Weathering, rock type, bedrock incision and landslides in a tropical environment:

The Ruzizi gorge in the Kivu Rift, Africa

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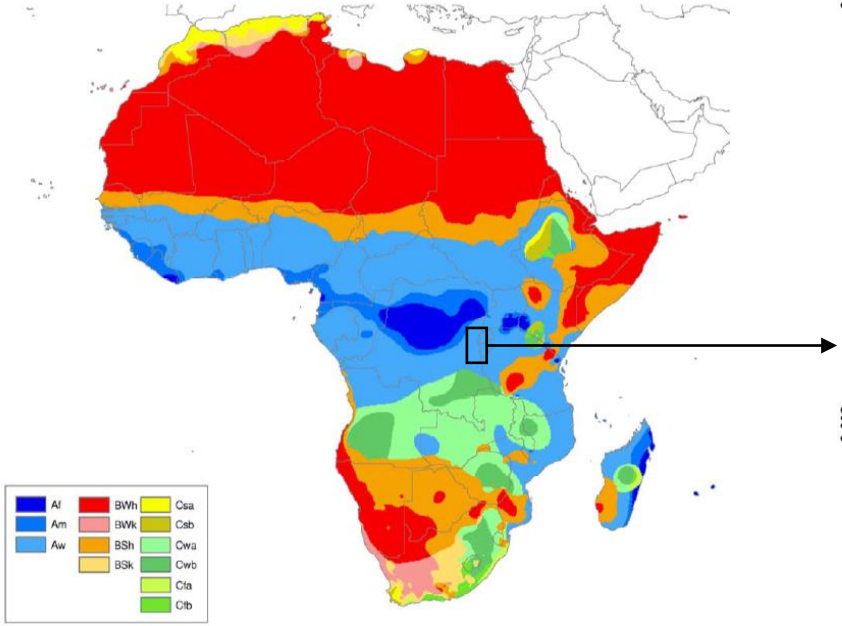
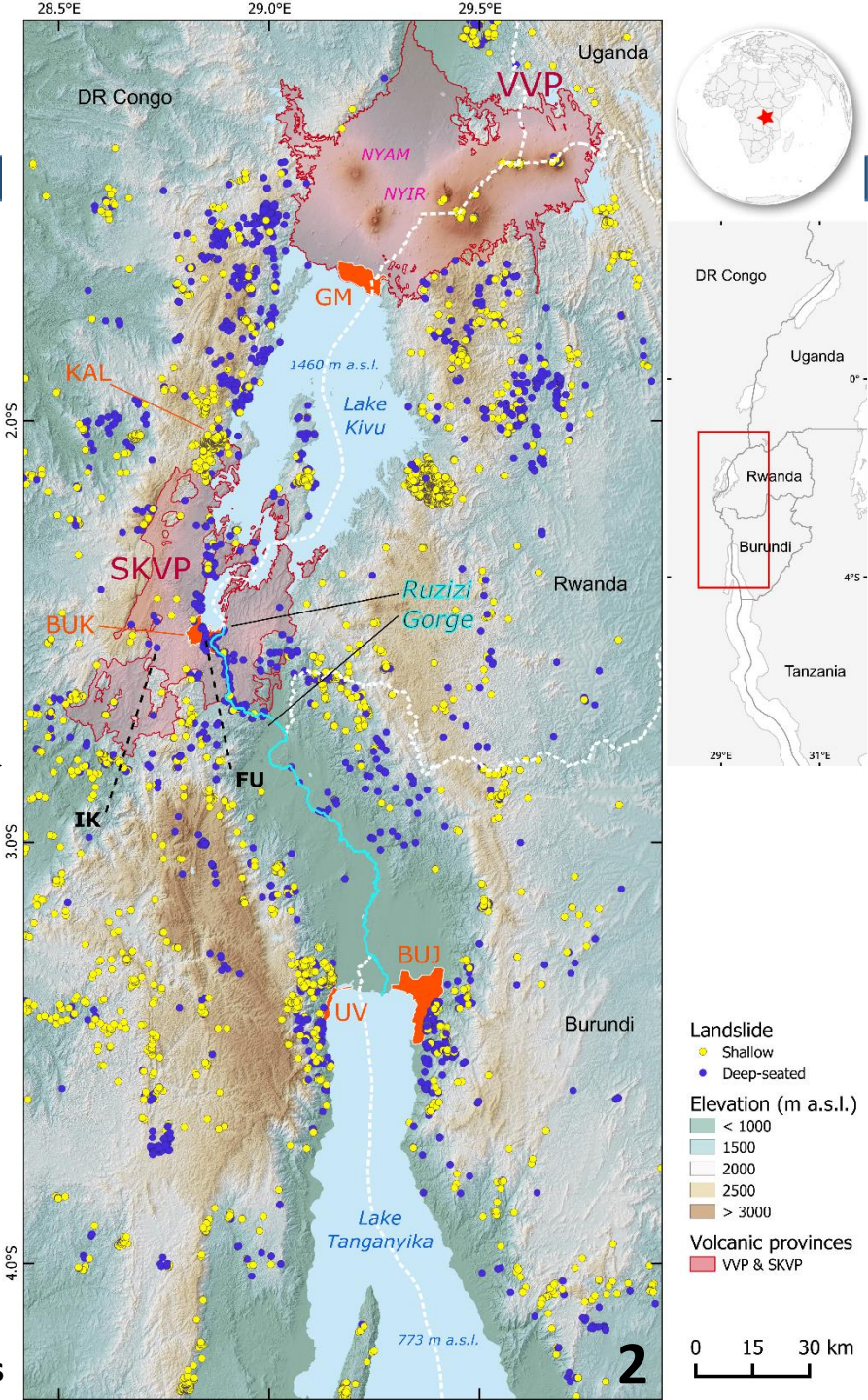
North Tanganyika - Kivu Rift region

