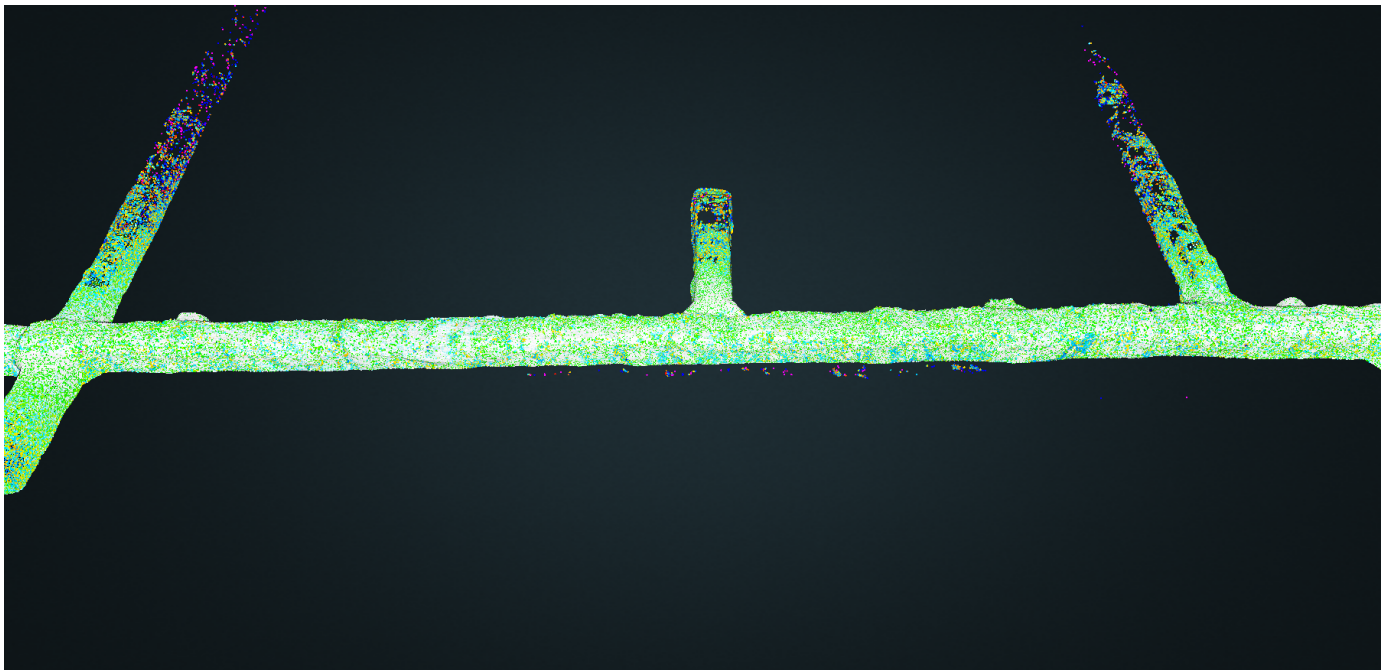
Compare continuously

Review long connected routes without control-based alignment.

01 / THE PRACTICAL BENEFIT

See what changed. Keep the route connected.

Atlas brings repeat captures into a common solution before the change map is calculated.



Oblique view along part of the West Fringe Drift change map. White, green and other colours are the native comparison display.

Reduce alignment work along the route

Separately mapped surveys can accumulate different distortions as the scanner travels. A single translation and rotation may align one location while leaving another offset. Atlas uses relationships between the recordings to solve their geometry together.

Work beyond individual comparison patches

A shared solution allows the change product to follow a connected drift, tunnel or corridor. The assessment does not have to be broken into short sections simply to repeatedly align independently drifting maps.

Reduce dependence on survey-control setup

Where the surveys contain sufficient common, stable geometry, that geometry supplies the relative constraints. A control network is not required just to bring the two captures into a common local frame.

Keep the original time distinction

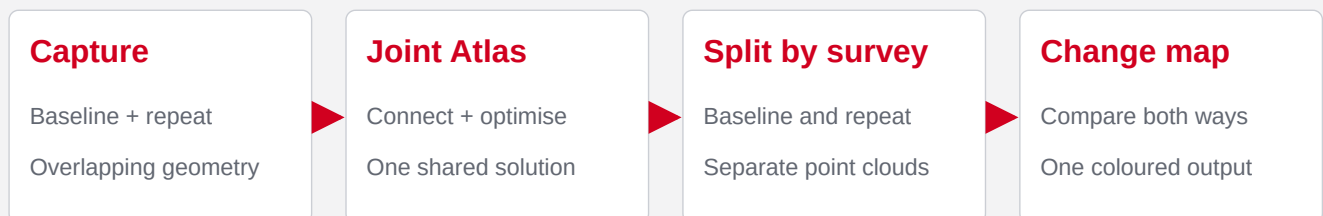
The jointly solved data is exported back into separate survey products. Change analysis can then compare the baseline and repeat populations without losing which recording each point came from.

02 / THE COMPLETE WORKFLOW

One shared solution. Two surveys to compare.

AtlasMerge supplies the common geometry; the downstream ChangeMap stage creates the coloured comparison.

Merge the solution. Preserve the surveys. Compare the result.



The split retains each recording's identity and the jointly solved coordinate frame.

Conceptual workflow. AtlasMerge registration and ChangeMap generation are separate processing stages.

Conceptual processing sequence, based on the reviewed GeoFuse, Fuse and native Atlas implementation.

Stage	What happens	Why it matters
Capture	Collect a baseline and repeat recording with useful overlap.	Shared, stable surfaces connect the observations.
Merge and optimise	Atlas connects the recordings and performs the joint map/trajectory solve.	The surveys are reconciled along the connected route.
Split	Export each recording's own points and trajectory from that solution.	Survey identity survives; coordinate consistency is retained.
Prepare and compare	Generate compatible analysis clouds from the Atlas exports and calculate ChangeMap.	The comparison uses the jointly aligned data.
Review and deliver	Open change_map.las, interpret the colours and retain supporting context.	The result can be examined as one coloured point-cloud product.

The recording process is named AtlasMerge. In this workflow its purpose is joint registration with separate outputs; it is distinct from producing only a single combined Atlas catalogue map.

03 / DIFFERENTIAL DRIFT

Correct the relationship between the surveys along the route.

The benefit comes from joint trajectory and map estimation, rather than a final rigid best-fit of two finished clouds.

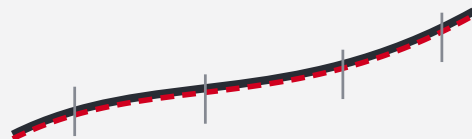
Why a single rigid alignment can leave a long route misregistered

Independent solutions



A local match does not remove changing drift.

