AWS Free Webinar: 4 August 2021

Natural Dam Failures
Past, Present, and Future

Presented by:

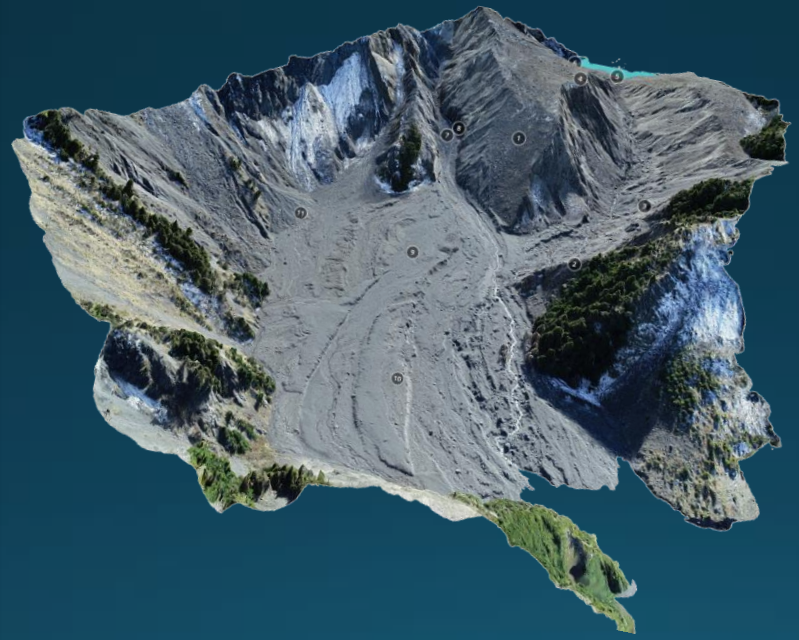
Chris Goodell

Kleinschmidt Associates

Krey Price

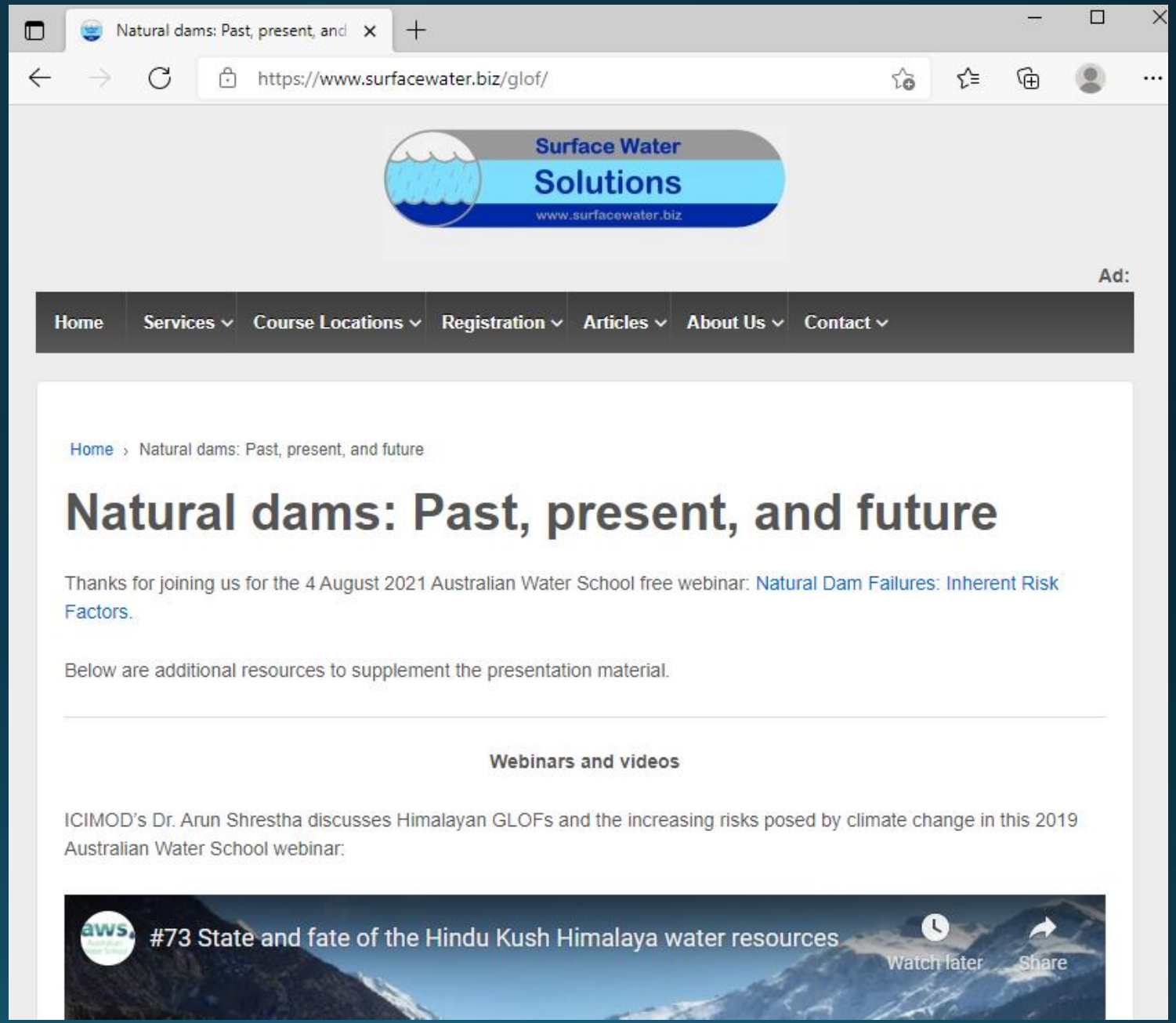
Surface Water Solutions

aws Australian Water School



Webinar Resources

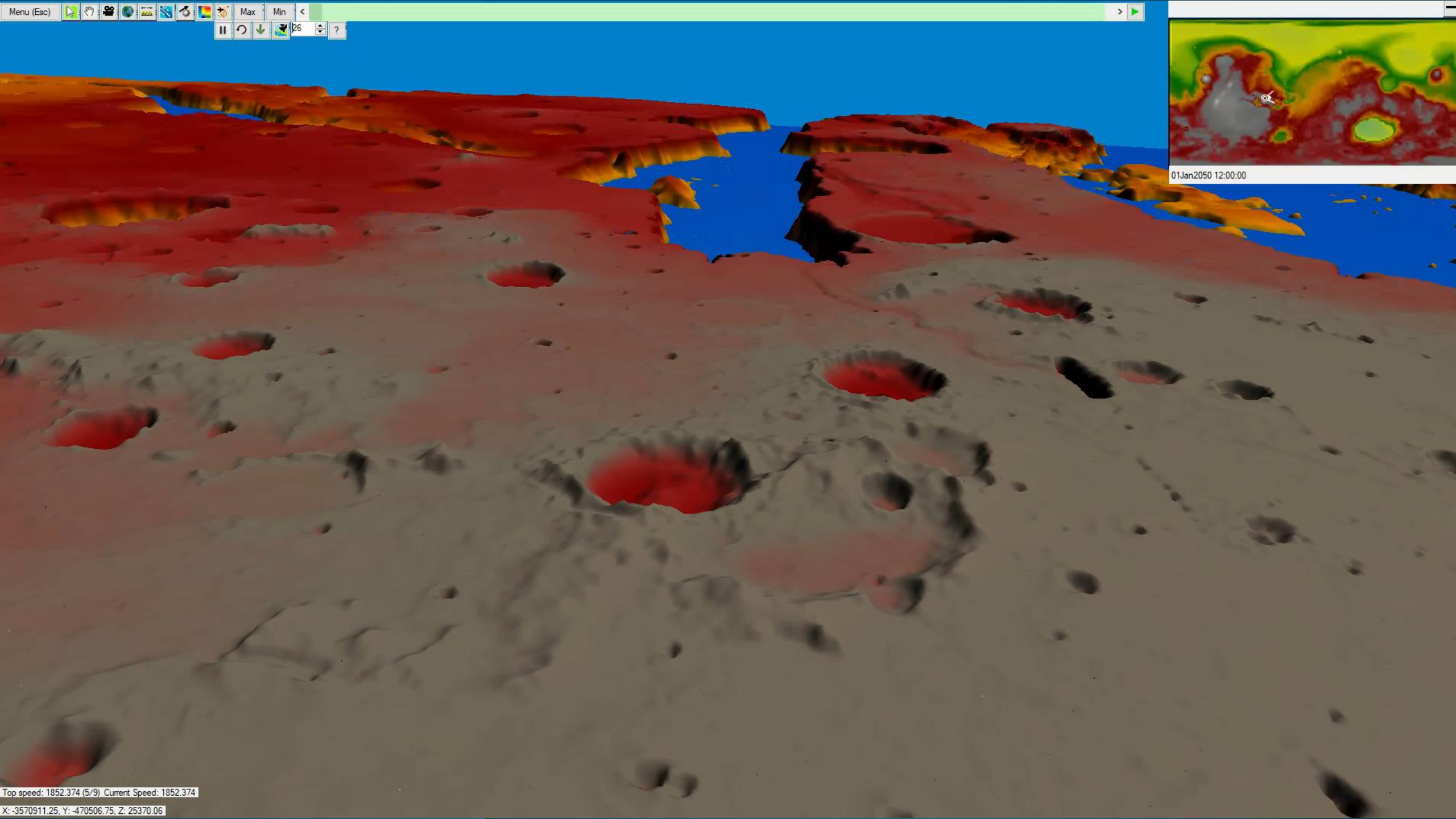
www.surfacewater.biz/glof/



Natural Dams

"Dam": A barrier preventing the flow of water

- Landslide dam
- Ice dam
- Moraine dam
- Lahar dam
- Alluvial fan avulsion


Menu (Esc)
Max
Min
26
?
01Jan2050 12:00:00
Top speed: 1852.374 (5/9) Current Speed: 1852.374
X: -3570911.25, Y: -470506.75, Z: 25370.06

