Tailings Facility Monitoring

MUD® technology detects subsurface and underwater hazards

Due to ongoing climate events, surrounding slope failure and seismic events, tailings facilities are predicted to fail at an accelerated rate. Fail-safe monitoring and management of Tailings Storage Facilities is imperative for the protection of valuable infrastructure, assets, human life and the environment.

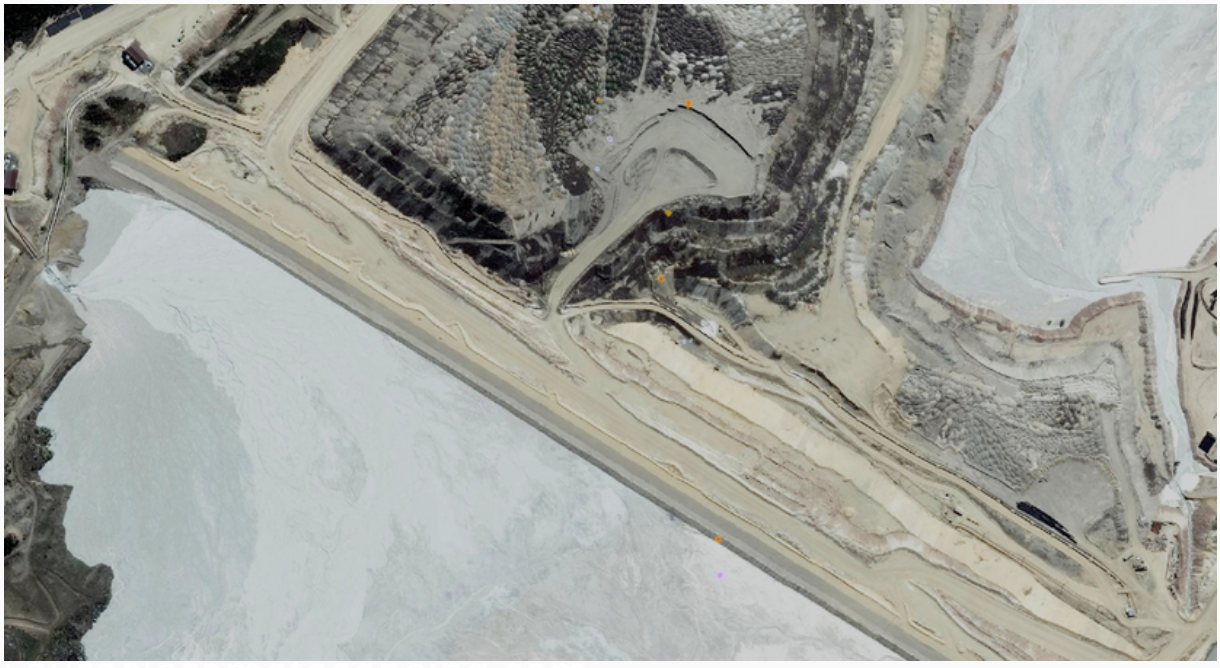
What Makes MUD® Mapping and Modeling Technology Stand Out?

Radar SAR Interferometry is a well-established method used to measure movement and deformation by duplicating the orbital path and the precise time and geometry of collection. Successive radar signals are analyzed for their differences, detecting movement or change as small as 2 mm. Auracle's Mapped Underworld Dimension (MUD®) model is an advanced Synthetic Aperture Radar (SAR) satellite-based monitoring tool that penetrates and models the earth's surface, near subsurface and underwater in 3D.