- Landslide hotspot
- Natural predisposition factors
- Combination of triggering factors
- Data poor context



Peel et al., 2007. HESS



Dewitte et al., 2021. Landslides

Ruzizi gorge

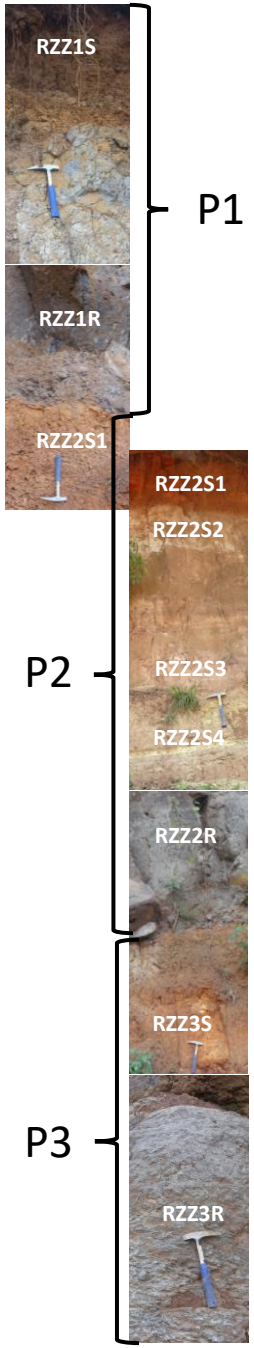
- Locate on the first 40 km of the Ruzizi river
- Between DRC and Rwanda
- 10,000 years old
- Lake Kivu level 100m higher
- Very high incision rate

- Volcanic and metasedimentary rocks
- Deeper weathering in volcanic rocks

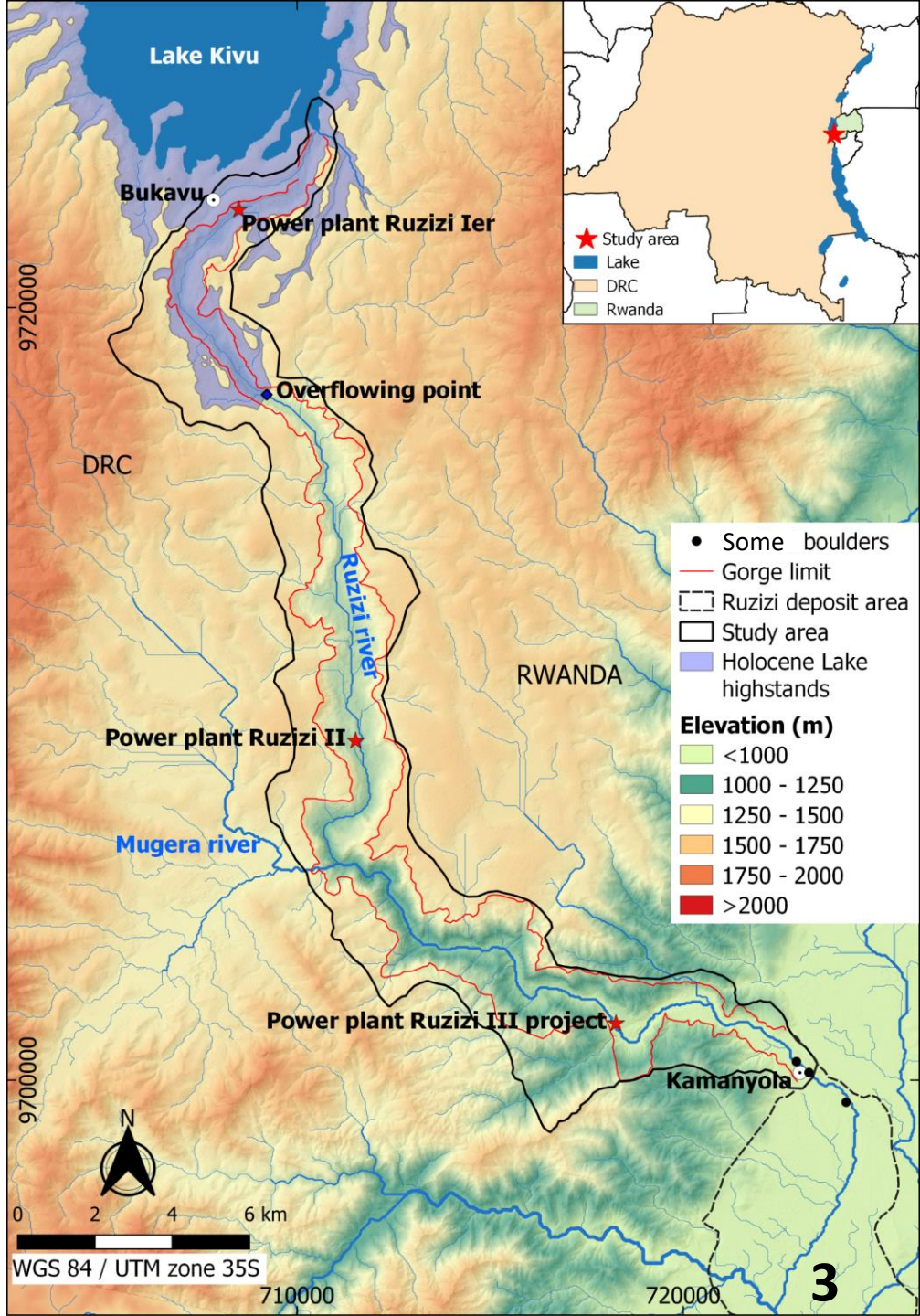
Objective :

