Both LiDAR (Light Detection and Ranging) and MUD® (Mapped Underworld Dimension) play pivotal roles in detecting, modeling and tracking objects. Both rely on emitting signals and measuring the reflections to gauge distances and the characteristics of objects. They are active sensing technologies, meaning they generate their own signals for object detection. However, the differences in their underlying technology lead to variations in their capabilities and applications.

- **Principle of Operation**: MUD® uses microwave radar signals to create 3D images by bouncing signals off the Earth's surface. LiDAR employs laser pulses to measure distances and create highly detailed 3D maps.
- **Atmospheric Interaction**: As a SAR-based technology, MUD® is unaffected by atmospheric conditions, and works through cloud, rain, fog, or snow. LiDAR primarily operates in clear conditions as it is highly sensitive to atmospheric interference.
- **Resolution**: MUD® offers high-resolution images (1.6m x 1.6m square pixel size with Sentinel 1 SAR data and 0.2m x 0.2m square pixel size with RadarSat2.) LiDAR is known for high spatial resolution, capturing fine surface details.
- **Coverage**: MUD® is suitable for large-scale area mapping and monitoring changes in small targets, over wide regions. LiDAR is often used for localized and detailed mapping.
- **Weather and Day/Night Operation**: MUD® works in all weather conditions, day and night. LiDAR can be affected by adverse weather and operates in daylight.
- **Penetration:** LiDAR has capacity to capture surface data in vegetated areas like forests and grasslands. MUD®, a deep penetrating SAR technology, penetrates and models the earth's surface, near subsurface and underwater, with subsurface depths of 100m (300 ft.)

What can MUD® see?

The MUD® technology is a satellite deep penetrating radar technology that models and monitors magnitude, location, pattern, direction and rate of hazardous and non-hazardous ground movement. Like an X-ray for the earth, MUD® penetrates deep vegetation, snow, ice, water, and overburden. Using AI algorithms, MUD® reveals underlying geological structures and textures, underground infrastructure and utilities, water courses and soil saturation, geohazards, disturbed earth and underground voids.

How to decide between LiDAR and MUD® data?

The simple answer: you don't have to pick one over the other.

