

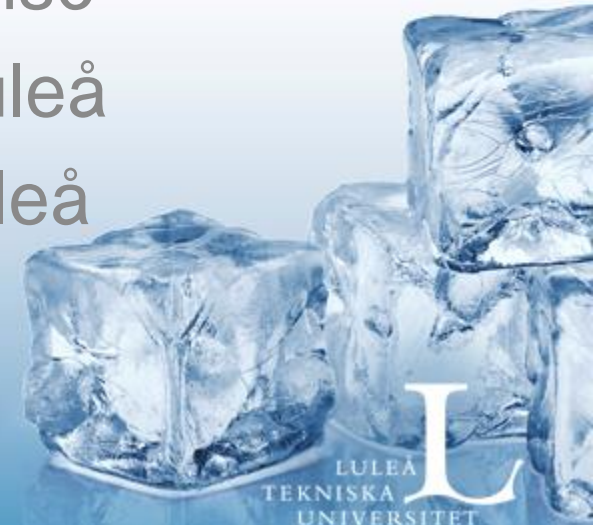


Remote sensing with satellites

Using satellite data (InSAR) to monitor surface movement for dam safety assessment

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Dams have to be safe

- during mining operation
- during remediation
- during long period of time after closure

Mount Polley, Canada



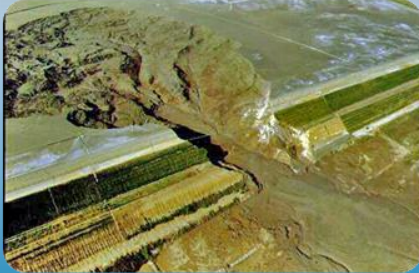
Aznalcóllar, Spain



Kolontár, Hungary



Merriespruit, South Africa



How do we know if a dam is safe?

We look at:

- Seepage
- Foundation
- Slopes
- Materials used
- Design
- Deposition methods
- etc



Factor of Safety (FoS)

We want a safety margin and use a Factor of Safety (FoS); 1,5 (1,3)

FoS is given from calculations based on:

- Failure mode
- Known and assumed mechanical properties of materials
- Geometry
- Calculation method
- Experience
- etc



Can the wanted FoS be verified?

Not easily as:

- FoS is calculated and cannot be measured
- Physical parameters can be measured
 - Pressure
 - Force
 - Deformations
 - Etc



Strategy and one goal of RESEM project: Dam safety viewed in real time

- Observation of the dam by satellite
- Evaluate surface movements from satellite data
- Calculate dam behavior for wanted FoS by e.g numerical modeling
- Identify expected movements at surface points

OK if observed $<$ expected

NOT OK if observed $>$ expected

Observations also give critical sections