To investigate the role of weathering and rock type on landslide occurrence, size and process

Stratified volcanic profiles



Metased profile



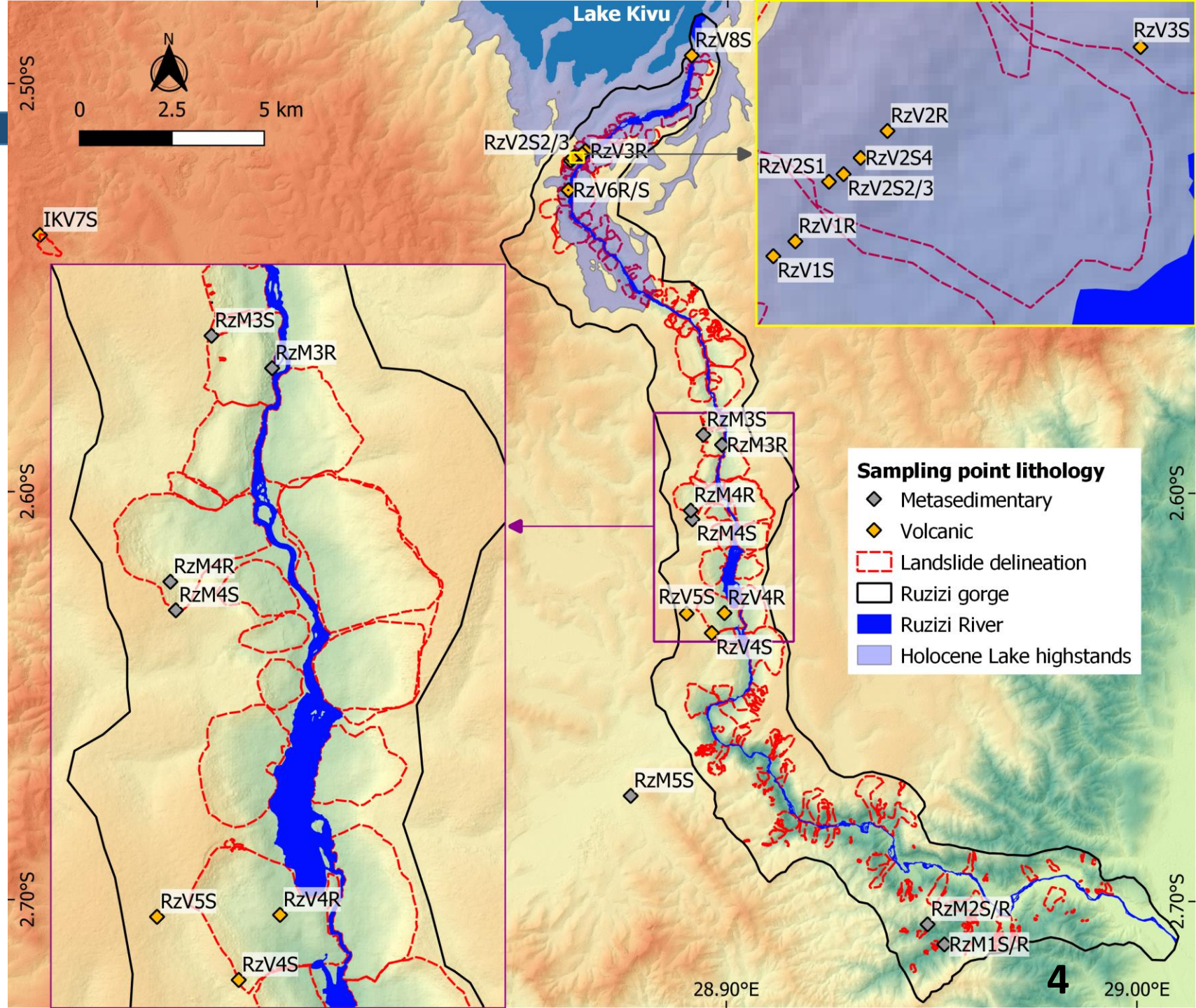
Methodology

- Sampling of soil and rock
- Inductively Coupled Plasma–Optical Emission Spectroscopy
- X-Ray Diffraction
- Thin sections
- Geotechnical tests