Landslide Dam: Lake Waikaremoana

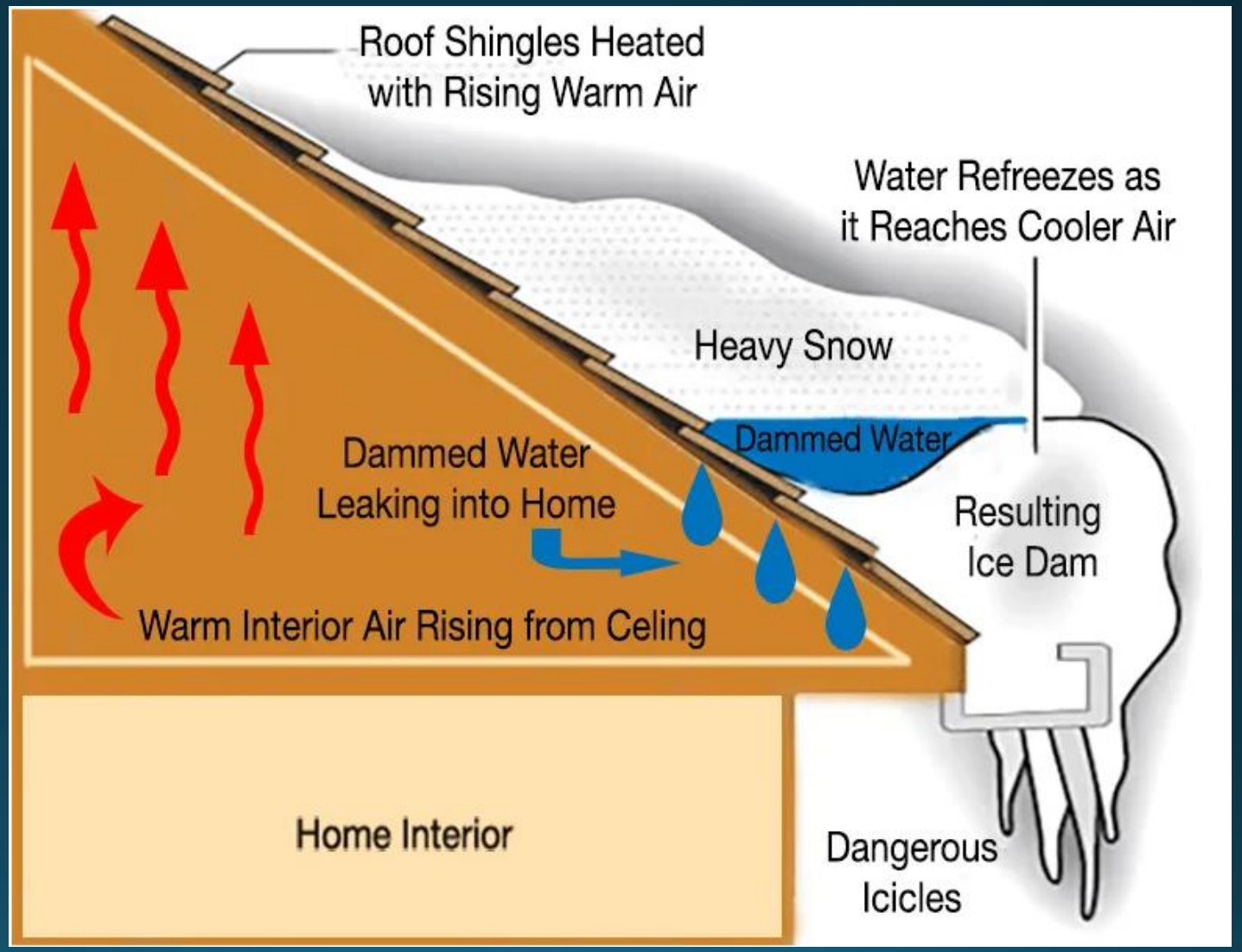
Landslide Dam: Sarez Lake

15 deaths per year in the U.S.

Ice Dam

15 deaths per year in the U.S.

Ice Dam



What's a GLOF and where would you find one?

Glacial Lake Outburst Flood:

- Ice or rock avalanches
- Collapse of moraine dam
- Washing out fine materials (piping)
- Earthquakes
- High upstream inflow