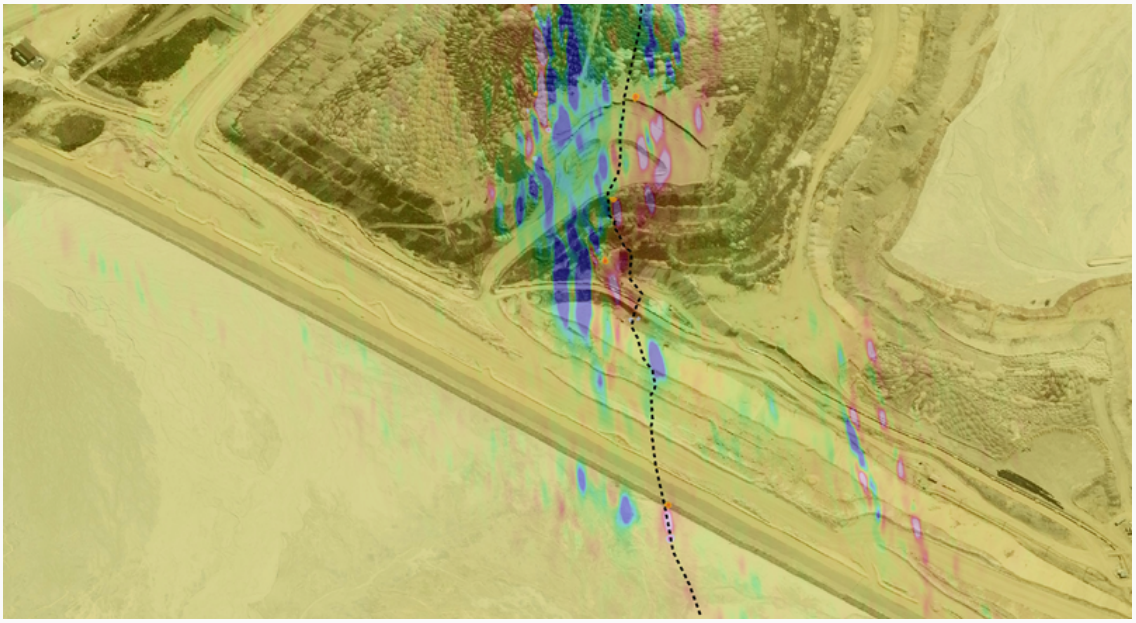
What Can MUD® See?

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.