Sampling strategy

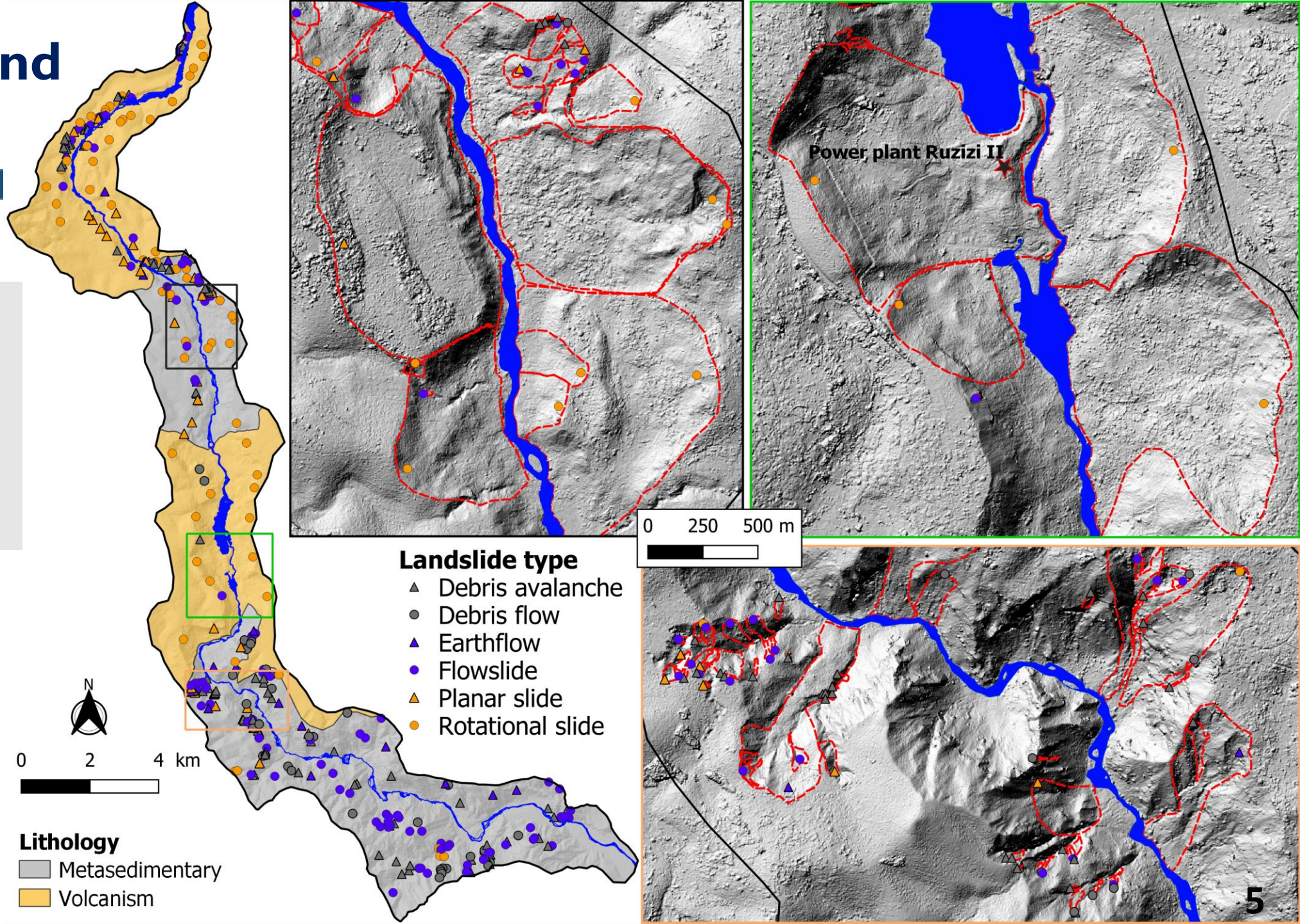
13 weathering profiles:

- 8 in the volcanic rocks
  - 6 in the area rejuvenated by the bedrock incision (of which 4 within landslides)
  - 2 in the relict area (of which 1 within landslide area)
- 5 in the metasedimentary rocks
  - 4 in the area rejuvenated by the bedrock incision (of which 3 within landslides)
  - 1 in the relict area (outside landslides)