Shared Atlas solution



Cross-survey constraints act along the route.

Illustration only: curves exaggerate the principle and are not measured error traces.

A shared solve reduces independent drift mismatch; residual alignment error must still be assessed.

Illustrative comparison of independently accumulated drift and a joint solution. This is not a measured before/after error plot from the example.

How drift becomes apparent change

If one scan bends or stretches differently from another, an unchanged wall can appear separated. The offset may vary with position, so aligning the start or a short overlap does not necessarily align the remainder.

Nearest-neighbour change analysis would colour that geometric mismatch just as it colours a real difference. Registration quality therefore matters before a difference is interpreted.

What Atlas changes

Common places and overlapping geometry connect the recordings. Their pose and map constraints are solved jointly before each recording is exported. This addresses independently accumulated drift within the connected solution.

The result is a shared spatial basis for comparison along the route. It does not make the two point sets identical: observations, coverage, noise and physical changes remain separate.

“No independent drift between the maps” describes the intended shared-solution benefit. It is not a guarantee of mathematically zero residual error or equal accuracy everywhere.

04 / INSIDE ATLAS MERGE

Connect the observations. Optimise the common geometry.

The reviewed pipeline works from recording data and trajectories, preserving the recording identities throughout.

Step	Role in the joint solve
Per-recording odometry	Build or reuse valid odometry for each input, retaining its sensor data and calibration context.
Cross-recording connection	Find common places and form relationships between the recording agents. The current native configuration requires the agents to connect.
Atlas optimisation	Use the shared constraint network to reconcile the trajectories and map geometry.
Global optimisation	Refine the connected solution before the export stage.
Coordinate handling	Use a shared local frame when GPS is unavailable, or the supported shared georeferencing path when GPS evidence is available.
Separate export	Write each recording's point cloud and trajectory from the same completed solution.

Common structure is the reference

Stable walls, roof geometry, intersections and other repeatable features are useful because they provide relationships between captures. Overlap distributed along the route supports the long-route comparison.

Retain compatible source data

Raw recording bags, calibration and sensor configuration are part of the input context. Two arbitrary exported LAS files are not equivalent to the complete recording inputs used by this automated AtlasMerge process.

Handle GPS availability deliberately

The current implementation chooses its connection and coordinate strategy according to available GPS evidence. With no usable GPS, the pair can be solved in a shared local Atlas frame.

Review connection quality

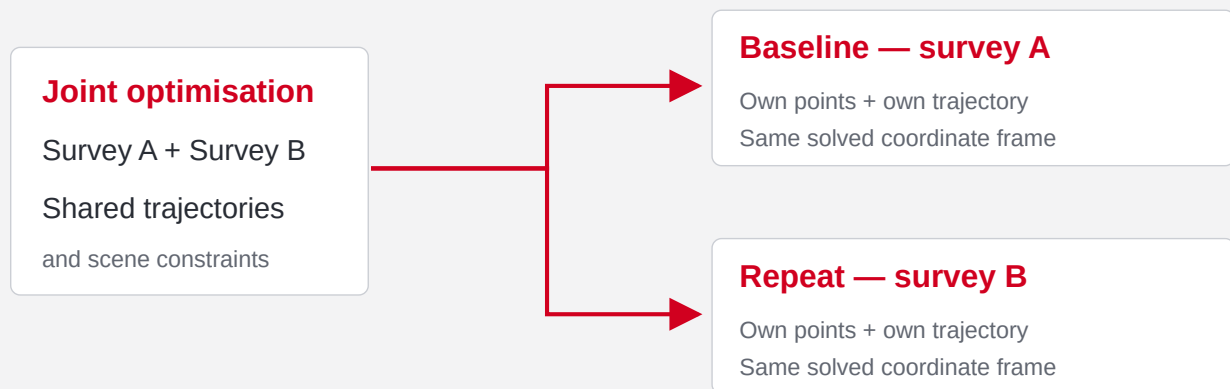
Repeated tunnel shapes, insufficient overlap or large scene changes can make the correspondence problem difficult. A connected result should still be checked against stable features along the route.

05 / THE SPLIT IS ESSENTIAL

One optimisation. Separate evidence for each survey.

Splitting is based on recording identity, not on cutting a combined cloud into arbitrary spatial pieces.

Keep shared geometry while separating recording membership



"Split" means export by recording identity. It does not independently re-register or re-solve each survey.

The baseline and repeat retain their own point populations and trajectories while sharing the solved frame.

Keep the comparison meaningful

A combined cloud alone no longer provides a clean baseline-versus-repeat distinction. Atlas therefore exports the two survey populations separately after the common solution is complete.

The operation writes a point-cloud product and trajectory for each recording. Both inherit the joint solution; the split does not launch an independent optimisation for either survey.

Carry the alignment into later processing

The analysis cloud must be derived from the corresponding Atlas cloud and trajectory pair. Otherwise, a downstream comparison could accidentally return to an independently processed source.

The reviewed Vectra preparation gives a complete global_atlas cloud/trajectory pair priority. The resulting compatible analysis products feed the ChangeMap calculation.

Pair identity matters: retain the baseline, repeat recording and completed Atlas outputs together. A visually aligned screenshot is not proof that a later processing job selected those same inputs.

06 / WITHOUT SURVEY CONTROL

Use the scene for relative alignment. Choose external referencing separately.

Survey control is not required to establish the shared local frame used by this example.

Relative change detection and absolute position answer different questions

Shared local frame

- Use overlapping scene geometry
- Align baseline and repeat together
- Compare without survey control

External project frame

- Tie the result to a site grid or datum
- Use appropriate reference evidence
- Validate absolute position separately

The West Fringe Drift exports explicitly record `shared_local_atlas`.

Control-free relative comparison does not assign a certified absolute position or elevation datum.

Relative alignment and absolute referencing are different deliverable requirements.

The control-free benefit

For relative change detection, the two surveys need a consistent relationship to one another. Joint Atlas processing can establish that relationship from common scene geometry, avoiding a separate control-based alignment step.

This is especially useful where installing, maintaining or revisiting control throughout a long underground route would be difficult.

When external referencing still matters

A mine grid, engineering datum or independently certified position requires the appropriate reference evidence. A shared local frame alone does not establish those properties.

If an external transformation is required, apply a consistent transformation to both survey products and retain the provenance. Independently adjusting the two outputs can undermine the shared solution.

07 / IN ORBIS

Select the repeat recording. Run the comparison workflow.

The recording's baseline association determines which earlier survey the automated registration uses.