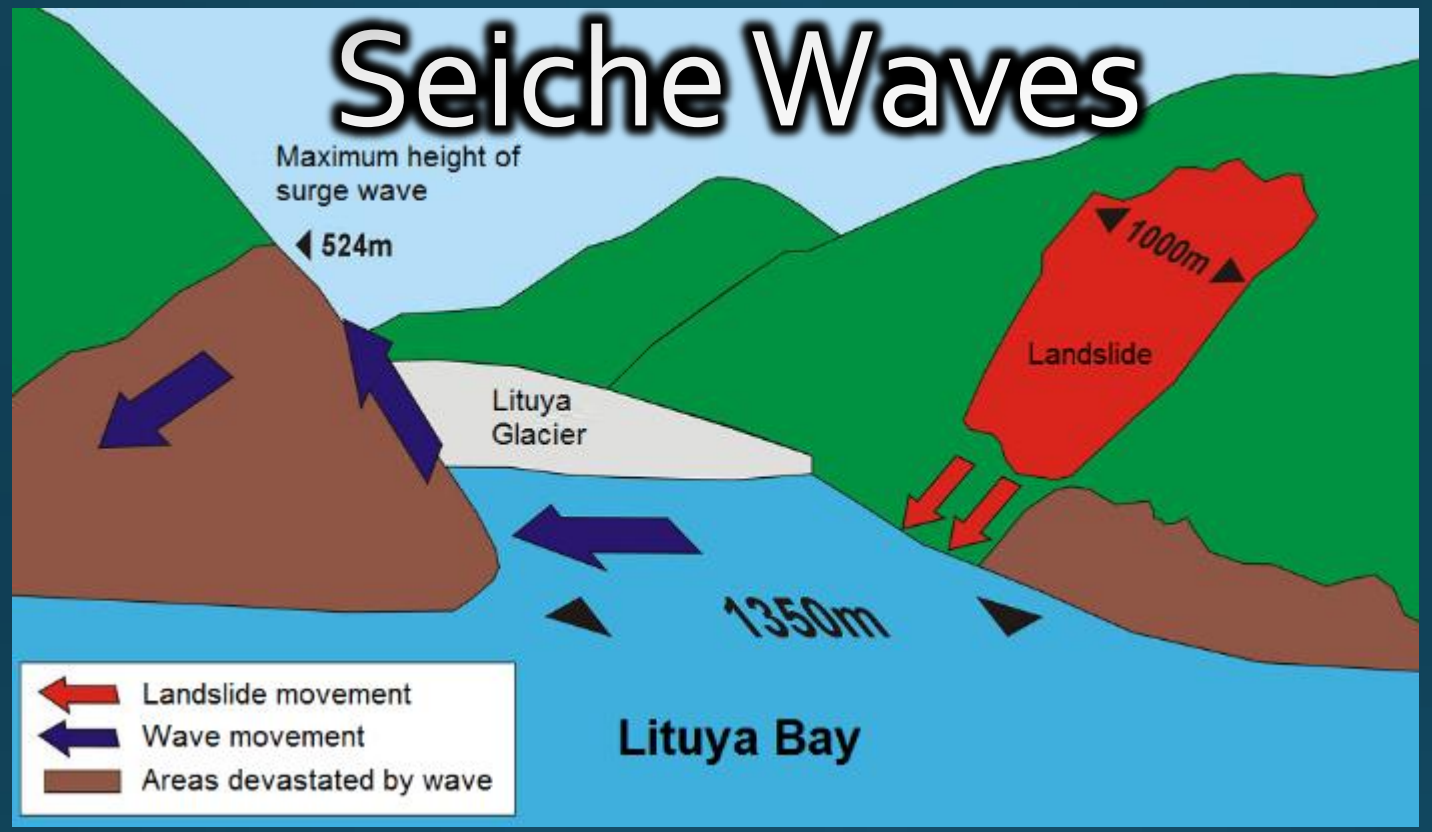
Lahar Dam

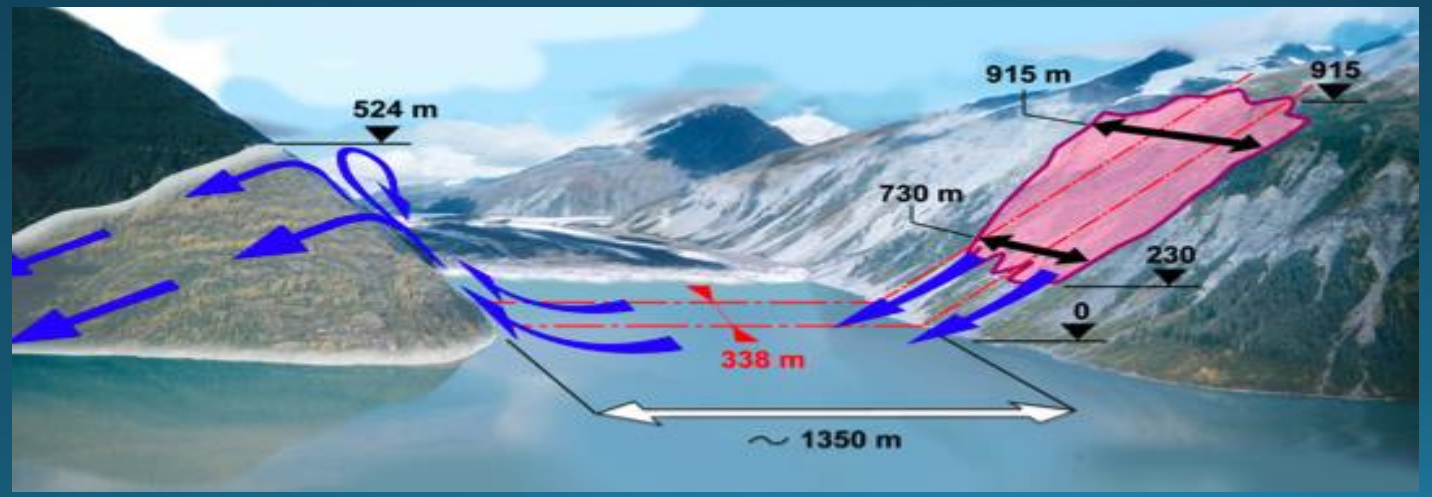
Alluvial Fan

Seiche Waves

Photo: GNS

Seiche Waves



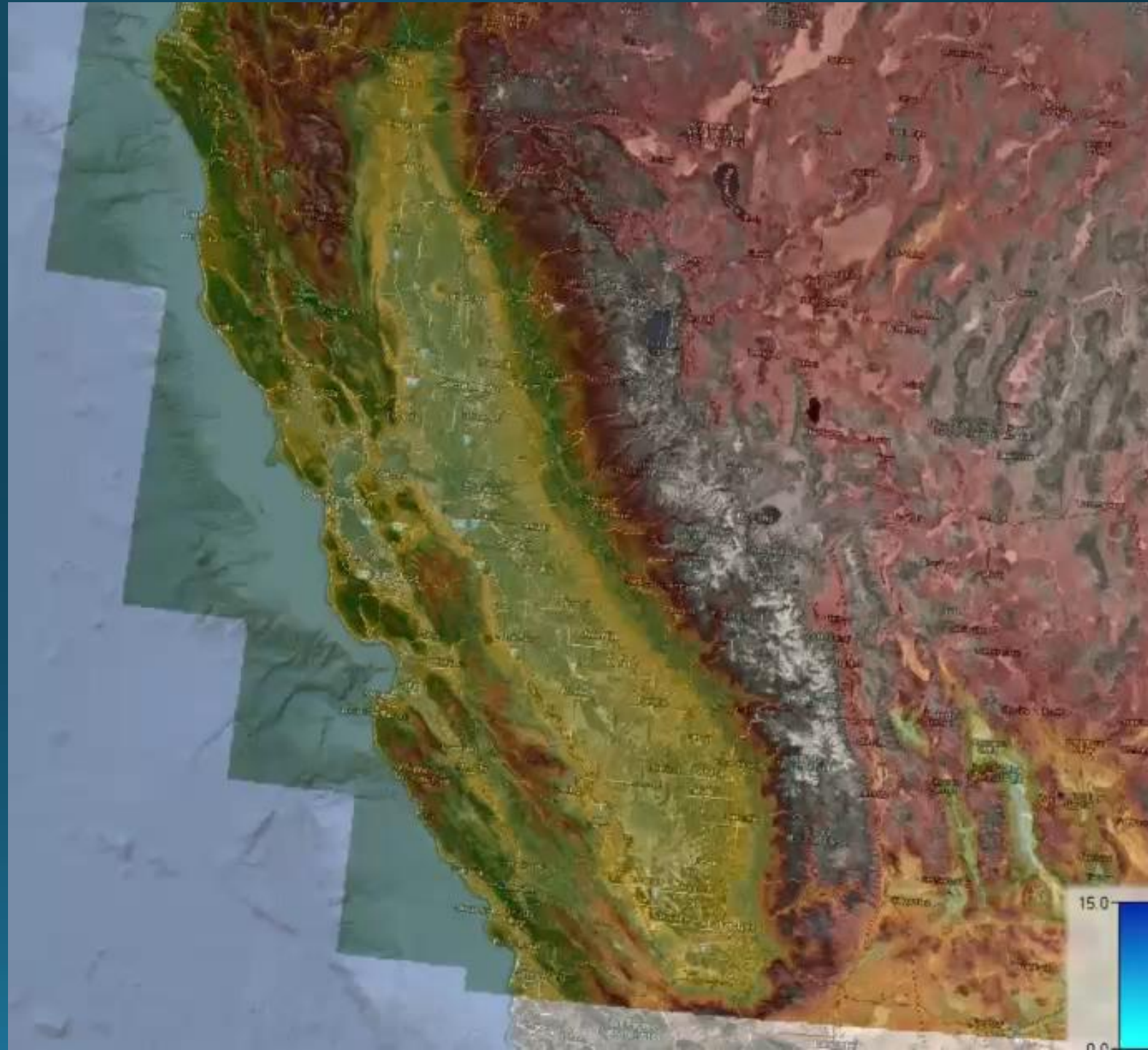


Prehistoric Dam Failures

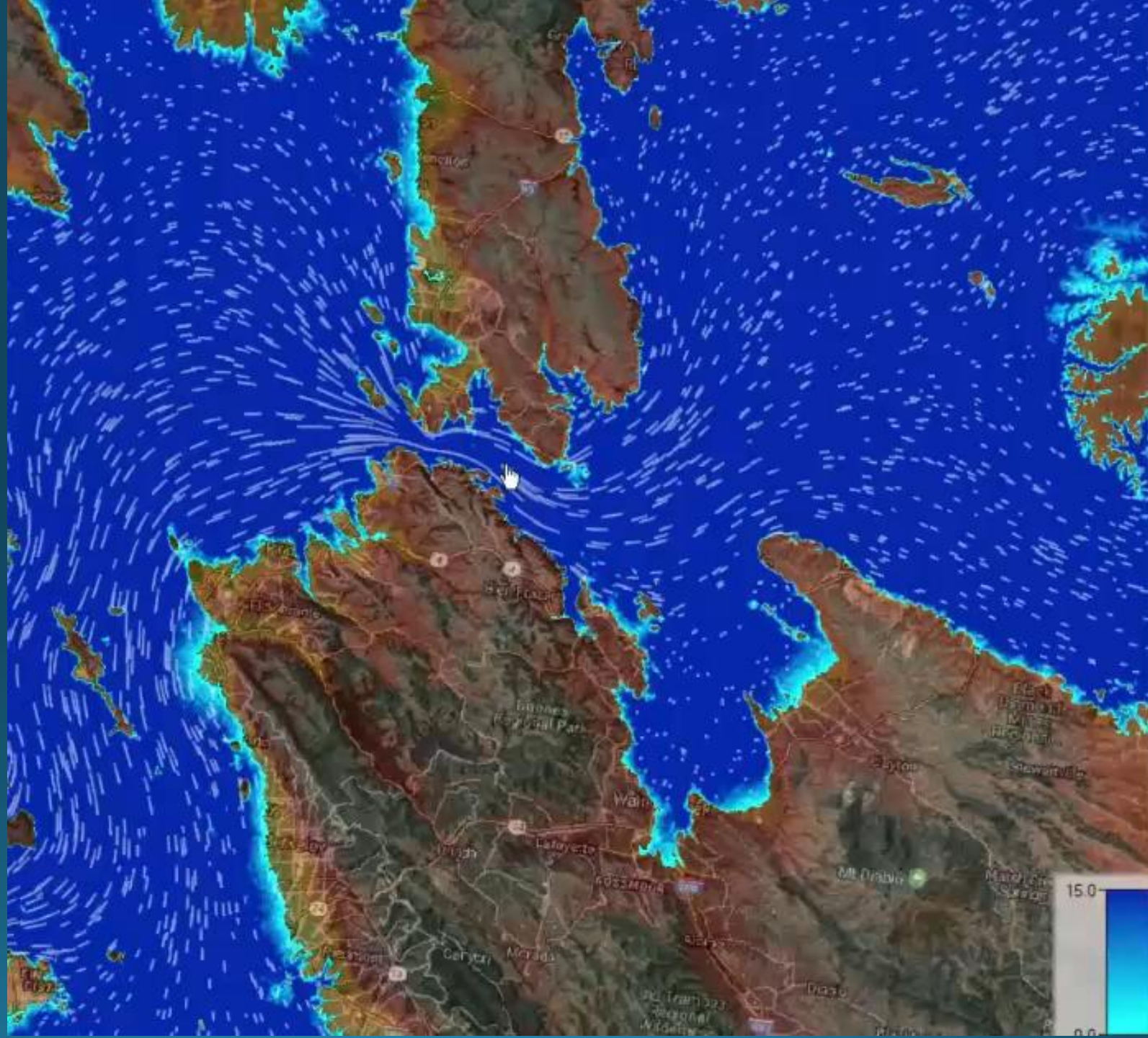
Lake Bonneville

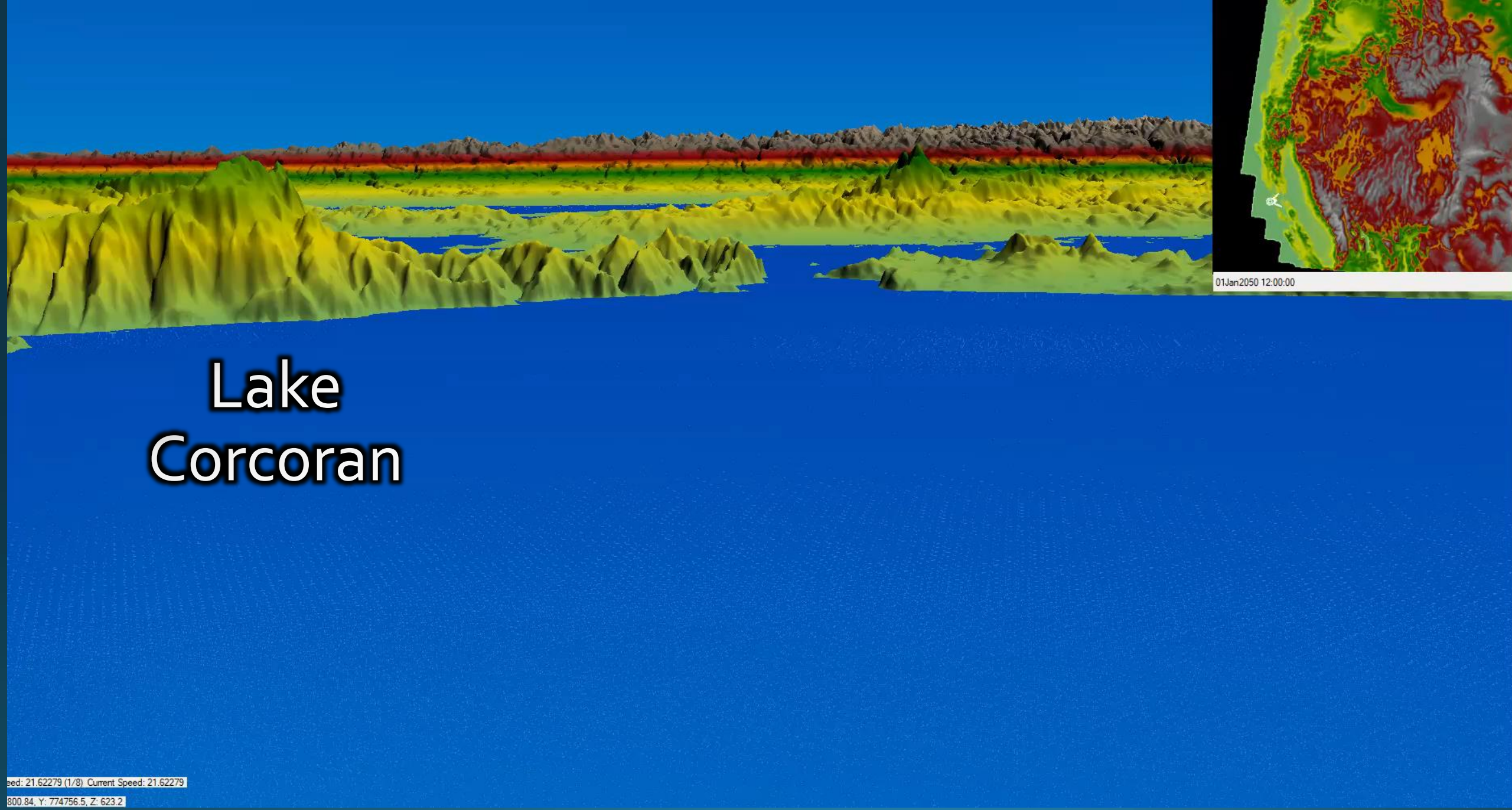
Lake Missoula

Lake Corcoran



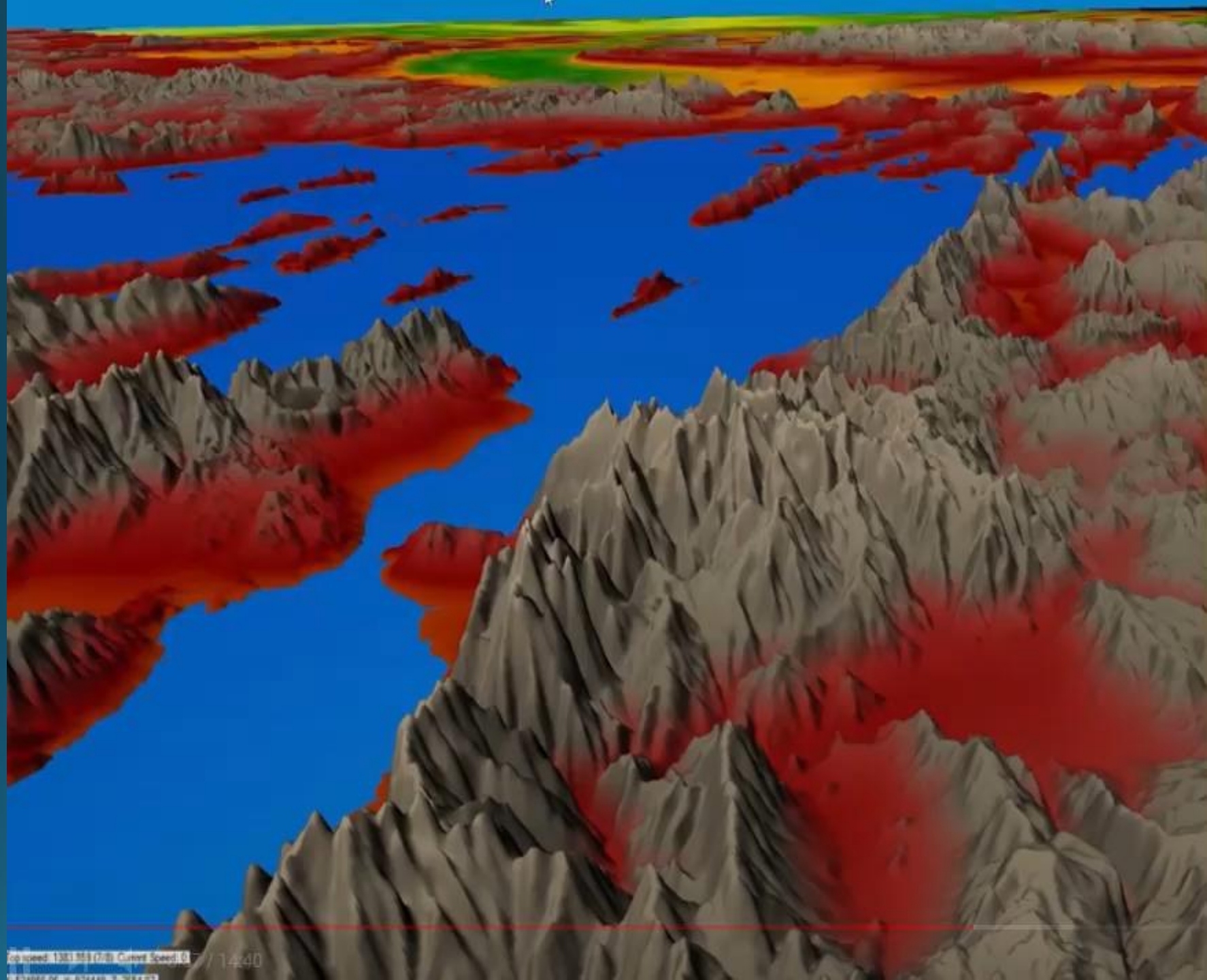