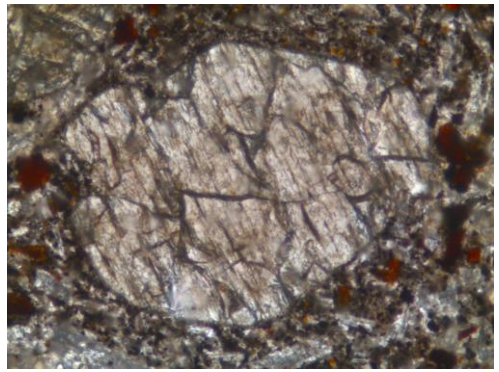
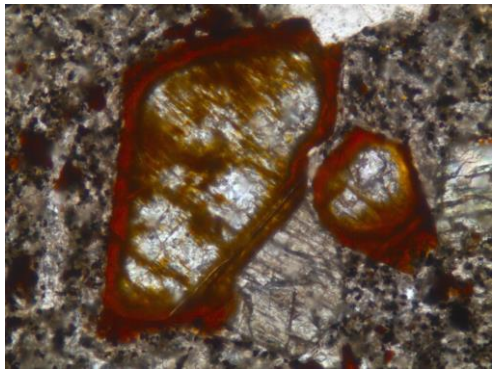
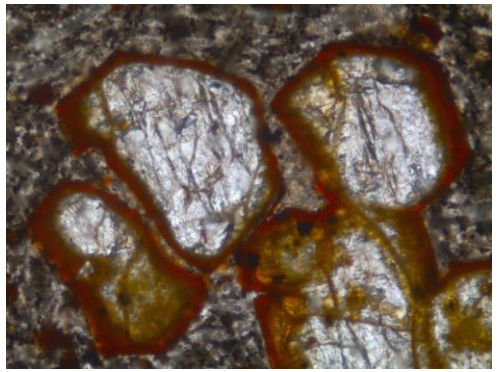
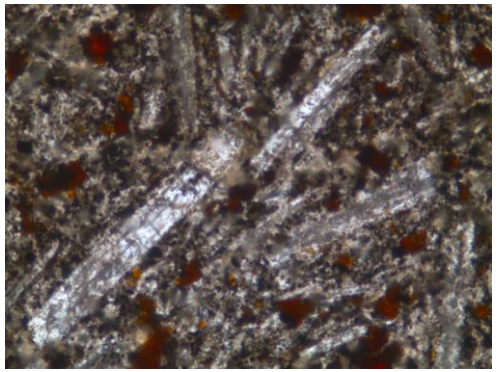
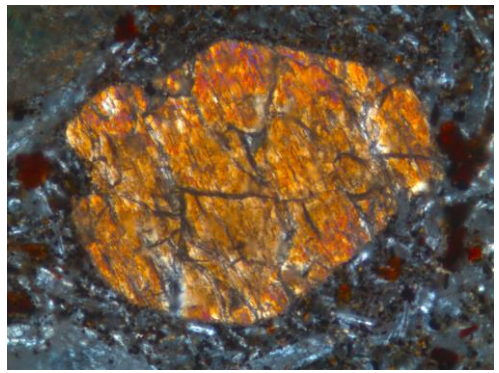
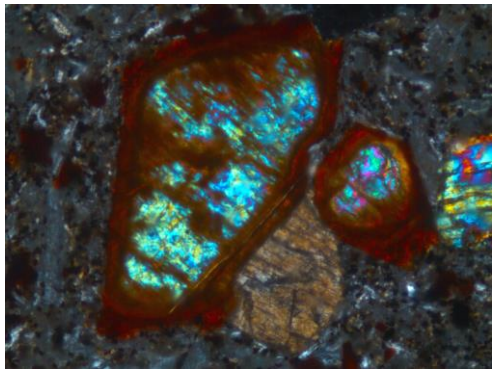
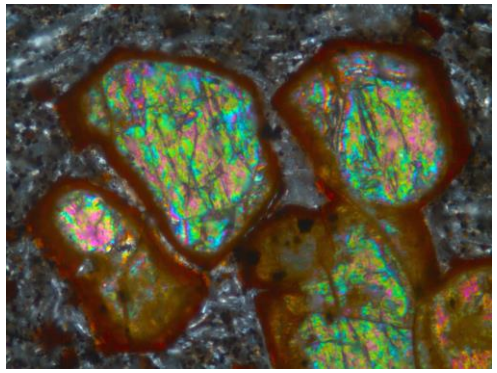
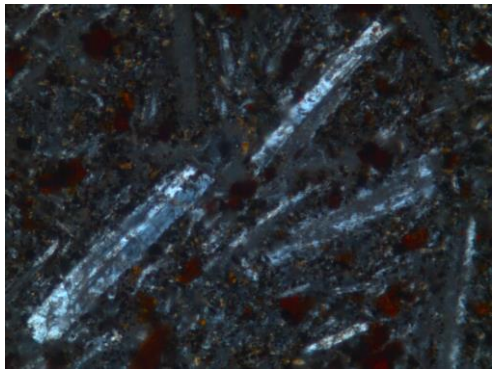


Landslides and lithology

- 385 landslides
- Different types
- Different process
- Different size
- Link with lithology



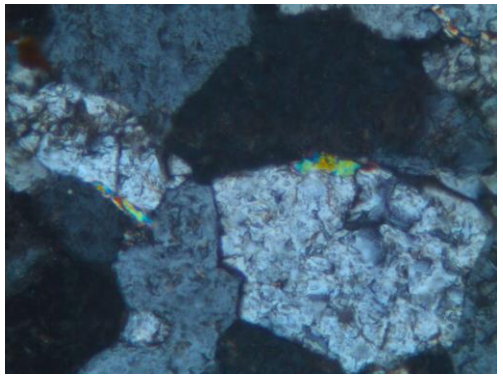
Rock type : volcanic rocks

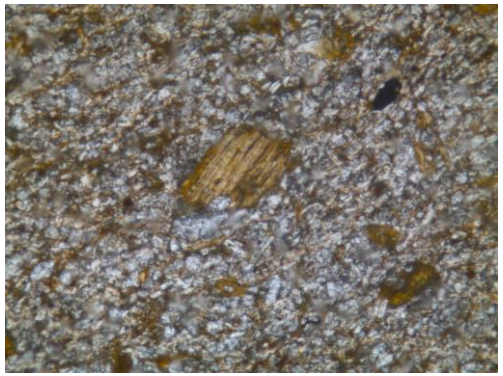
Augite | Olivine | Olivine_iddingsite | Plagioclase