Action	What to check
1 · Set the baseline	Confirm the baseline recording associated with the recording's muster point. It must identify the intended comparison survey.
2 · Run AtlasMerge	Queue AtlasMerge for the repeat recording, or use the configured workflow that includes it. Monitor Pipeline for completion.
3 · Check the split outputs	Confirm both recordings have the matching completed Atlas cloud and trajectory products.
4 · Prepare the analysis pair	Regenerate the required Vectra products from those Atlas outputs. Confirm source selection and any filtering used.
5 · Generate ChangeMap	Run ChangeMap against the intended baseline. Subsequent LAS/viewer conversion makes the coloured product available for inspection.
6 · Inspect the result	Open the repeat recording and enable change_map.las. Disable the other point clouds so they cannot obscure its colours.
7 · Retain the context	Keep the recording pair, source products, processing history, coordinate frame and interpretation with the delivered map.

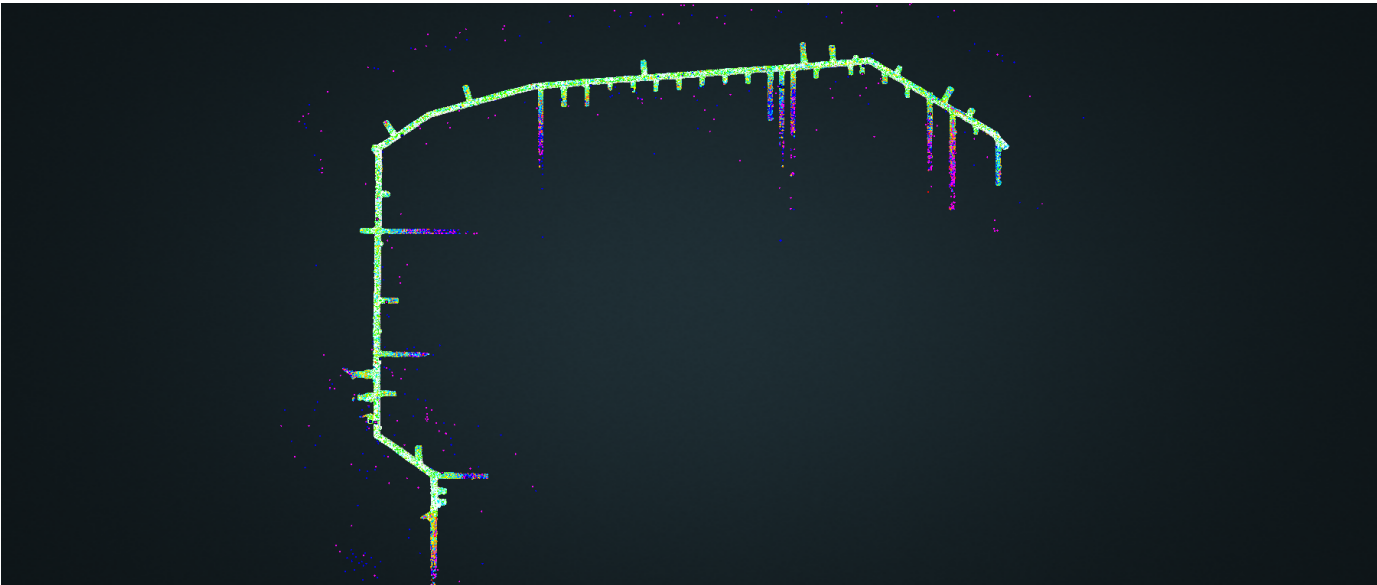
A configured workflow can chain processing stages. AtlasMerge by itself is the joint-registration stage; it should not be described as automatically performing every later ChangeMap and viewer-conversion step.

For this brochure the existing completed result was inspected read-only. No merge, map regeneration, baseline change or production overwrite was submitted.

08 / WEST FRINGE DRIFT EXAMPLE

A connected underground route. A single change-map layer.

The requested Orbis example shows the comparison as one navigable coloured point cloud.



Plan view of the change-map network. Only change_map.las is enabled; no separate baseline, repeat, trajectory or terrain layer is overlaid.

Case detail	Published evidence
Repeat recording	2026_05_06_03_05_27Z_2850_West_Fringe_Drift
Baseline partner	2026_05_06_02_26_33Z_2850_West_Fringe_Drift
Coordinate reference	Both Atlas manifests report shared_local_atlas .
Separate Atlas outputs	451,449,018 repeat points; 511,263,621 baseline points.
Displayed change product	932,541,062 points in change_map.las and its converted viewer metadata.
Sampled scanner route	Approximately 1.37 km , calculated from the repeat Atlas trajectory sampled at every 100th pose.

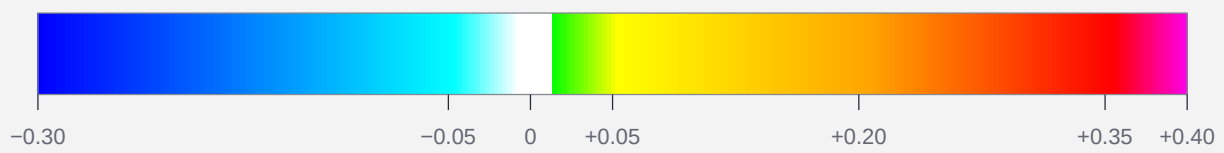
The two Atlas manifests identify one another as partners and name the same registration work directory. The displayed change product is a downstream derivative; its point count is not simply the sum of the two raw Atlas exports.

09 / READ THE NATIVE COLOURS

Understand the separation. Keep the survey identity in mind.

The sign of the colour coordinate identifies which survey a point belongs to.

Native change-map colour scale



Baseline population

Blue / cyan: larger separation

Metres. Near-zero distances are white (approximately -10.3 mm to $+9.5$ mm).

The display saturates at -0.30 m and $+0.40$ m. Colour-band width is not survey accuracy.

Repeat population

Green $\rightarrow$ yellow $\rightarrow$ red $\rightarrow$ magenta

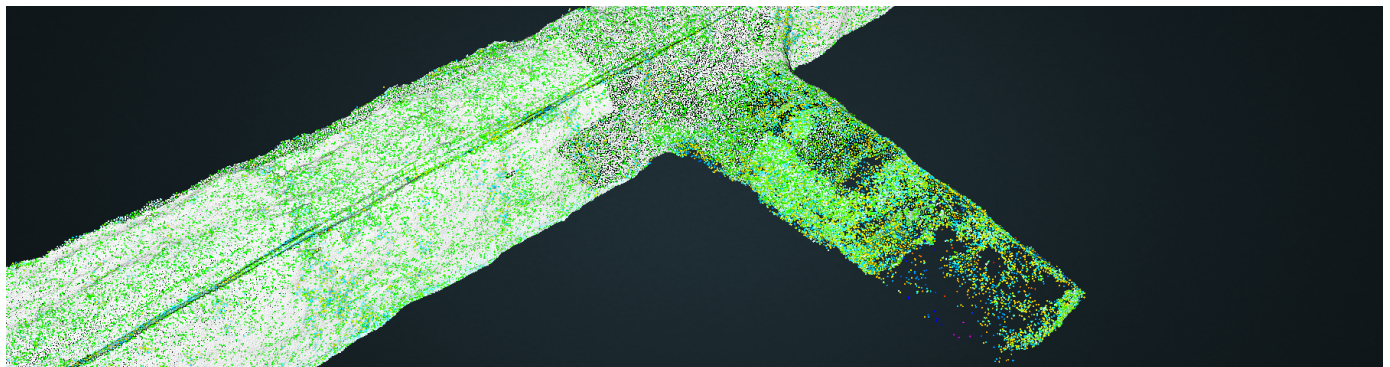
Scale reconstructed from the reviewed engine colour definition. Native point colours are preserved in every screenshot.