MUD® technology fuses LiDAR and SAR data and then visualizes the once diverse datasets into one, comprehensive analytics package.
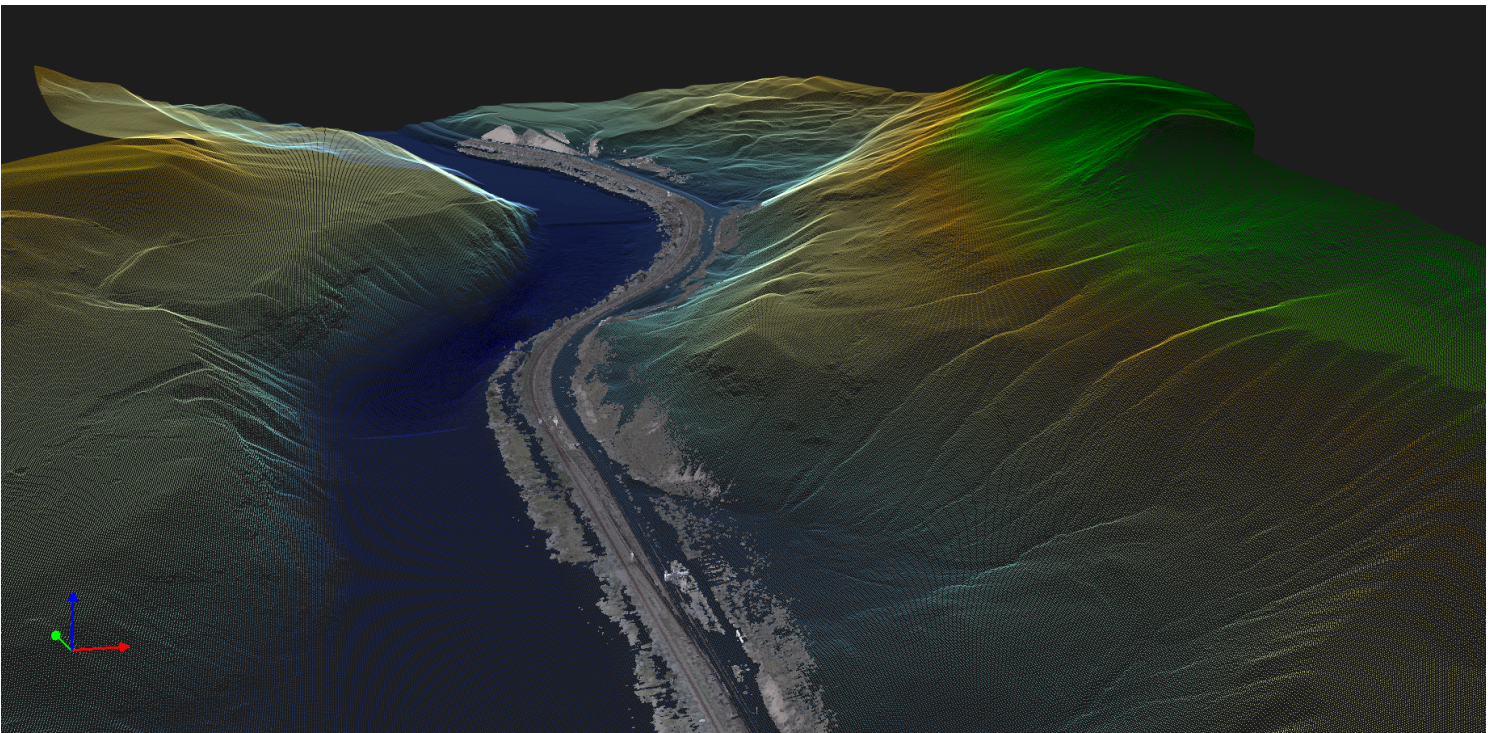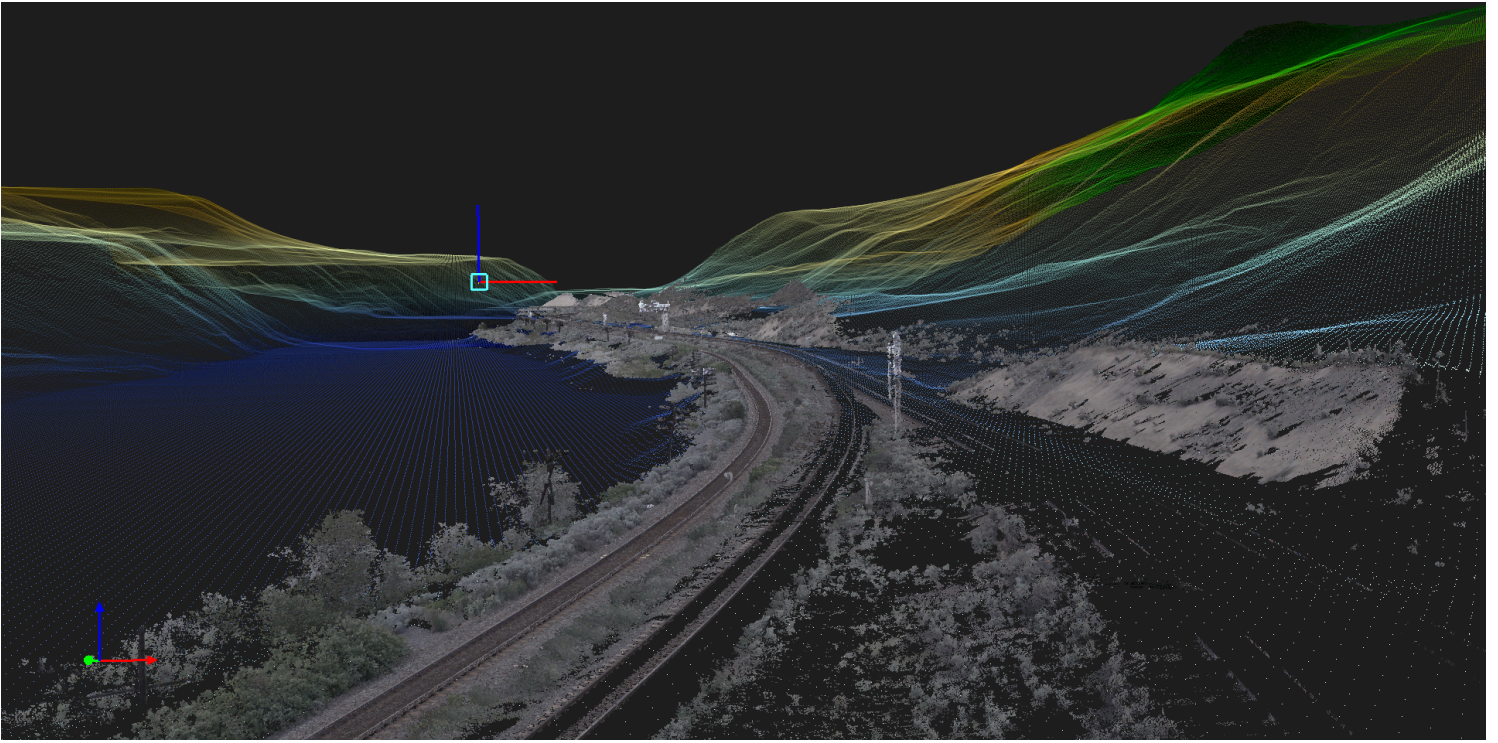
Taken at two sites along a complex section of track, these images demonstrate Auracle's ability to fuse LiDAR high-resolution data into its MUD® surface, subsurface and underwater technology. MUD® AI technology forms a unified standard of accuracy and precision, the highest level between dissimilar sensor and instrument surveys. This means that measurements taken at any location along the rail network have the same accuracies and precision. This new fused data set also easily ingests other geolocated data, such as drill log, geophysical or instrument data.

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