Subsurface Geological Feature Detection

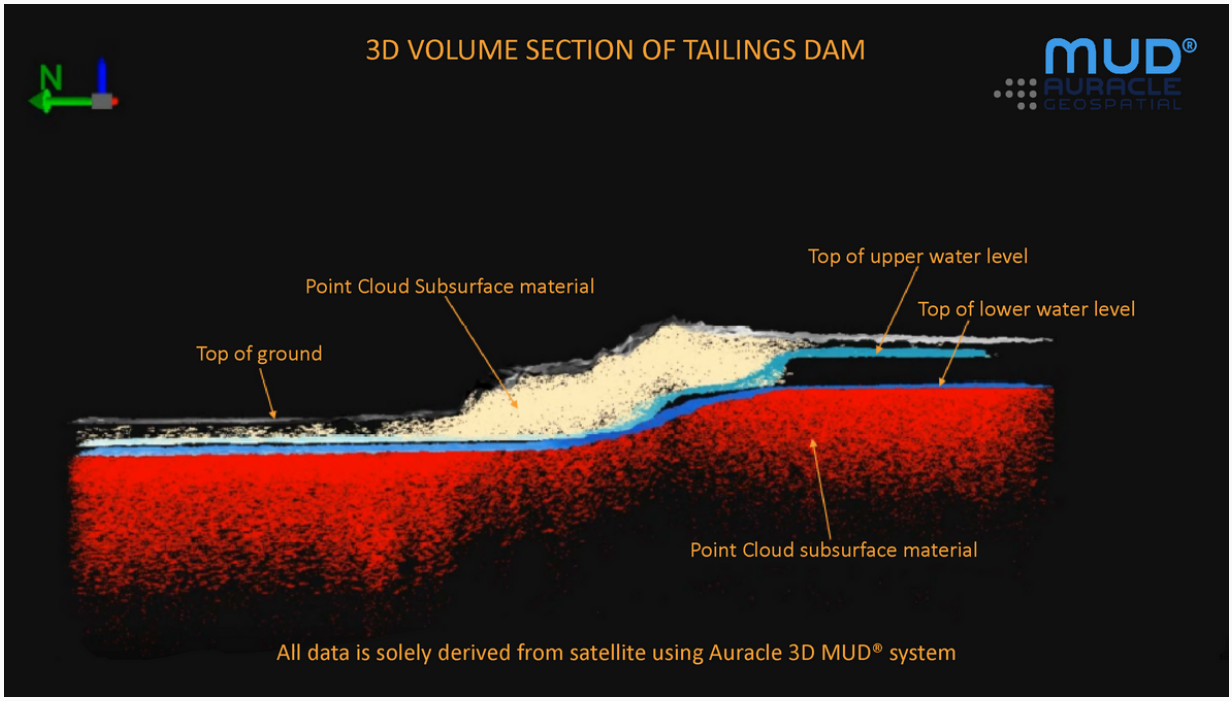


MUD® detected a geological fault that extended underwater and under the tailings facility (labeled as a dotted black line.) A fault is a fracture between two blocks of rock that allows the blocks to move relative to each other, occurring rapidly or more slowly, as creep. Most faults produce repeated displacements, potentially threatening the stability of the tailings facility, over time.



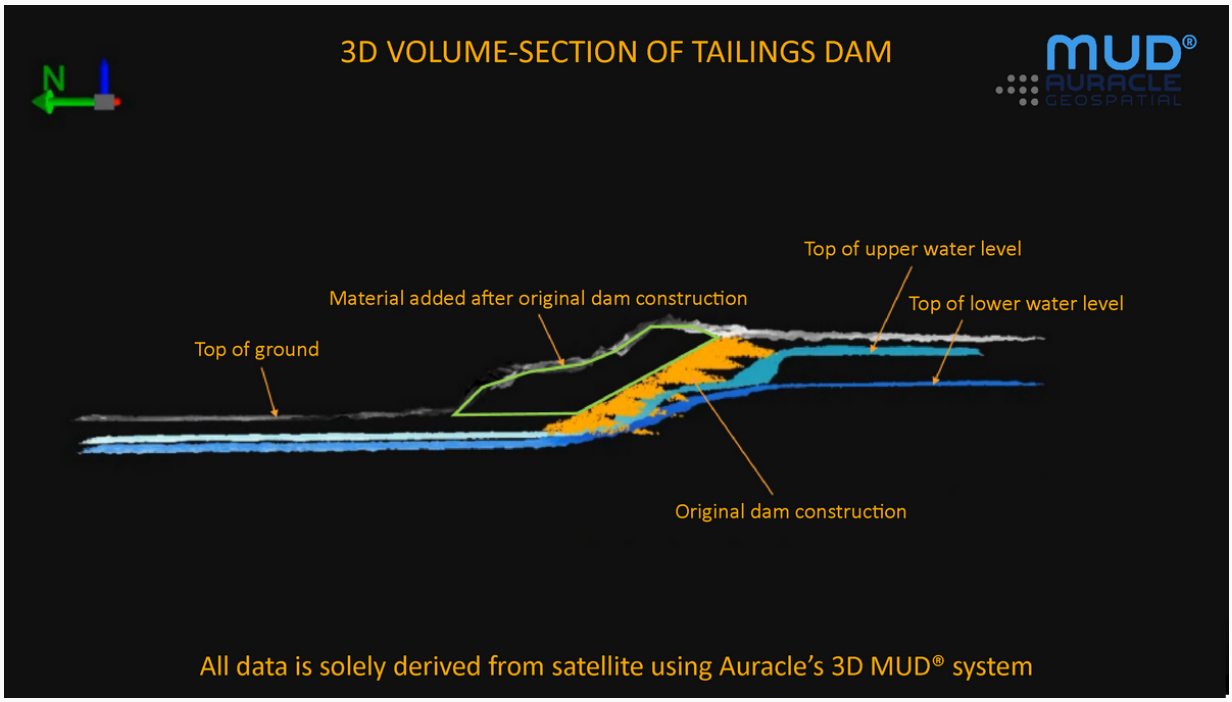
MUD® detected a displacement on either side of the fault, all under the tailings facility which traditionally would have gone undetected until it revealed itself as part of a failure event. This image shows that one side of the fault is rising (in blue) while the other side of the fault is subsiding (in red.)