Baseline: negative colour coordinate

Baseline points are coloured by their distance to the nearest repeat-map point, using the negative side of the scale. Greater separation moves toward cyan and blue, saturating at -0.30 m.

Repeat: positive colour coordinate

Repeat points are coloured by their distance to the nearest baseline point, using the positive side. Beyond near-white, the scale moves through green, yellow, orange and red to magenta at $+0.40$ m.



Close-up of the same change_map.las layer. Interpret coloured regions in their geometric and coverage context.

White is the near-zero colour band, not an accuracy certificate. Blue does not automatically prove removal, and warm colours do not automatically prove added material.

10 / HOW CHANGEMAP WORKS

Compare both directions. Display both point populations.

The reviewed change engine measures nearest-neighbour separation in the common coordinate frame.

Compare both survey populations



Repeat points → nearest baseline point: positive colour coordinate.

Baseline points → nearest repeat point: negative colour coordinate.

Schematic. Sign identifies the survey population; it is not a signed surface-normal displacement.

The two passes preserve evidence from both surveys. Arrows illustrate nearest-neighbour comparison, not motion vectors.

Forward comparison

For each usable repeat point, the engine finds the nearest baseline point and calculates the Euclidean distance. That distance selects the positive-side colour. Coincident points can legitimately produce zero separation.

Reverse comparison

The engine also compares baseline points against the repeat population. Their distances drive the negative-side colours, retaining baseline-only or poorly matched geometry in the output.

One combined change product

The coloured repeat points and readable baseline points are written into the change cloud. A single visible layer can therefore show evidence from both acquisitions.

What the number represents

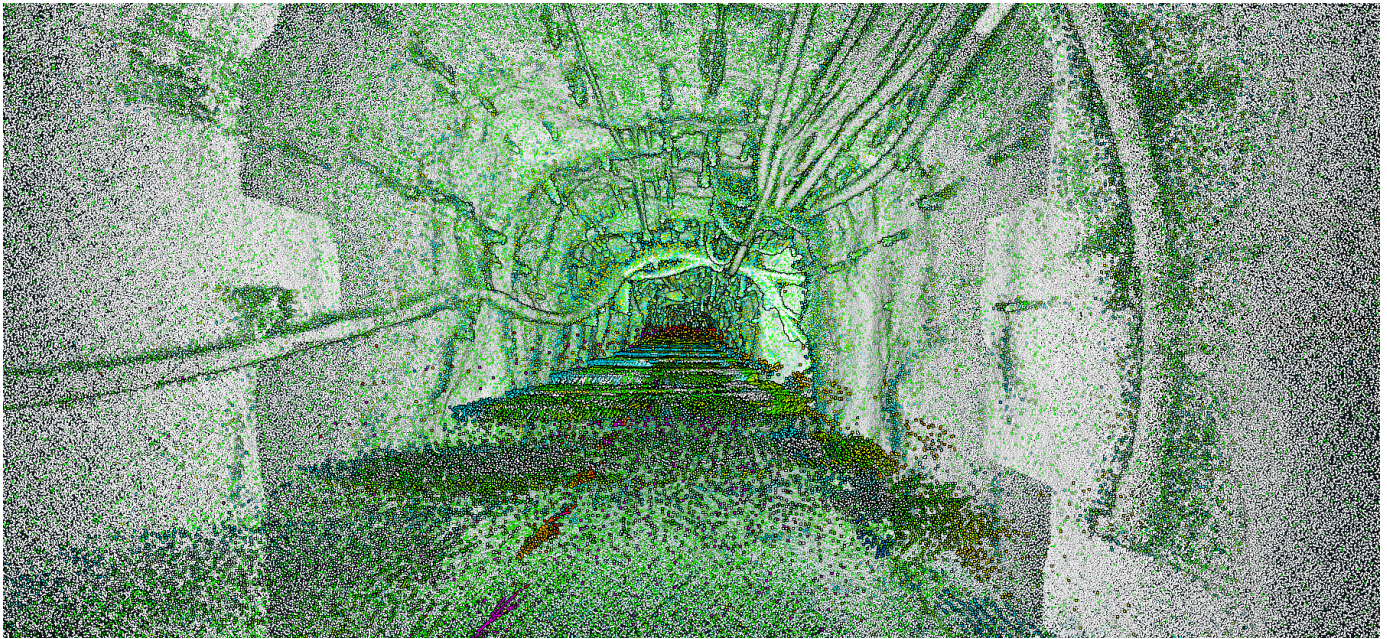
Nearest-point distance depends on geometry, sampling density, coverage and alignment. It is not automatically displacement perpendicular to a wall, a volumetric difference or a statistically significant movement.

The reviewed current-map input requires the supported Vectra/ray layout; malformed or all-zero ray data is rejected. The resulting LAS is a presentation/export derivative of the change product.