Lake Corcoran

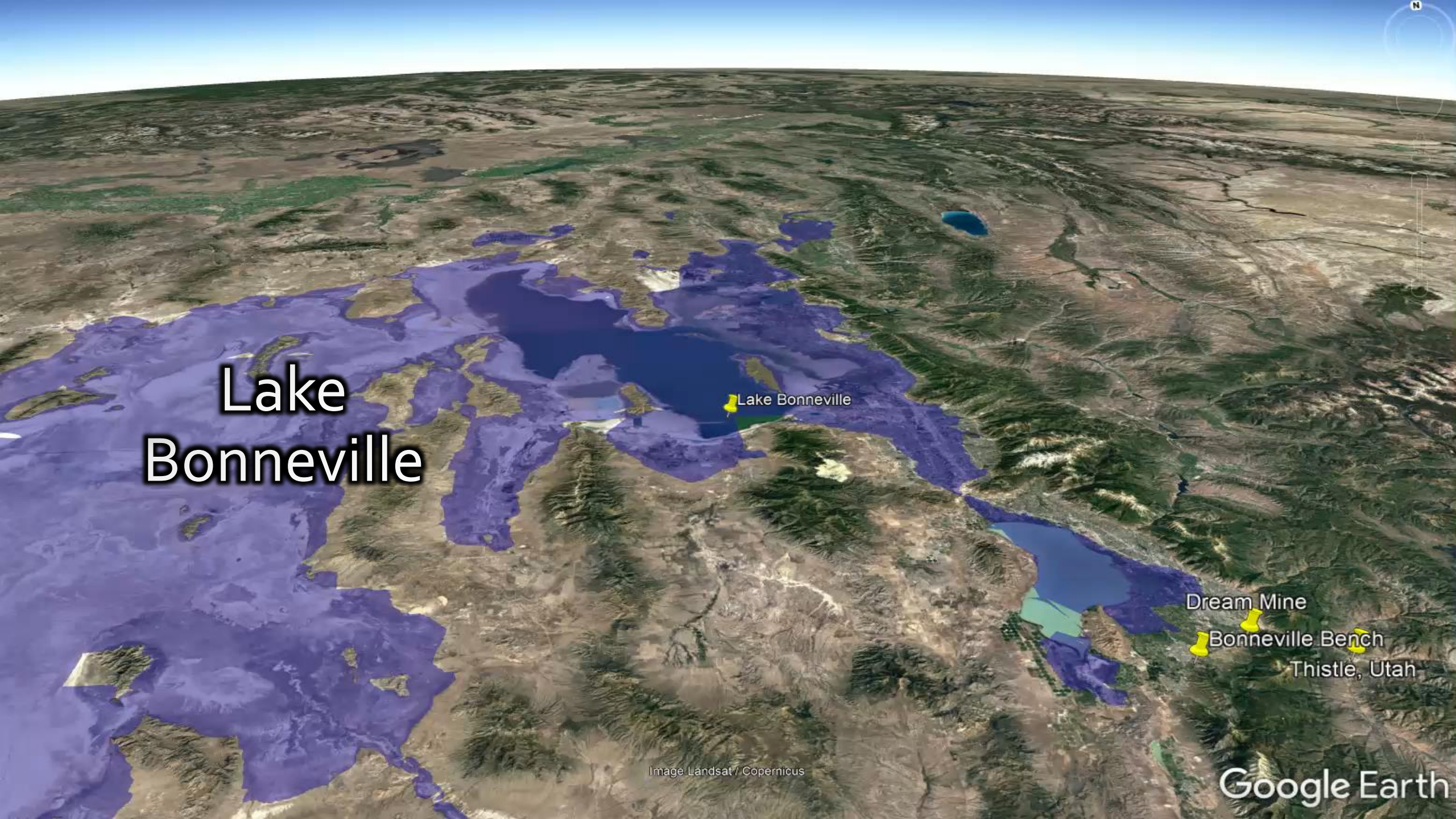



Lake
Corcoran
01Jan2050 12:00:00
eed: 21.62279 (1/8) Current Speed: 21.62279
800.84, Y: 774756.5, Z: 623.2

Lake Bonneville

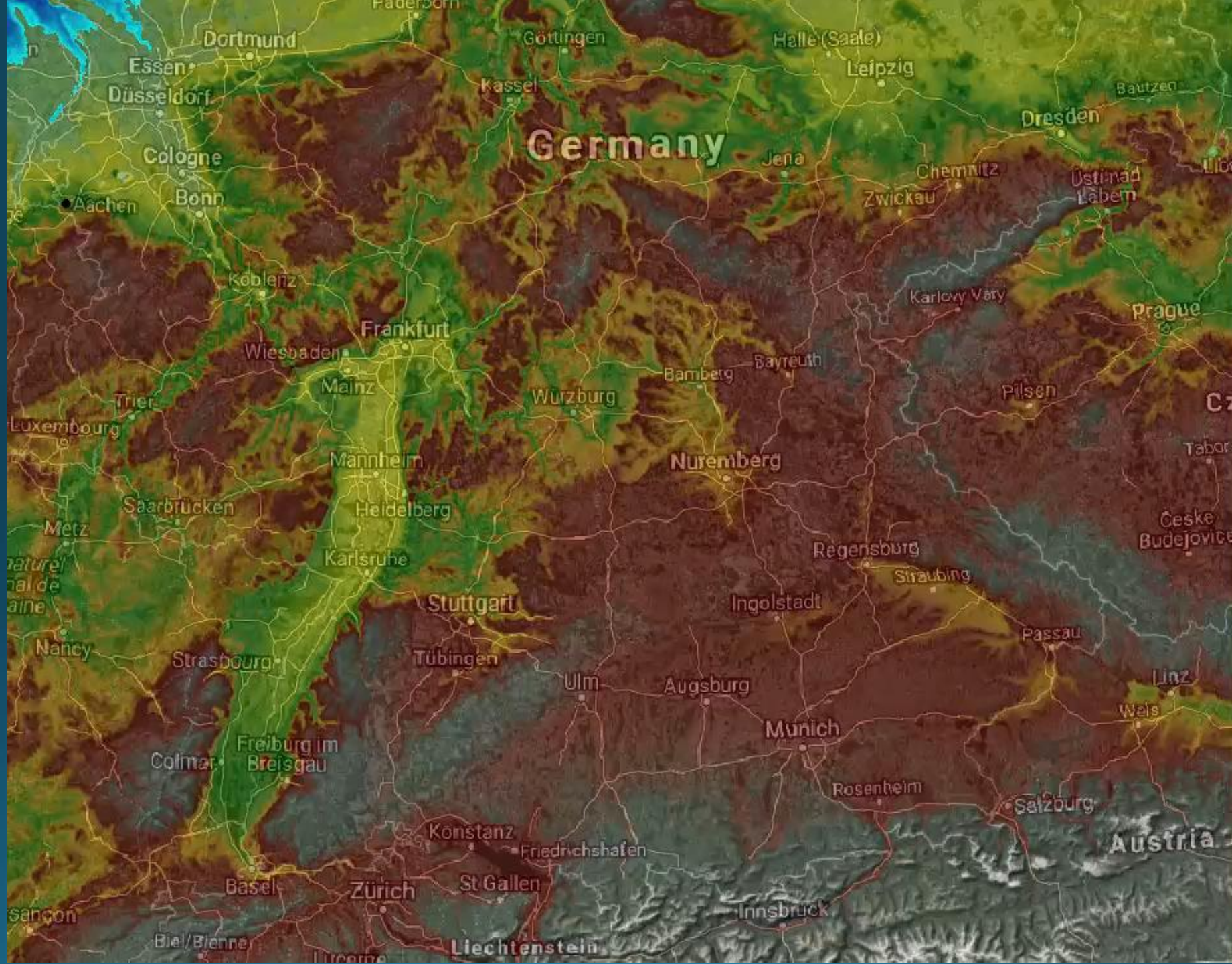
Lake Bonneville




Lake Bonneville
Lake Bonneville
Dream Mine
Bonneville Bench
Thistle, Utah
Image Landsat / Copernicus
Google Earth

