Coupling GIS and field data for landslide hazard predisposition assessment and mapping, using 3D geological modelling

Case study of the Graity mountain, Canton of Berne, Switzerland

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Situation of the Graity mountain (BE)

3D geological model
- Integrating dips
- Spreading the geological information using the calculated dips
- 3D geological model in guise of a virtual boreholes grid

3D homogeneous geological units
- Mapping the geological formations according to the geotypes
- (X, Y) levels (sampled data)
- Homogeneous geological units 3D modelling

Simulated piezometric level
- Measured transmissivity according to the homogeneous geological units
- Hydrographic network and measured piezometric levels
- Simulated piezometric level

3D factor of safety
\[ FS = \frac{c + \left(\gamma \cdot \cos \alpha - u\right) \cdot \tan \phi}{\left(\gamma \cdot \sin \alpha + \gamma_w \cdot i\right) + \gamma_w \cdot i} \]
- c: cohesion (Pa)
- \gamma: unit weight of the formations (N.m\(^{-3}\))
- \gamma_w: unit weight of the water (N.m\(^{-3}\))
- \alpha: slope (°)
- u: pore water pressure (Pa)
- \phi: internal friction angle (°)
- i: hydraulic potential gradient (-)

Stabilizing and destabilizing factors

Map of slope instability predisposition

Pre-existing mitigation work

Summarizing map of the factors with positive or negative effect on stability

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