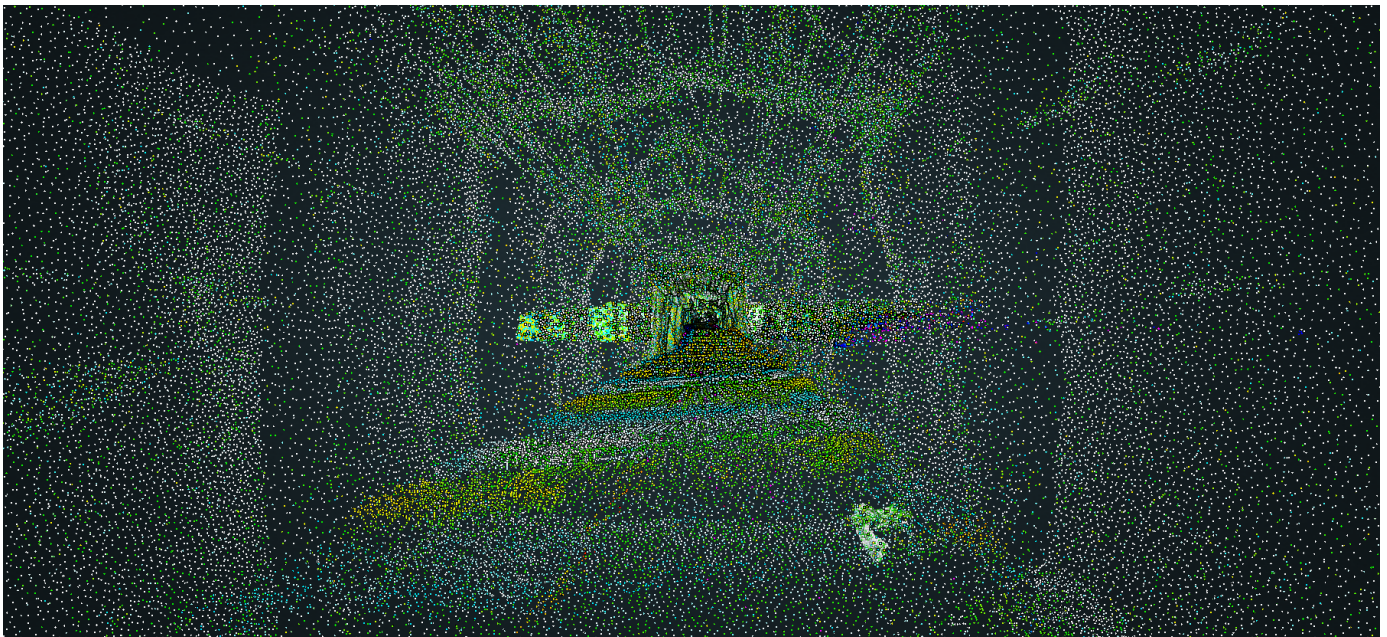
11 / INSIDE THE DRIFT

Inspect the comparison from the scanner's perspective.

Walking-level views help relate the colours to the roof, walls, floor and objects in the passage.



Interior view along the lower part of the mapped route. Only the change-map cloud is shown.



A second interior viewpoint along the route. White and green regions show the native colour response; they do not by themselves establish stability or a movement threshold.

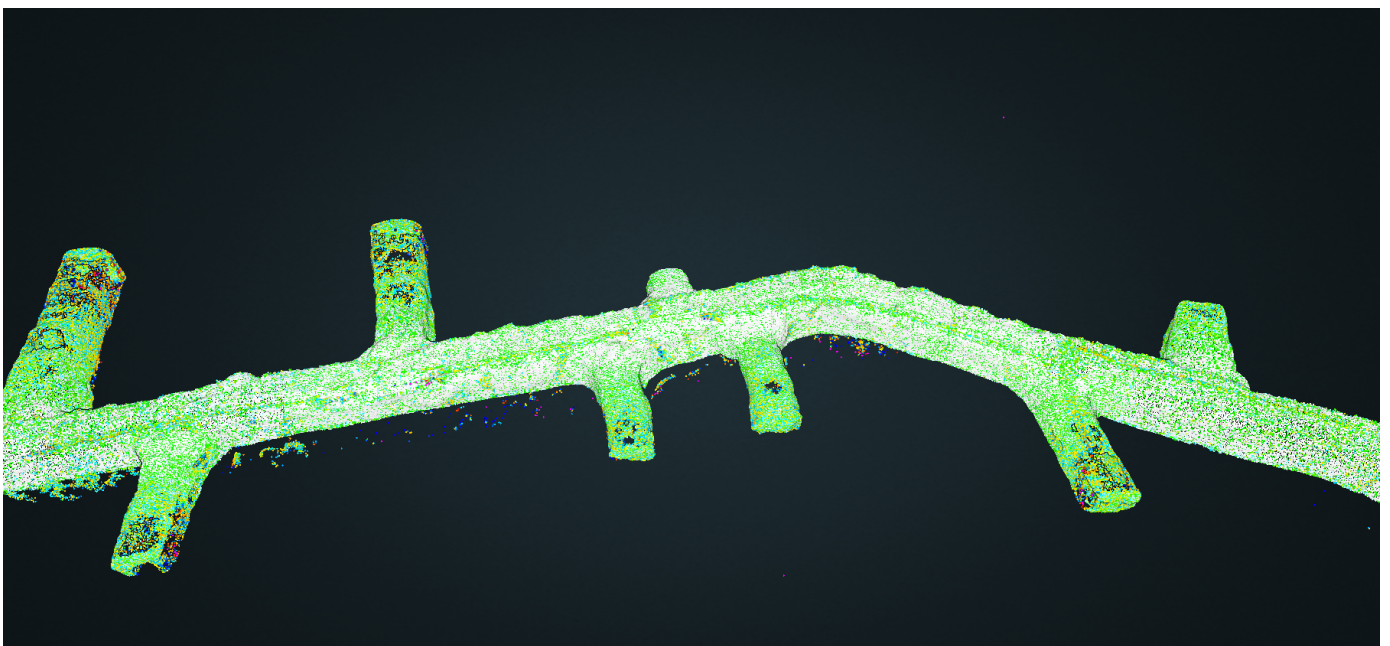
12 / JUNCTIONS AND CONNECTED COVERAGE

Follow the comparison through changes in direction.

A route-level view preserves the relationship between the main passage, intersections and branches.



Oblique inspection of a junction on the mapped corridor. Native change colours remain visible across connected geometry.

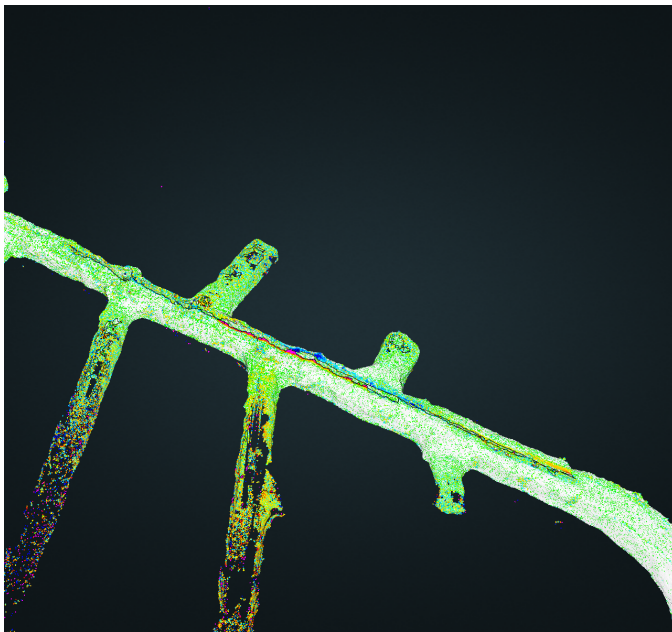


A further junction viewed from above and to the side. Rotate the scene before interpreting an apparent opening or isolated coloured patch.