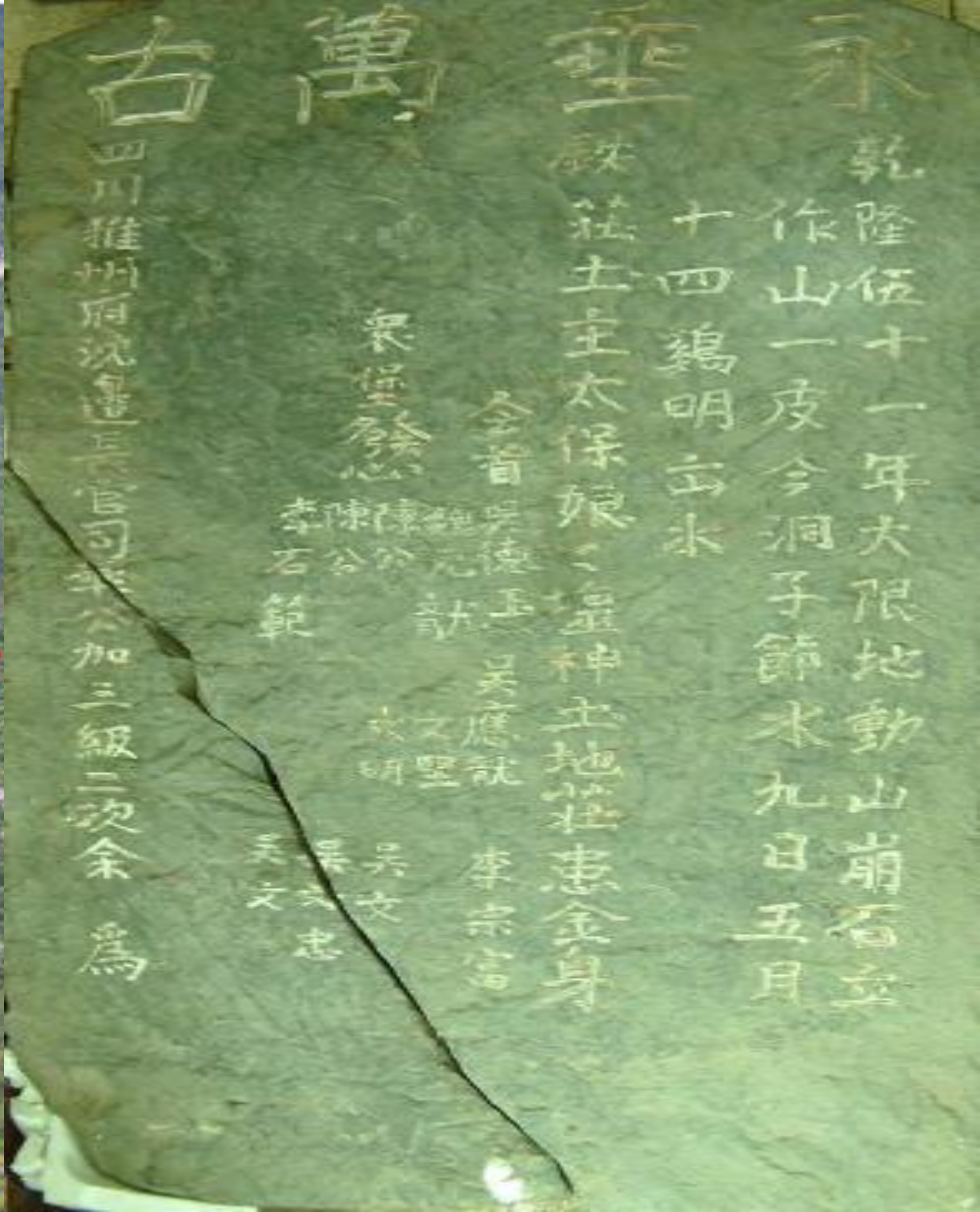
Thistle, Utah

Lake Constance




Flims
Flims
Rockslide
Image Landsat / Copernicus
Image © 2021 Maxar Technologies
Google Earth


