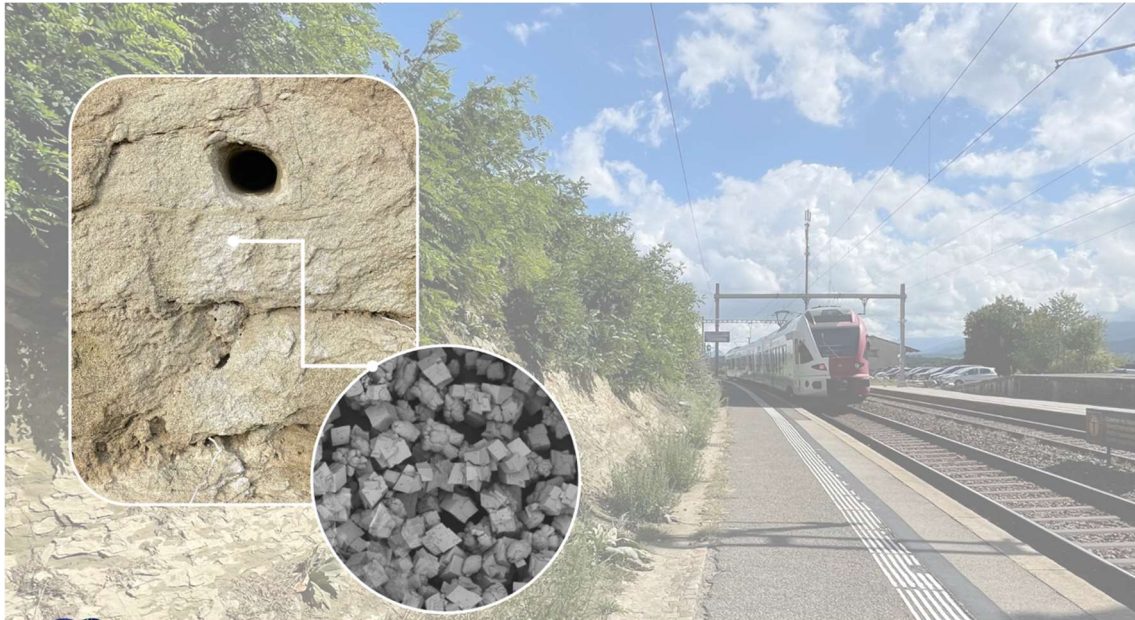


A project with the Swiss Railways

Medusoil's biominerals to mitigate continuous sandstone erosion



SBB CFF FFS



CEN/TR 17105

Medusoil applied its flagship biomineralization product on a slope adjacent to a train platform of the Swiss Railways in the canton of Fribourg. The goal was to naturally increase the calcification content via a combination of minimally invasive injections and spraying techniques to ultimately mitigate the continuous erosion of the slope.



View of the eroded sandstone slope, prior to stabilization works

The application took place in two steps:

(i) injection via 17mm-diameter drills (opened via light, handheld equipment) to saturate the mass and identify potential fissures

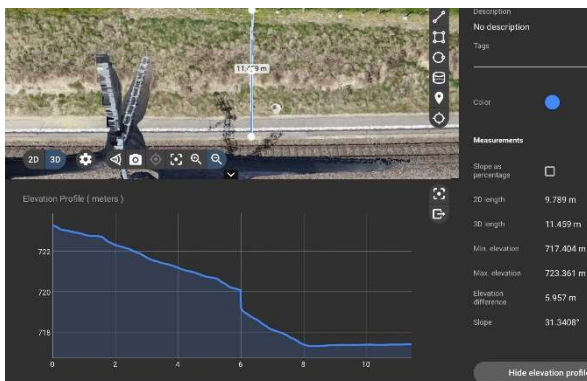
(ii) surface percolation of an area of 45 m² for additional mineralization

Works concluded within a week. A year after the application, calcification is omnipresent on the slope and pocket penetrometer measurements allow evaluating the residual cohesion as follows:



Pocket penetrometer assessment of the cohesion for various zones of the slopes

	<u>Cohesion (kPa)</u>
Fully eroded sand	5-9
Weakly cemented zone	<20
Bio-cemented zones	>70



Finally, during the project design and subsequent monitoring of the zone, Medusoil proposed an advanced GIS system combined with LiDAR which enables the detection of movements and soil mass loss over time. The system represents a fast and economic way for obtaining a robust evolution of the digital terrain model down to the scale of millimeter.