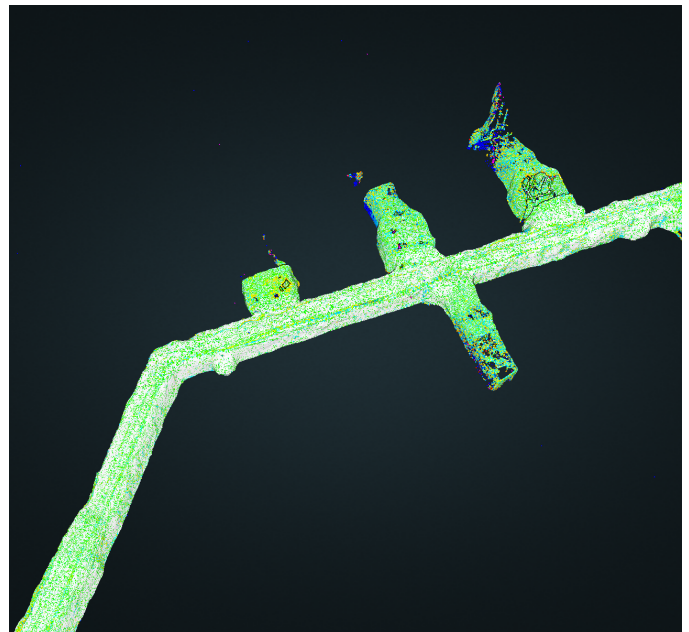
13 / BRANCHES AND EXPOSED EDGES

Use coverage context to interpret the extremes.

Strong colours can be useful review cues, but the reason for separation must be established from the scene.



Upper-route branch geometry in the change product.



A different group of branches along the lower route.

Look for consistent observations

Check whether the same surface was visible and sampled in both passes. A branch observed farther in one recording may have large nearest-neighbour distances even if the rock surface did not move.

Inspect occlusion and range

Vehicles, equipment, people, viewpoint changes and blocked sight lines can alter coverage. Long-range and sparse returns also change the distance to the nearest sampled point.

Treat saturated colours as a prompt

At the ends of the display scale, larger distances share the same colour. The image cannot distinguish every large value once it reaches saturation.

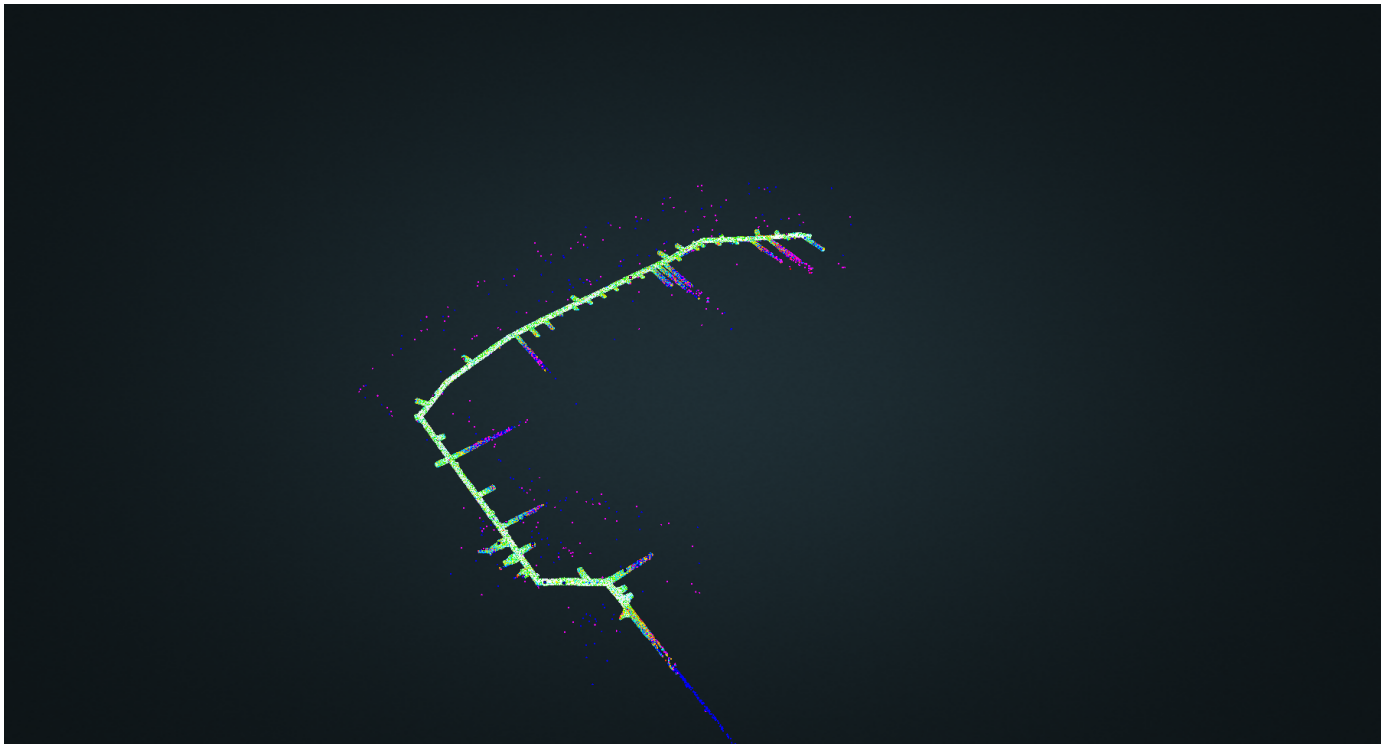
Keep interpretation separate from appearance

Review stable surrounding geometry, relevant survey records and the original observations where needed. These screenshots do not assign physical causes to particular coloured regions.

14 / LONG-ROUTE DELIVERY

Extend the comparison with connected survey coverage.

The shared solution removes the need to repeatedly align short, independently drifting comparison patches.



Oblique route overview from the requested recording. The approximately 1.37 km sampled scanner path is a case measurement, not a maximum product length.

No control-spacing requirement

Survey-control placement does not define where a relative change map has to stop. With sufficient overlap and stable constraints, the jointly solved route can be compared and exported as a continuous product.

Scale is still practical, not infinite

Processing extent depends on scene connectivity, recording quality, memory, disk space, runtime and supported output formats. "Unlimited length" is best understood as the absence of a control-imposed comparison length, not a literal unbounded processing guarantee.

The example's 932.5-million-point viewer product demonstrates a large delivered comparison. It does not validate arbitrary route length, throughput or uniform accuracy.

15 / CAPTURE FOR A USEFUL COMPARISON

Repeat the useful geometry. Keep the scene connected.

Good acquisition makes it easier for Atlas to establish the relationships that change detection depends on.