China
Slide No.2
Slide No.1
Dadu River, 1786

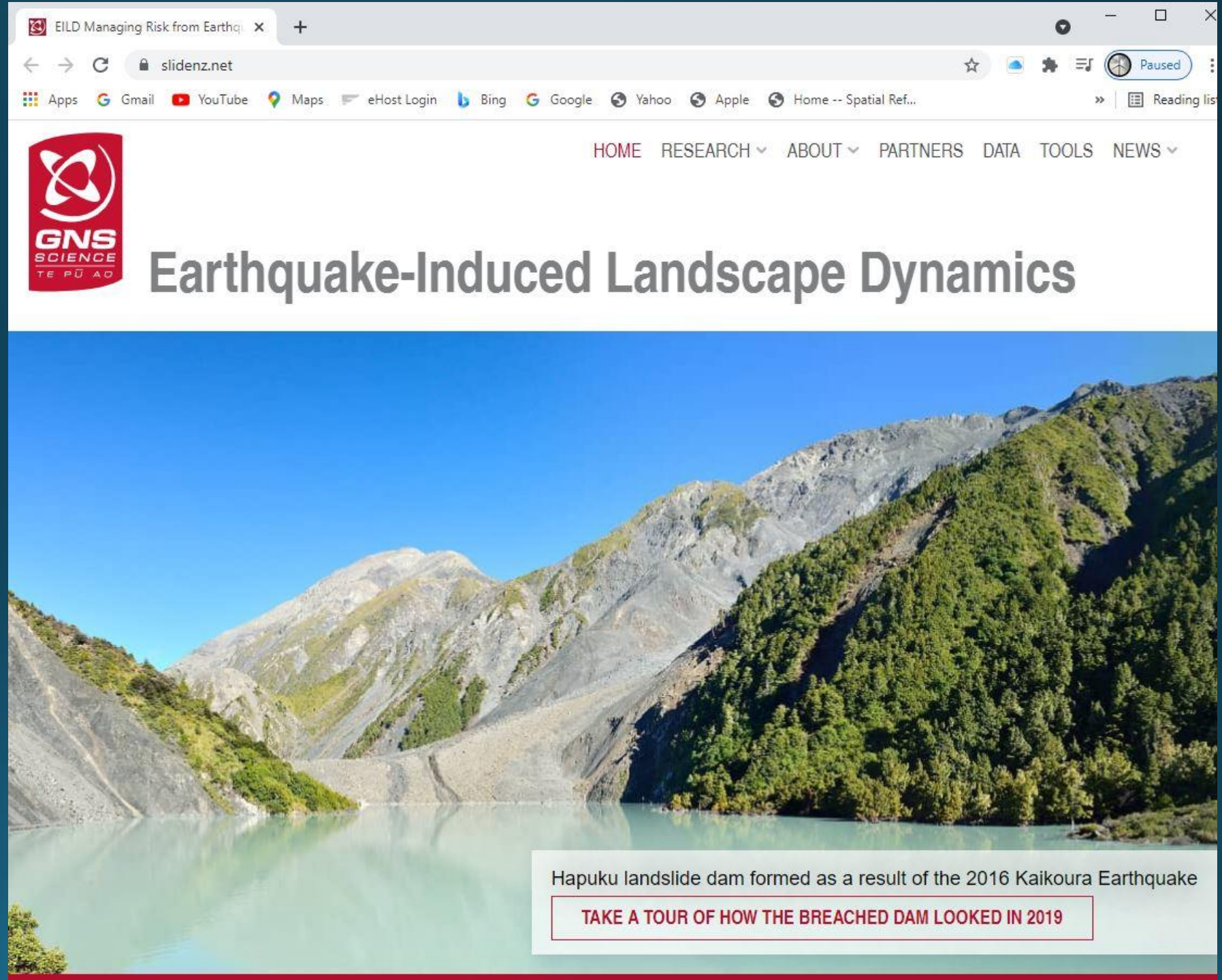

永垂萬古

China

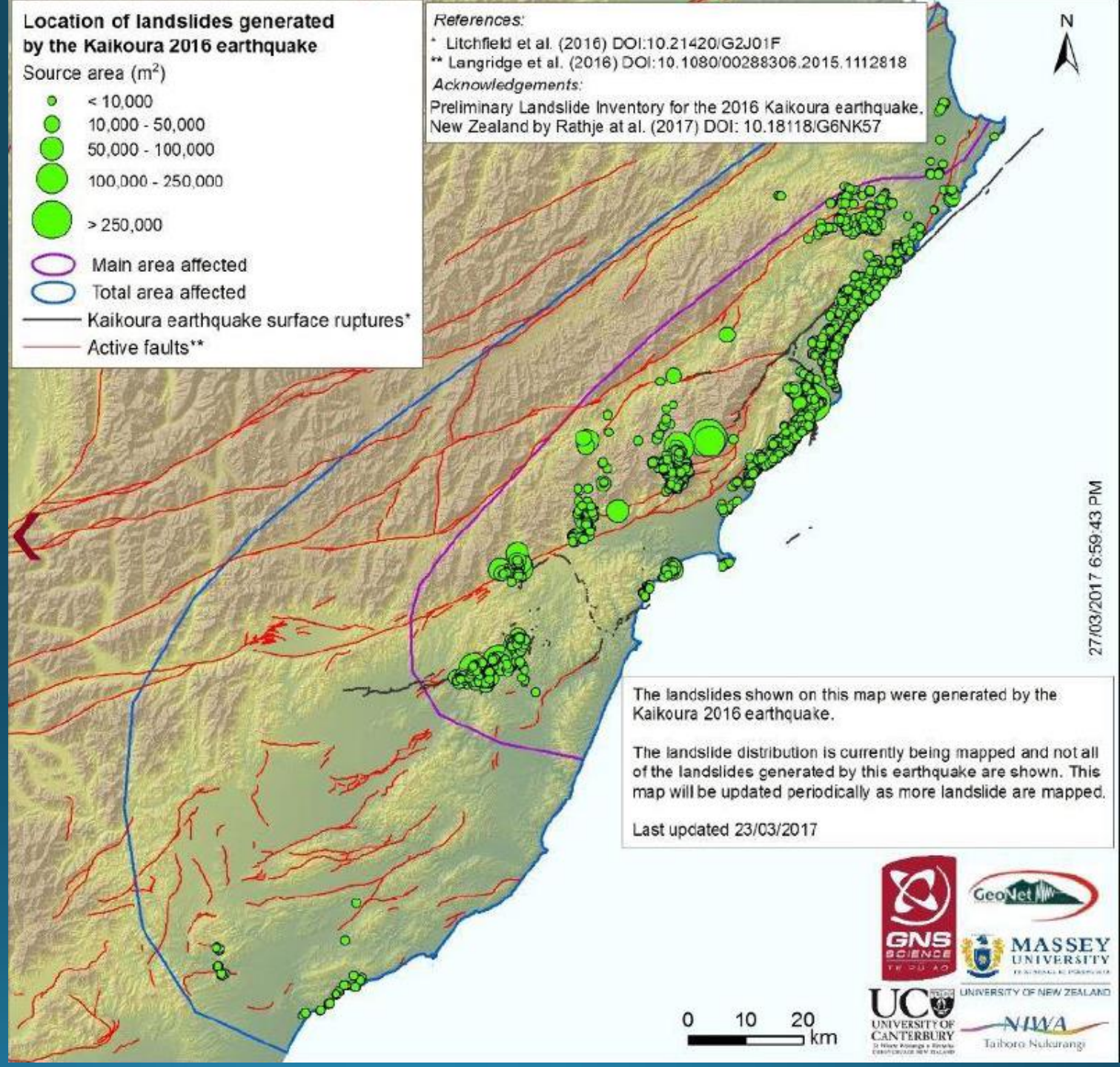
Diexi Lake, 1933 event

Landslides generated by 2016 Kaikoura Earthquake

Landslides generated by 2016 Kaikoura Earthquake

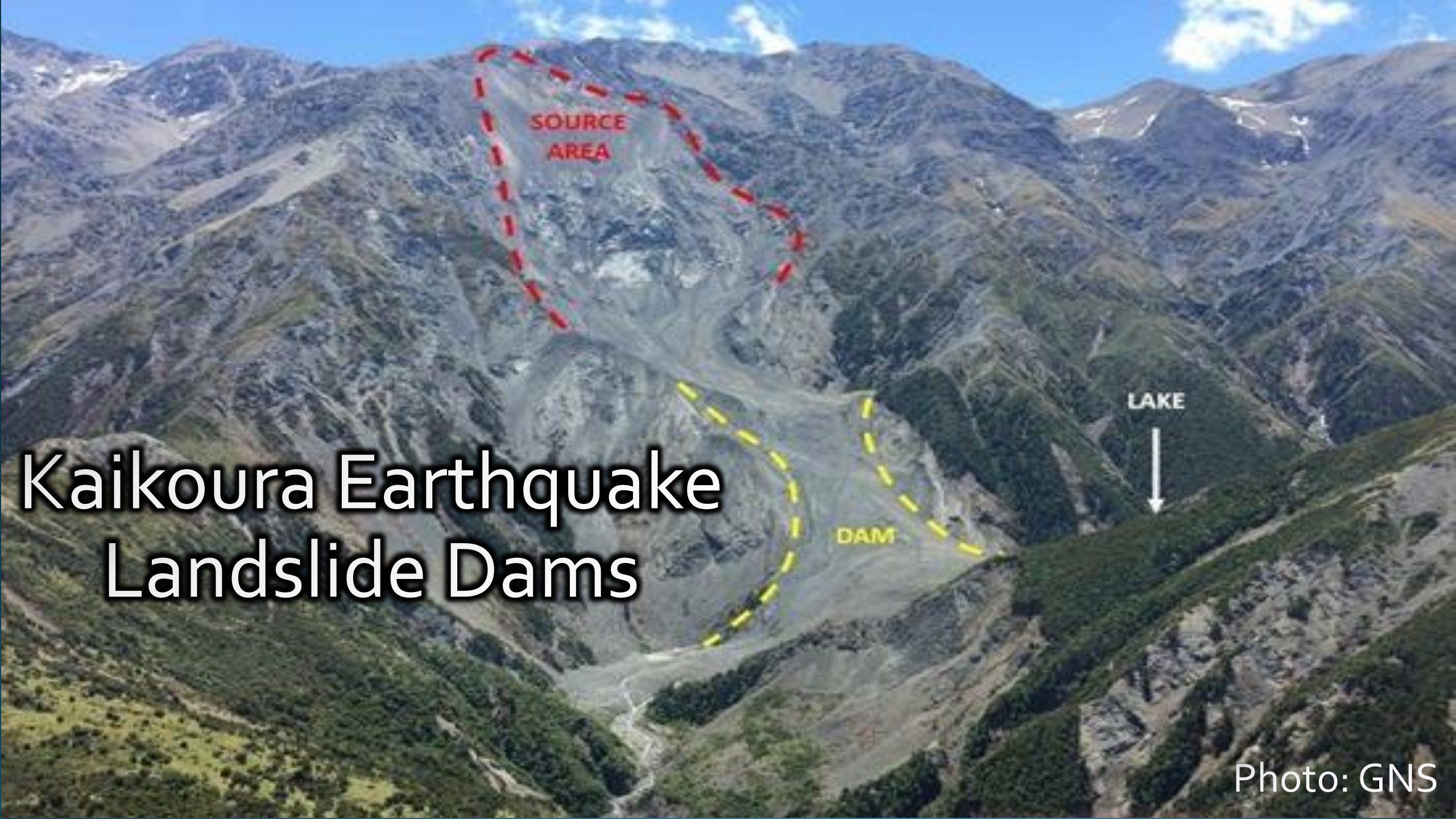


Landslides generated by 2016 Kaikoura Earthquake



Kaikoura Earthquake Landslide Dams

Photo: GNS



Kaikoura Earthquake Landslide Dams

Photo: GNS

Leader Dam

Kaikoura Earthquake Landslide Dams

Dam Breach Modelling Parameters

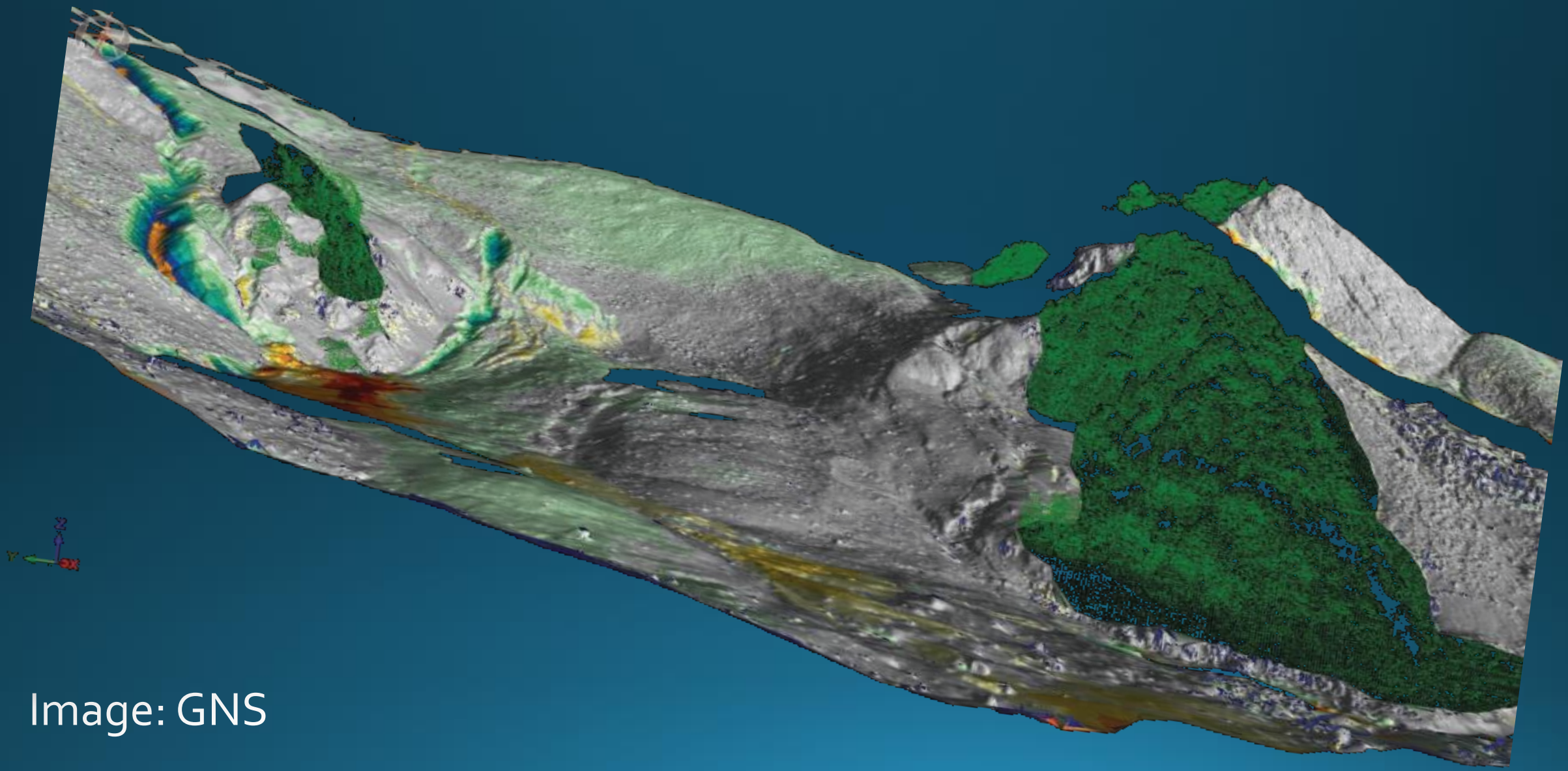


Image: GNS

Dam Breach Modelling Parameters