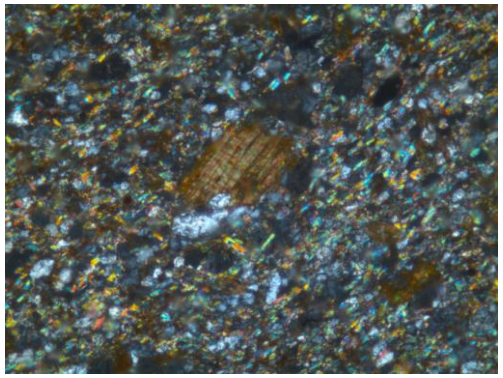
Basalt and basanite

Rock type : metasedimentary rocks

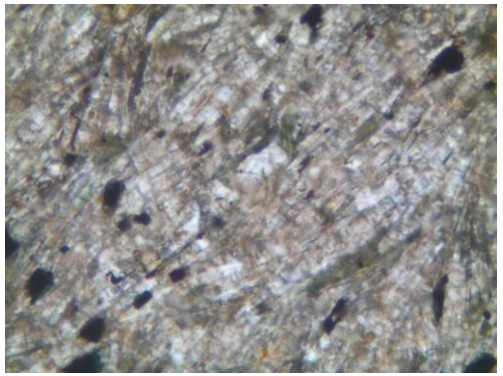


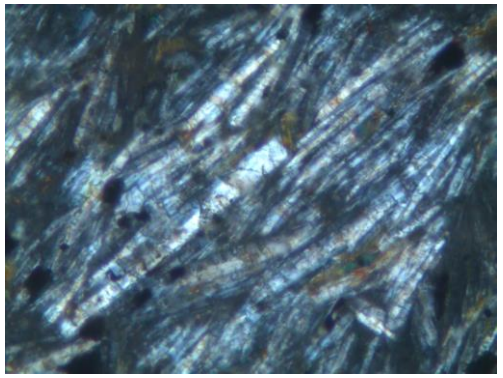
Quartzite





Schist