Capture consideration	Practical benefit
Repeat common stable structure	Give the joint solver reliable surfaces that have not changed between passes.
Distribute overlap along the route	Support relative alignment beyond a single start point or isolated junction.
Cover intersections and transitions	Distinct geometry can help connect long stretches of similar-looking tunnel.
Use compatible viewing coverage	Reduce differences caused only by observing surfaces from different ranges or directions.
Manage occlusion	Record where equipment, vehicles or other obstructions prevented a comparable view.
Retain recording and calibration data	Preserve the inputs required by the joint processing and trajectory-aware analysis chain.
Keep a compatible starting context	The current non-GPS registration can use a same-start-pose hint. Use compatible starts and review the resulting connection.
Keep independent check evidence when needed	Validate the intended measurement task, especially where small changes or acceptance decisions matter.

Protect the stable reference

When much of the scene has changed, the remaining stable structure becomes more important. Plan overlap that still provides a meaningful common basis.

Record acquisition differences

Keep notes on route coverage, access restrictions and changed objects. They help separate genuine scene differences from missing observations.

16 / OUTPUTS AND TRACEABILITY

Deliver the coloured result. Retain the evidence behind it.

The change map is most useful when its survey pair and processing context travel with the file.

Product	Role
Per-survey Atlas cloud	The separate jointly solved point cloud for each recording; the native operation publishes global_atlas.ply and LAS products.
Per-survey trajectory	The matching global_atlas_traj trajectory, retaining that recording's path in the shared solution.
Atlas metadata	Partner identity, coordinate-reference information and validation/provenance for the exported products.
Analysis cloud pair	Compatible Vectra products derived from the corresponding Atlas cloud/trajectory pairs, with preparation choices recorded.
change_map.ply / change_map.las	The coloured comparison and its LAS derivative. Preserve native RGB colours when handing it to compatible point-cloud software.
Converted viewer cloud	A spatially streamed representation for Orbis inspection; display detail is limited by the current view and point budget.

A useful handover

Include baseline and repeat names, the processing date, coordinate frame, colour legend, source-selection record and supporting screenshots. Preserve relevant quality checks with the delivered map.

Know what the LAS carries

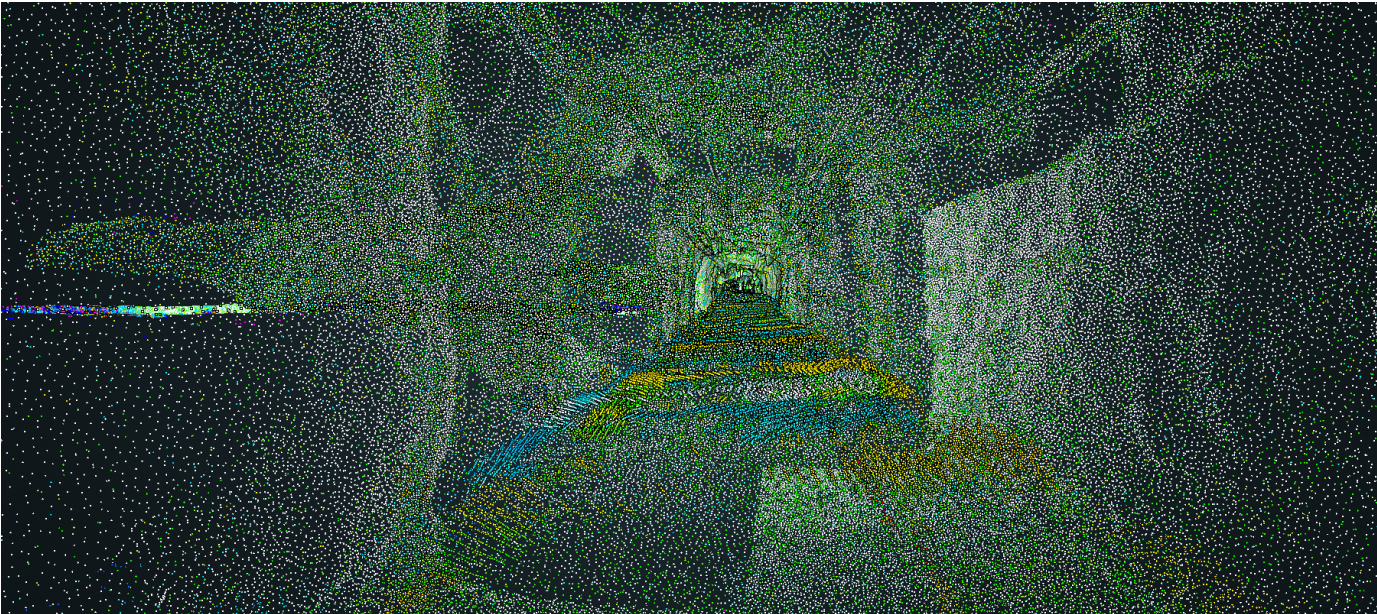
The inspected change LAS contains coordinates, time and colour fields. Its viewer metadata does not advertise a separate per-point change-distance attribute. Do not assume a numeric displacement table can be recovered from RGB alone.

All brochure screenshots use the converted representation of change_map.las alone. The displayed points are a view-dependent subset of the full 932,541,062-point product.

17 / ASSESS THE EVIDENCE

Use colour to locate questions. Use geometry to answer them.

A coloured difference map supports inspection; a physical-change conclusion needs the appropriate context.



Reverse-facing interior view of the change map. Native geometry and colours are retained; no movement, convergence or excavation value is inferred from this image.

Observation	Possible explanations to check
A broad coloured offset	Real change, residual registration mismatch, or a combination of both.
A strong colour near a survey edge	Unequal coverage, an occluded surface, sparse sampling or genuine scene difference.
An isolated coloured object	Equipment or scene changes, transient objects, outliers or mismatched observations.
White or near-white points	Close nearest-neighbour separation within the display band; not proof of absolute accuracy or zero movement.
Opposing blue and warm colours	Different survey populations at separated locations; not a signed vector showing the direction of motion.

18 / REPEATABLE REVIEW

Make each comparison easy to revisit and explain.

Use the same disciplined chain from capture through interpretation.

Before processing

Confirm the baseline association and intended repeat recording. Check that their recording data is complete and that overlap is sufficient for a connected Atlas solution.

After AtlasMerge

Check the completed outputs for both recordings. Confirm partner identities and coordinate context, then prepare the analysis pair from those shared-frame products.

After ChangeMap

Confirm the selected sources and successful output. Open change_map.las on its own, inspect the entire route, and revisit coloured regions from several directions.