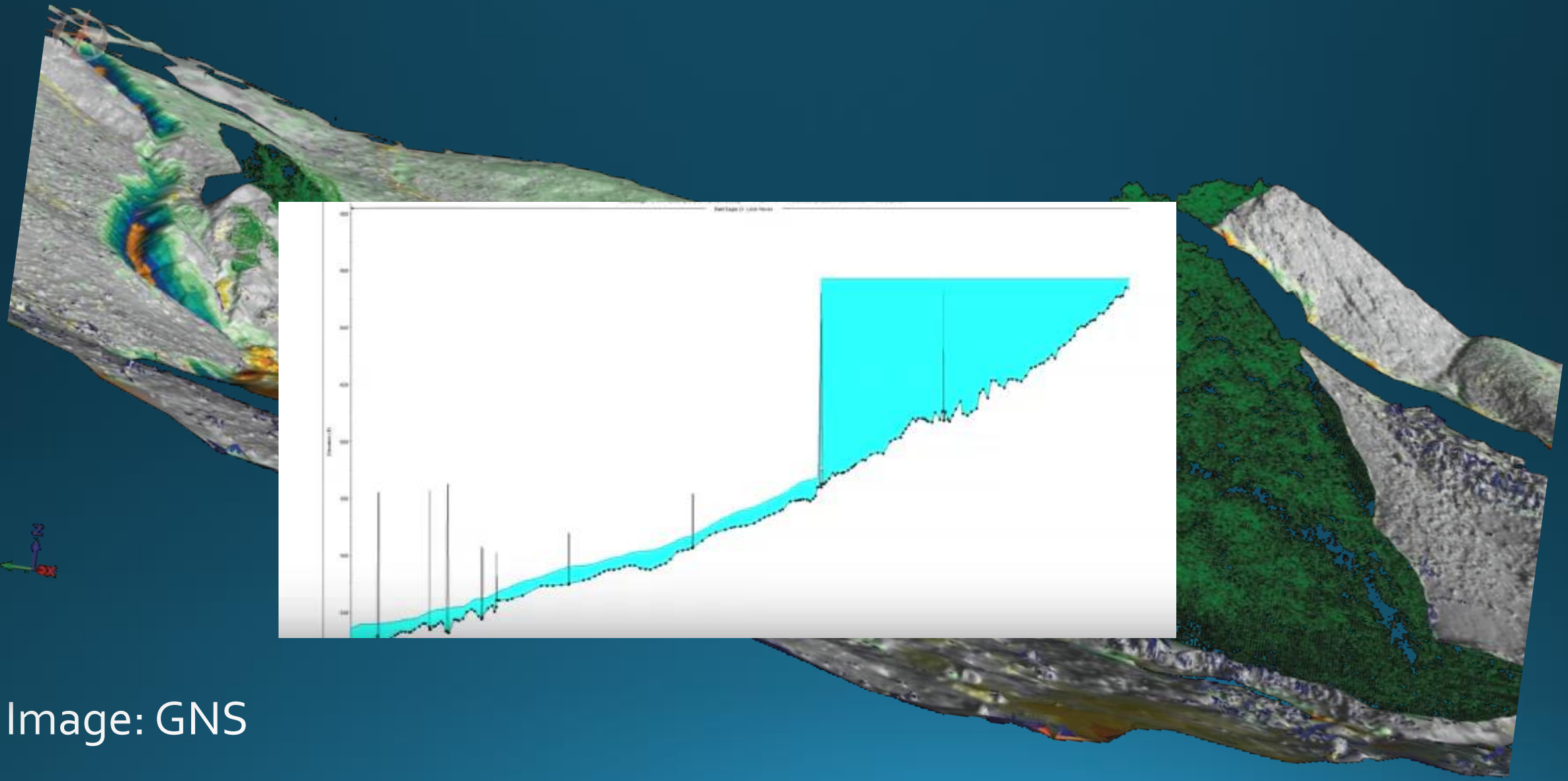


Image: GNS

Dam Breach Modelling Considerations

Terrain data: Existing and new dam

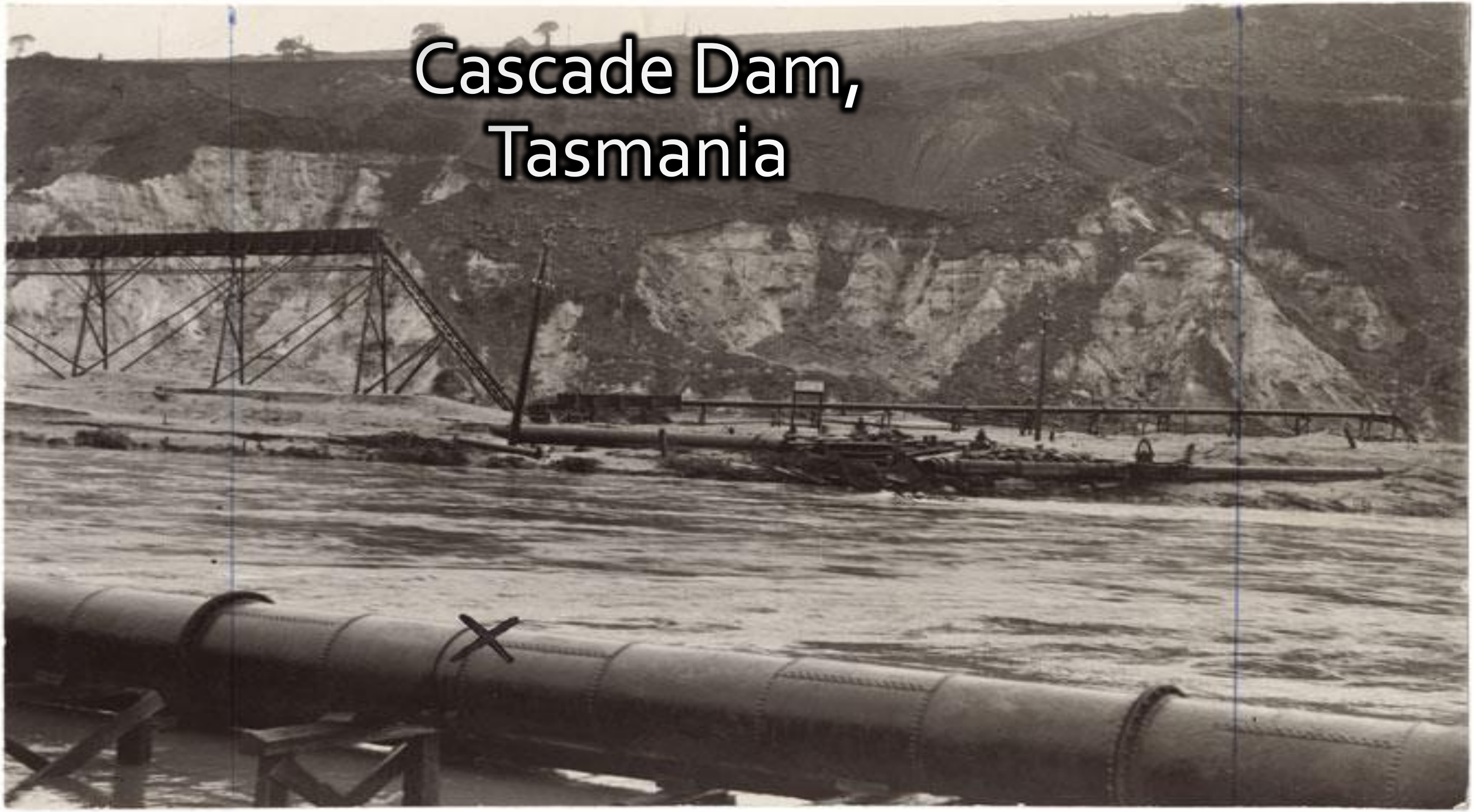
Hydrological data: time to fill and spill

Geotechnical data: breach parameters

Population and infrastructure data

Modelling parameters:
Approach, grid size, time step, run time

Australia: Lake Elizabeth, Victoria


Cascade Dam,
Tasmania


Cascade Dam,
Tasmania

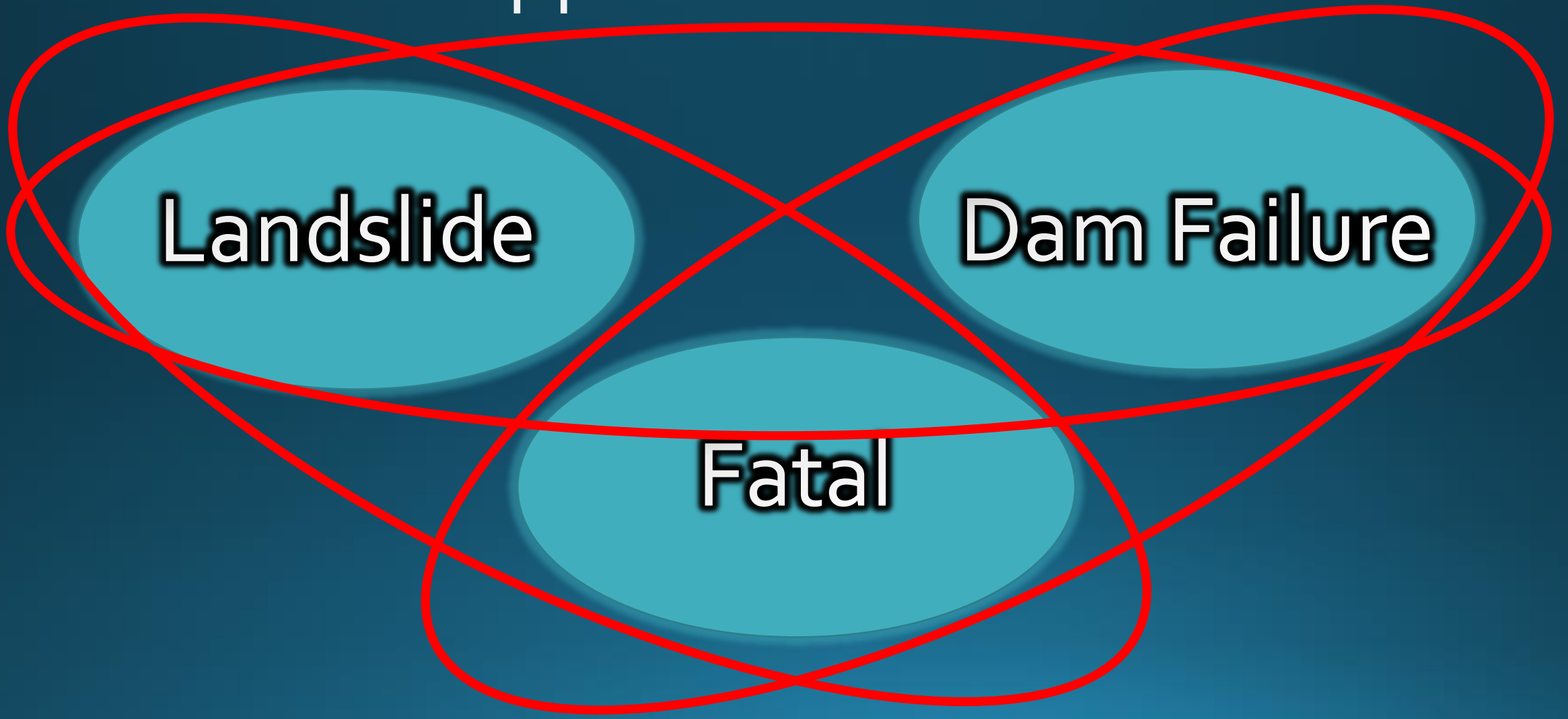
Could a fatal landslide dam failure happen in Australia?

Landslide

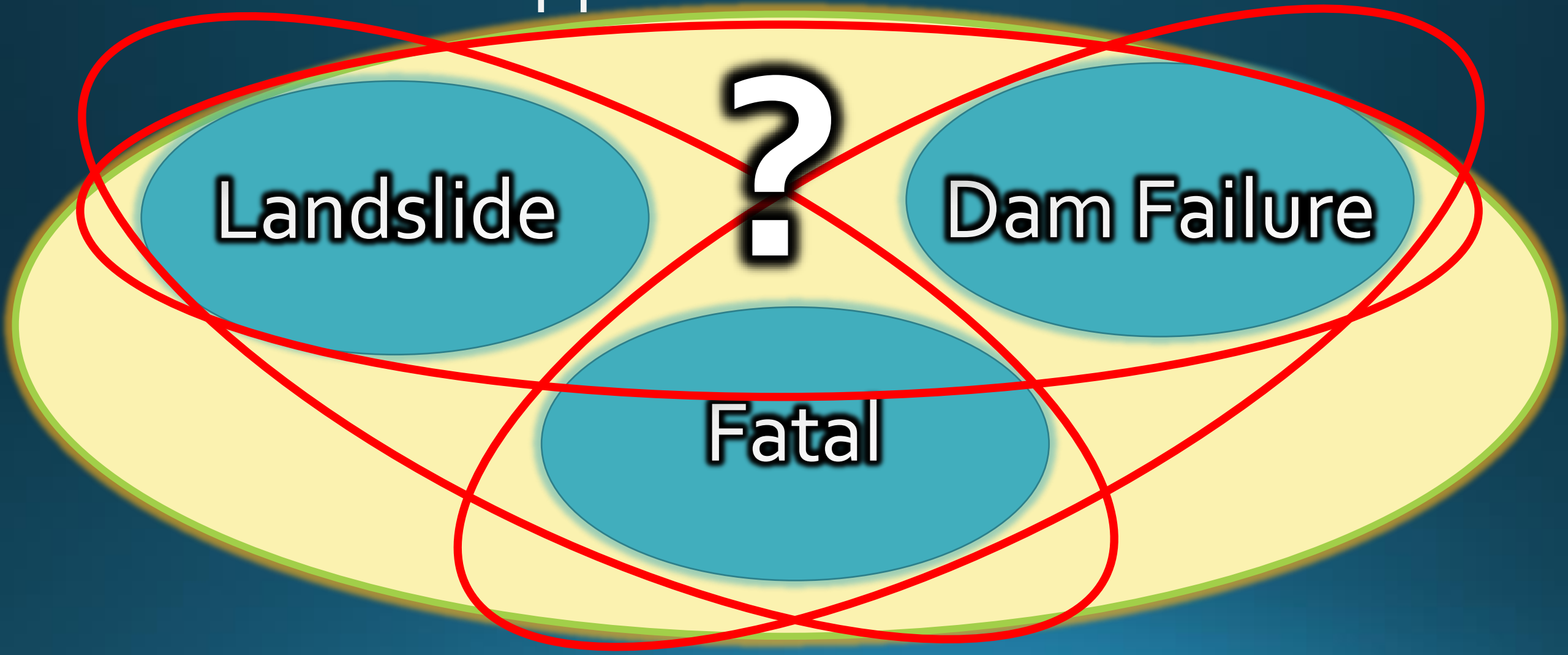
Dam Failure

Fatal

Could a fatal landslide dam failure happen in Australia?