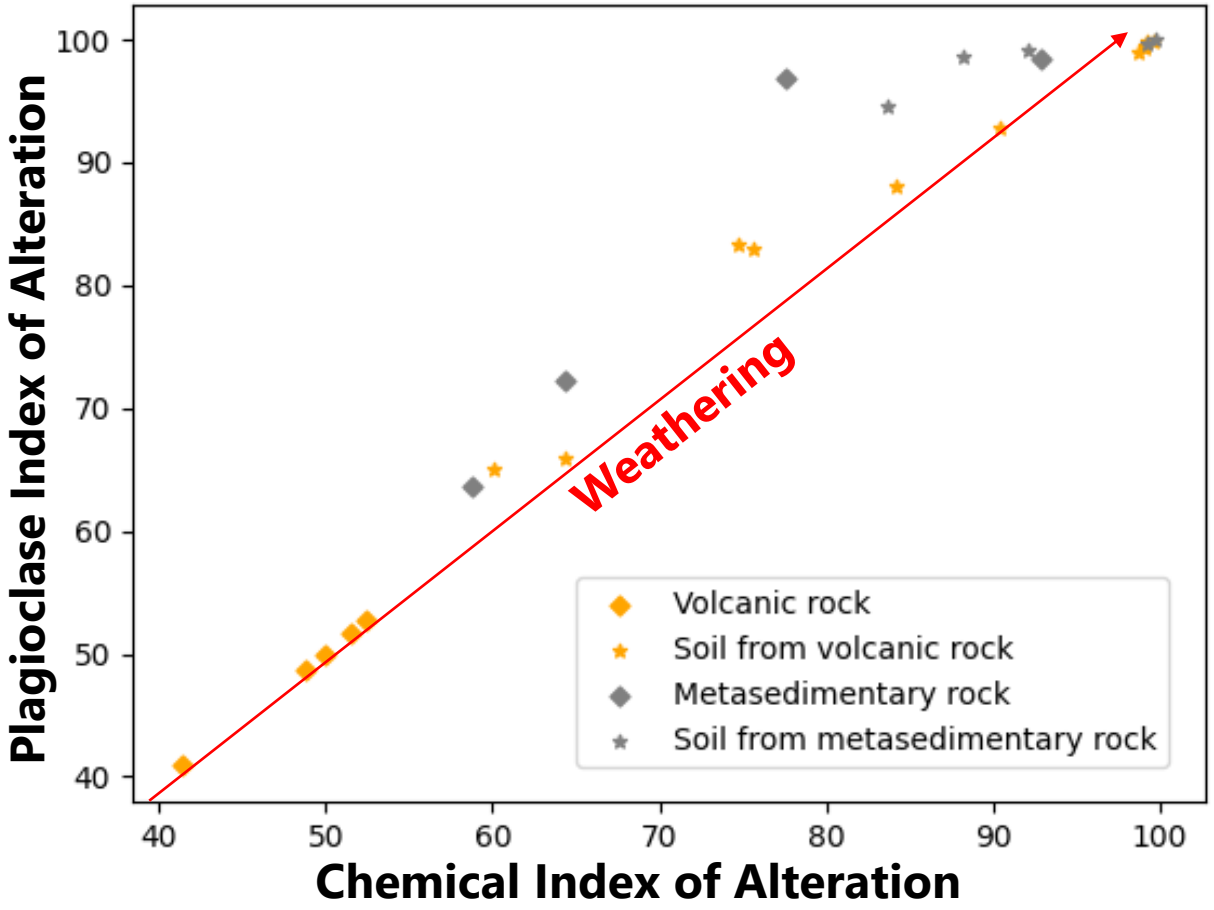
Quartz-schist

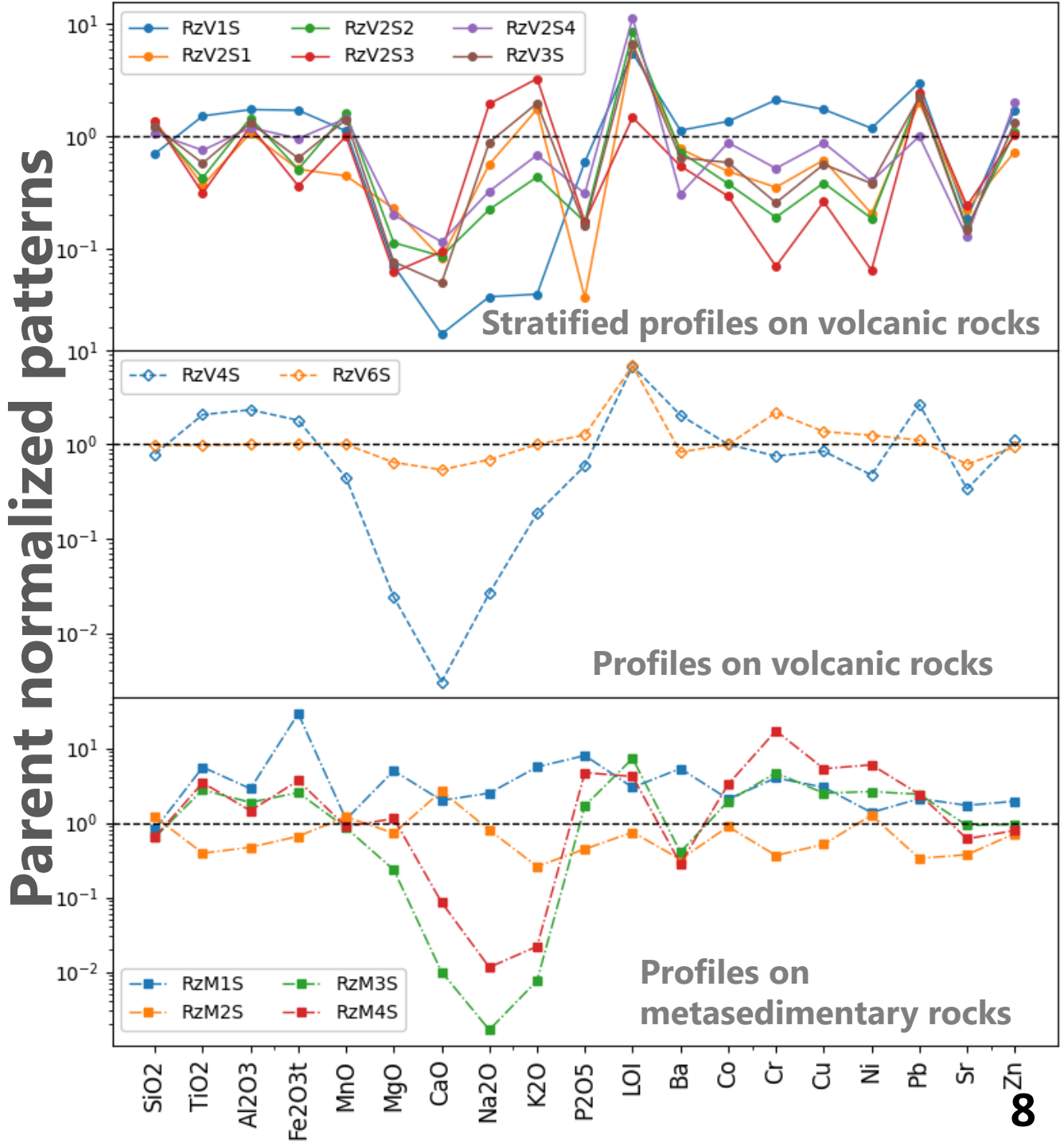
North

Grey

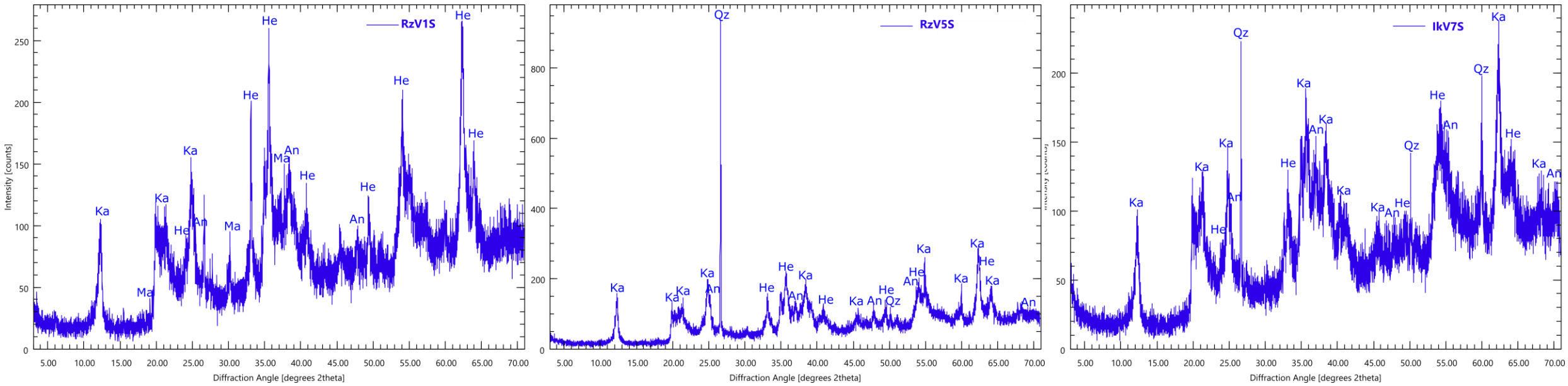
Weathering

Chemical changes and weathering index vs landslide size and process