Subsurface Point Cloud 3D Volume Section



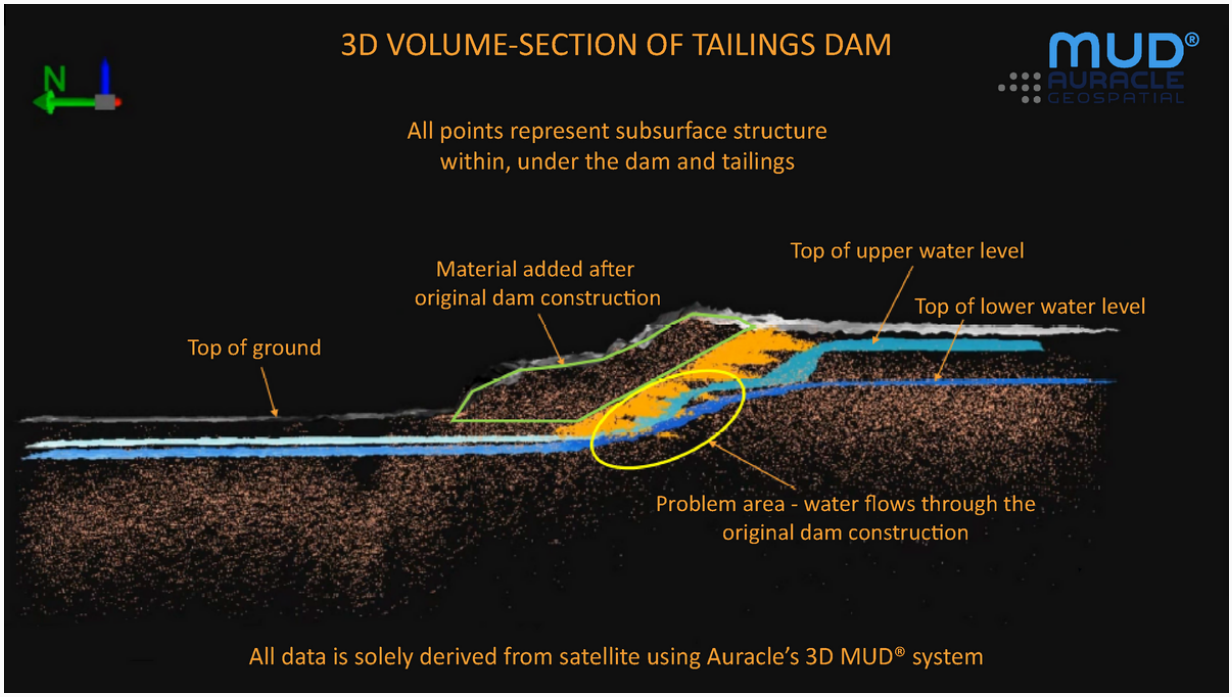
MUD® produces a 3D Volume section that visualizes, as a digital twin, the subsurface of the tailings facility, including underwater. It reveals important location of the top of the ground, the upper and lower water levels and the composition of the subsurface materials.