Could a fatal landslide dam failure happen in Australia?



Mining Implications


Sunkoshi River
Nepal


Bhote Kishi River
Tibet

Climate Change + Population Growth

Future risks

Climate Change + Population Growth


#73 State and fate of the Hindu Kush H...
Watch later
Share
Future risks
Watch on YouTube

Mitigation

Mitigation

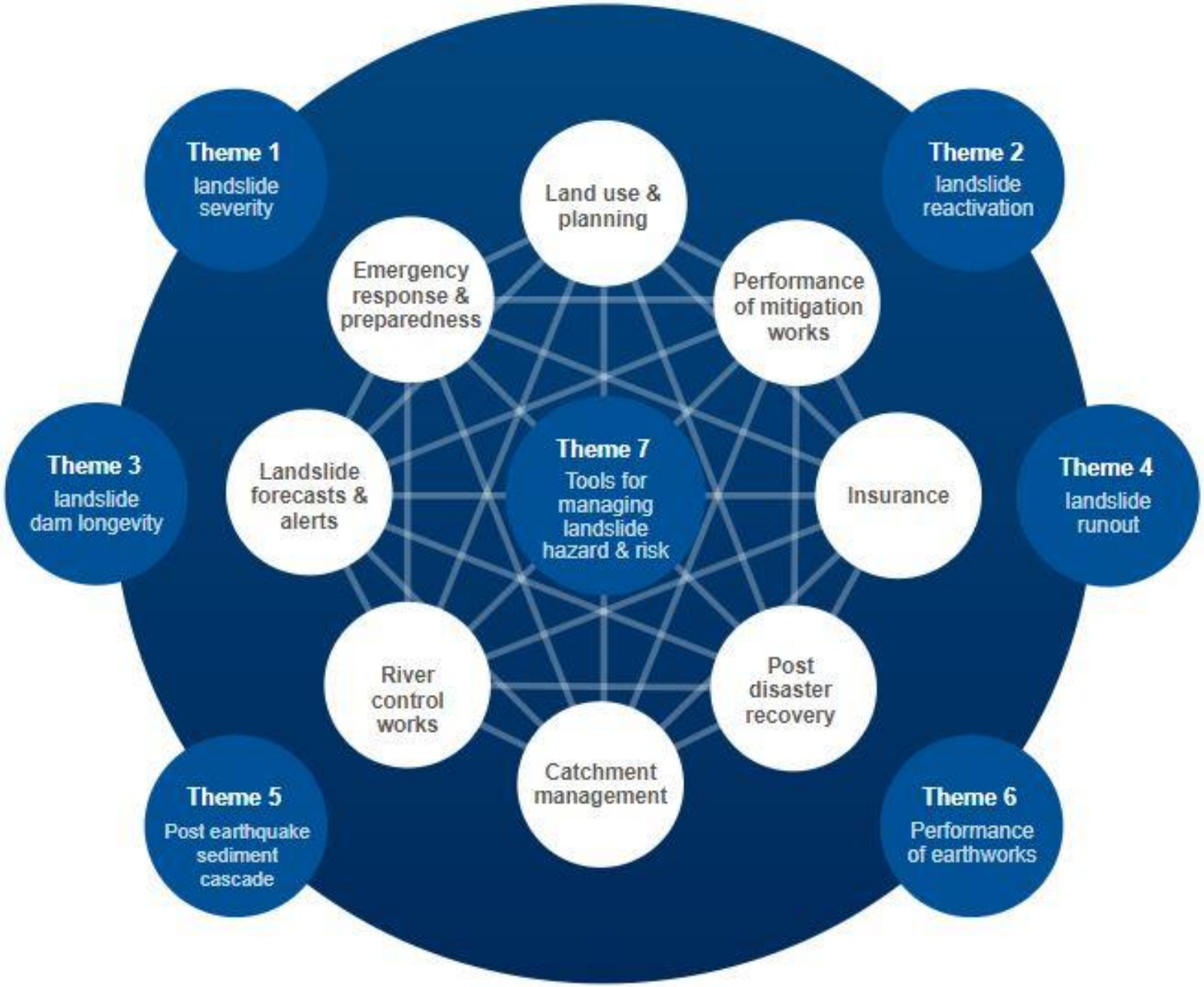
Ongoing research

- USGS landslide dam likelihood index
- National NZ landslide dam inventory
- Forecast model development
- ICIMOD glacier climate change impacts
- Kaikoura landslide dam monitoring

Managing the risk from earthquake induced landslides

Large earthquakes, like the November 2016 Mw 7.8 Kaikōura earthquake, can generate thousands of landslides, landslide dams and damage hillslopes that are susceptible to failure during rainstorms and aftershocks. This debris, when mobilised, creates new hazards, including further landslides, landslide dams, rapid aggradation and formation of alluvial fans and floodplains, and increased river channel instability, as the debris cascades from hillslope to sea. These hazards may persist for decades and therefore represent a prolonged risk that must be managed by the impacted communities and stakeholders.

Earthquake-induced landscape dynamics is funded by the New Zealand Ministry for Business, Innovation and Employment Endeavour fund. The five year programme (2018-2023) is led by GNS Science in association with a number of research partners. The research is directed to effectively manage earthquake- and post-earthquake landslide risk using an integrated set of predictive tools guided by an evidence-based decision making framework by determining over what time scales do landscapes heal after major earthquakes. The Kaikōura earthquake provides a laboratory to quantify post-earthquake landscape dynamics.



The research will:

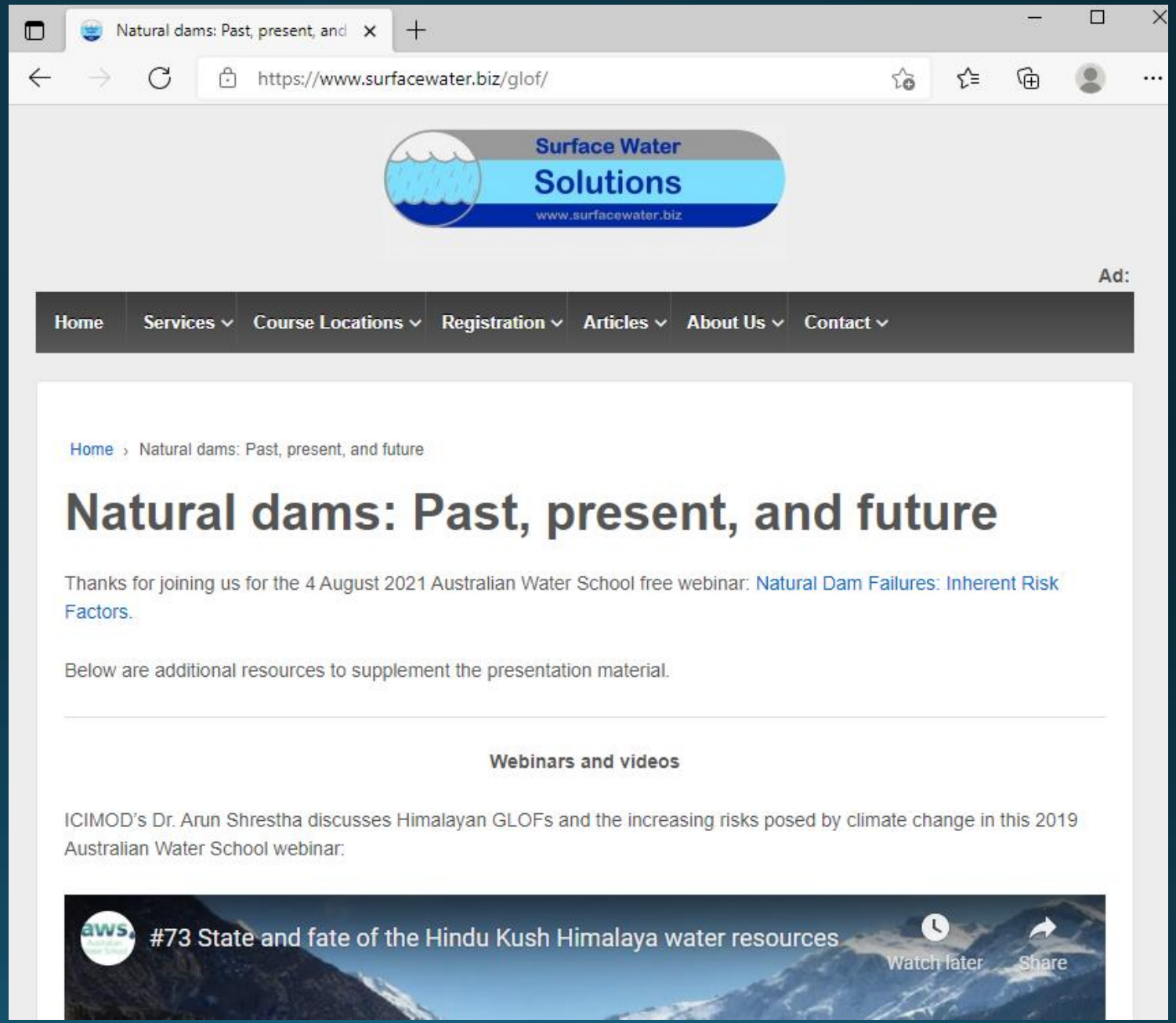
Develop a framework and tools to allow people to manage the risk to life, property and infrastructure from landslide and other sediment hazards caused by the Kaikōura earthquake and other earthquakes in NZ. The research programme has seven themes

A tool box and decision-making framework will be developed that will better inform landslide risk avoidance and residual risk-management methods and practices for people and stakeholders: 1) affected by the Kaikōura earthquake; and 2) affected by future earthquakes in New Zealand and overseas.

EXPLORE THE RESEARCH

Webinar Resources

www.surfacewater.biz/glof/



AWS Free Webinar: 4 August 2021

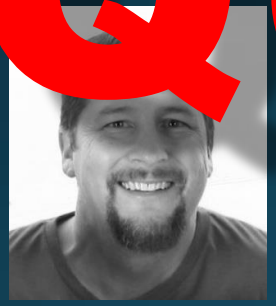
Natural Dam Failures
Past, Present, and Future

Presented by:

Chris Goodell

Kleinschmidt Associates

QUESTIONS?



Surface Water Solutions

aws Australian Water School