Before drawing conclusions

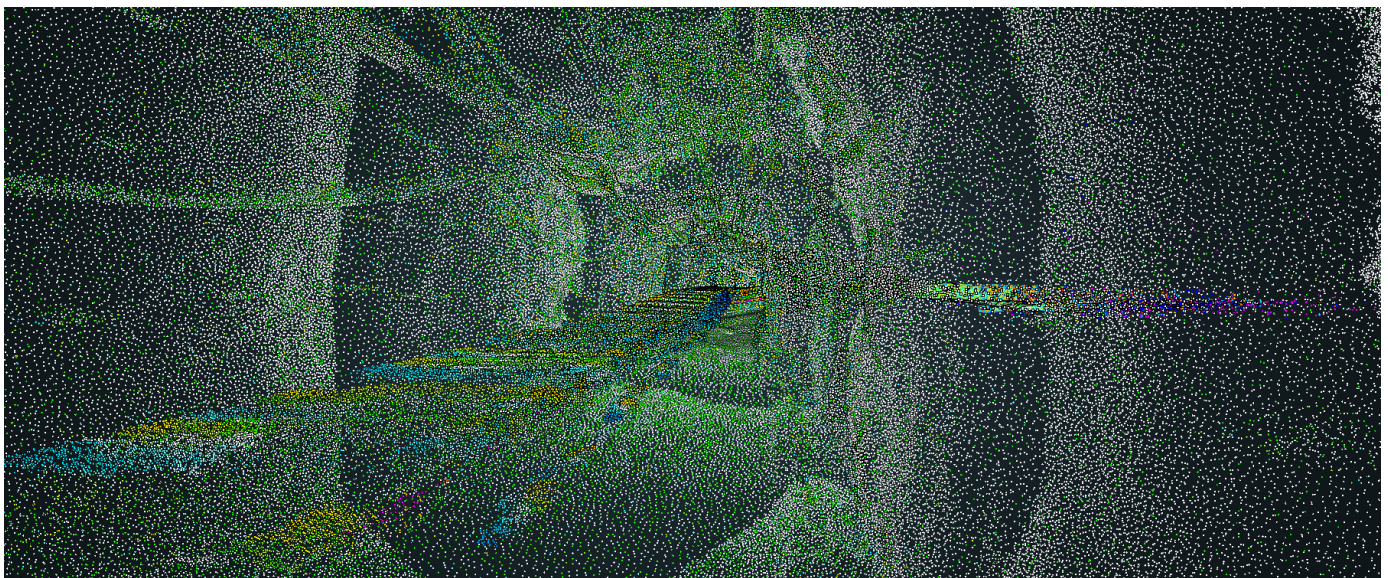
Assess stable-reference agreement, coverage, sampling and scene changes. Use appropriate independent evidence when a result must establish movement, compliance or a small physical change.

Before delivery

Retain the native colour legend and explain saturation. Keep the pair identity, coordinate frame, processing history and review notes with the output.

When the survey is repeated

Choose the intended baseline explicitly and repeat the shared-solution workflow. Comparable acquisition and retained evidence make changes across successive assessments easier to interpret.

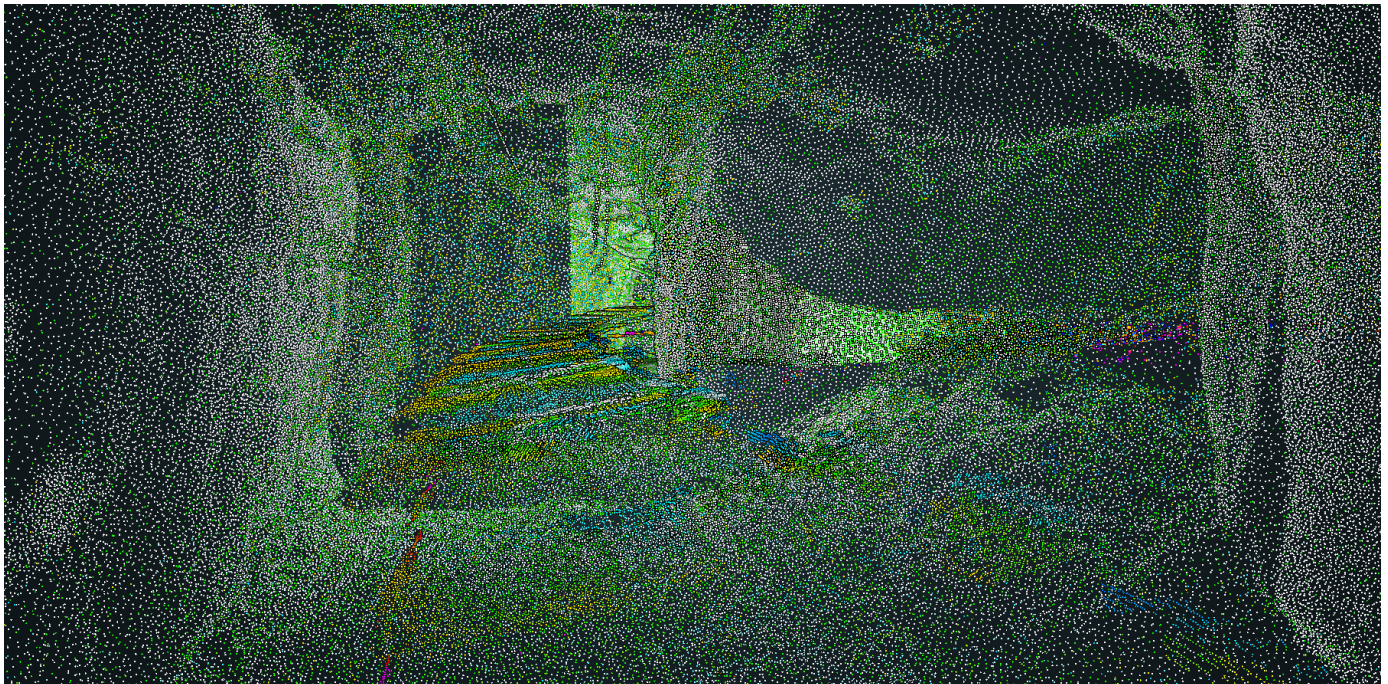


A walking-level view near a change in direction. The same single change-map layer is used throughout the brochure.

19 / PUT ATLAS CHANGE DETECTION TO WORK

Compare the route. Keep the shared solution.

Bring repeat surveys into one spatial relationship, then retain their differences as a useful review product.



West Fringe Drift · interior inspection of the native change-map product. Only change_map.las is visible.

For long connected environments

Use joint mapping to address differential drift before comparing tunnels, underground drives and other repeatable corridors.

For a reviewable change product

Keep survey identity through the split, generate the comparison in the shared frame and deliver the map with its interpretation context.

Explore Orbis Atlas change detection

Discuss your repeat surveys, overlap and change-detection requirements with AutoMap.

sales@automap.io · 0438 753 678

automap.io/contact

Implementation review, case metadata and native viewer captures: 20 September 2026. Diagrams explain the workflow and are not measured error plots. Screenshots preserve the supplied change-map colours. Source references and capture records accompany the editable brochure.