Subsurface Digital Twin Dam Construction History



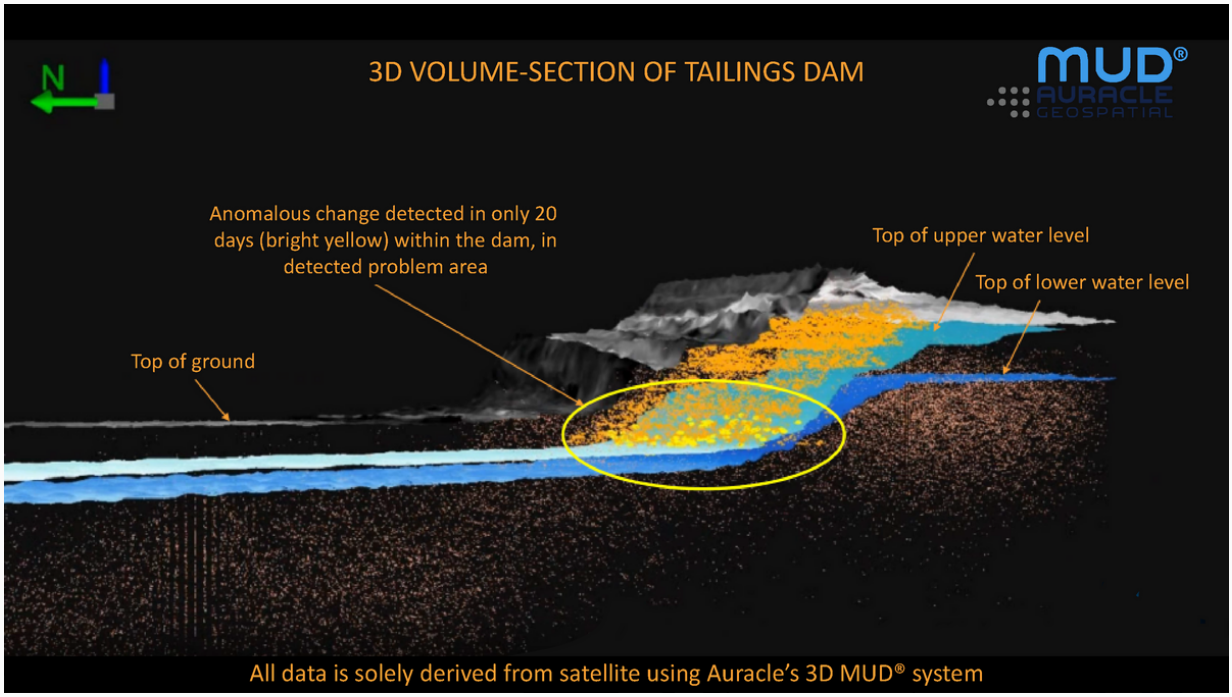
MUD® produces a 3D Volume section that visualizes, as a digital twin, the subsurface of the tailings facility, including underwater. It reveals the location of materials that were added after the original design and construction of the dam. It also visualizes the actual berm, shown in orange for display purposes.

Subsurface Digital Twin Dam Construction History



MUD® produces a 3D Volume section that visualizes, as a digital twin, all points representing subsurface structure within and under the dam and tailings. Here, subsurface water flows through the original dam construction, not visible at surface and which was not resolved with the application of any of the materials added after the original dam construction.

Subsurface Digital Twin Dam Construction History



MUD® produces a 3D Volume section that visualizes, as a digital twin and detects anomalous change over only 20 days (labeled in bright yellow.) This detected problem occurs within the dam and is not visible at surface or detectable through any traditional monitoring methods.

Subsurface Digital Twin Dam Construction History

FEATURES AVAILABLE SAR MONITORING	InSAR	MUD®	DiffInSAR	PSInSAR
MONITORING FREQUENCY	>20 days	**<40 hours**	>20 days	>20 days
MONITORS SURFACE	✓	✓	✓	✓
MONITORS UNDER LAND SURFACE	✗	✓	✗	✗
MONITORS IN 3D	✗	✓	✗	✗
MONITORS UNDER WATER	✗	✓	✗	✗
ELIMINATES LAYOVER AND DISTORTION	✗	✓	✗	✗
UNIFORM SPATIAL ACCURACY	✗	✓	✗	✗
COMPLETE AREA	✗	✓	✗	✗