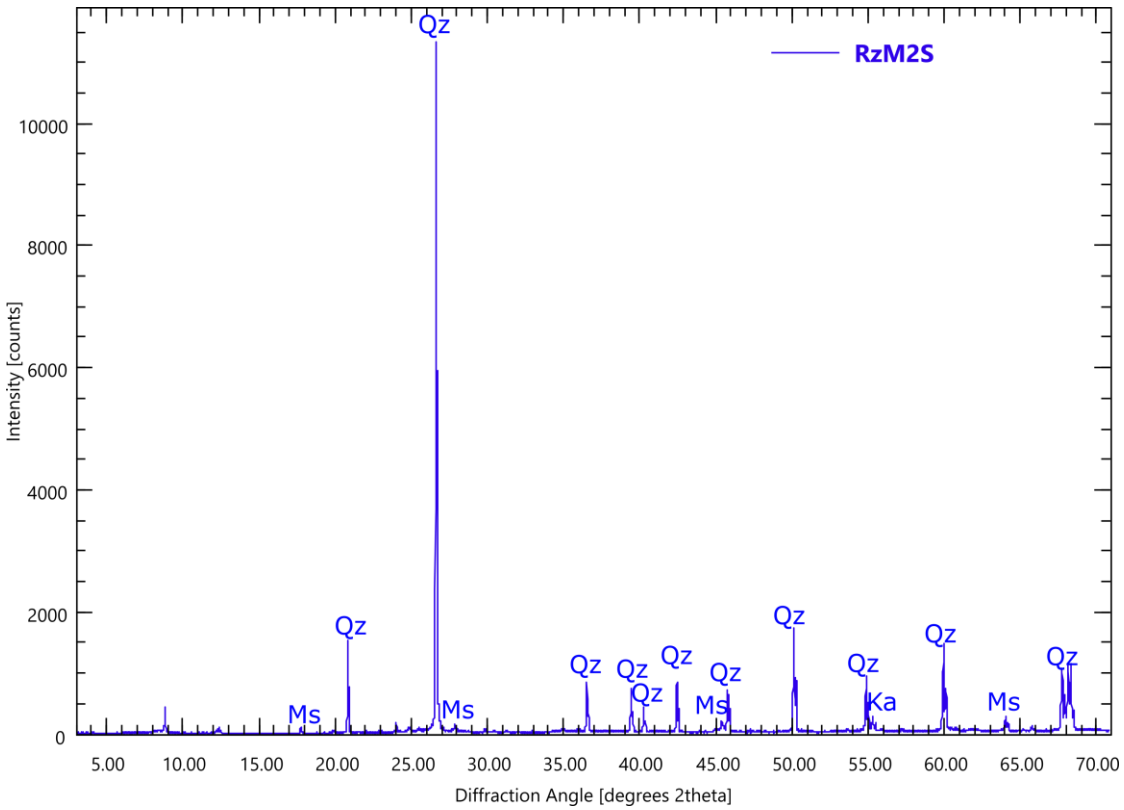


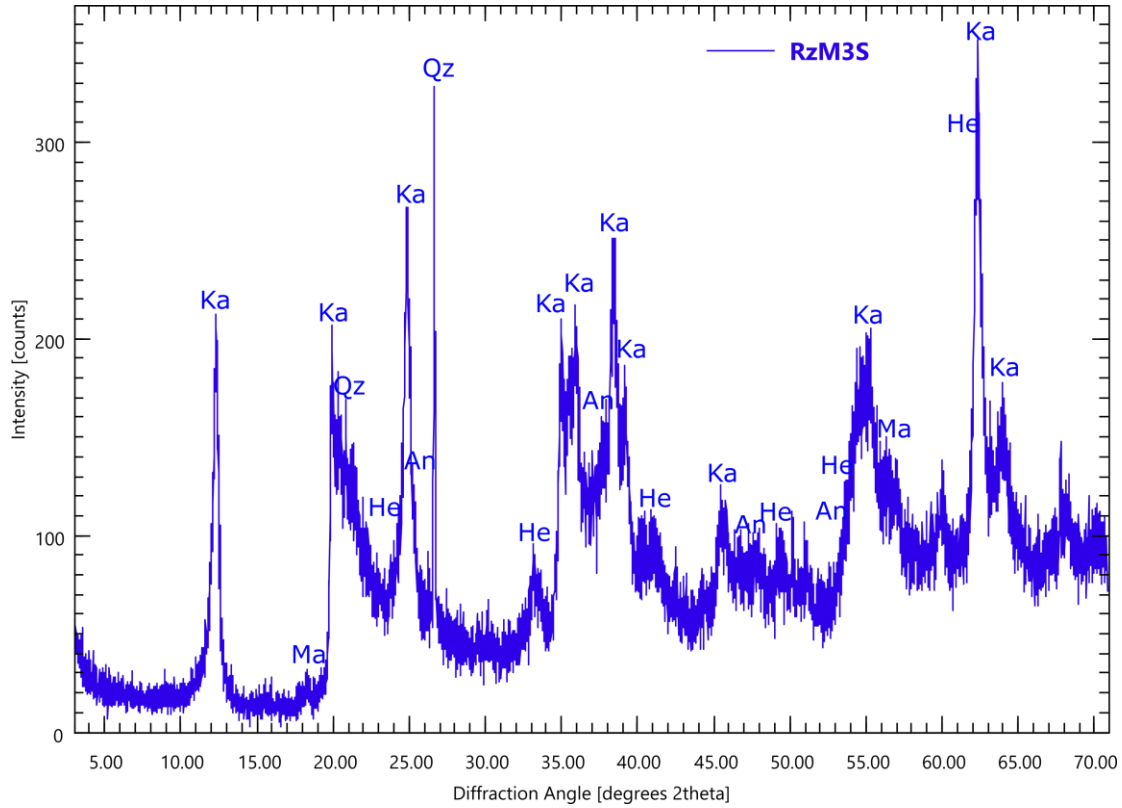
Soil mineralogy : from volcanic rocks



Ka: Kaolinite, **Ma**: Magnetite, **He**: Hematite, **An**: Anatase, **Qz**: Quartz

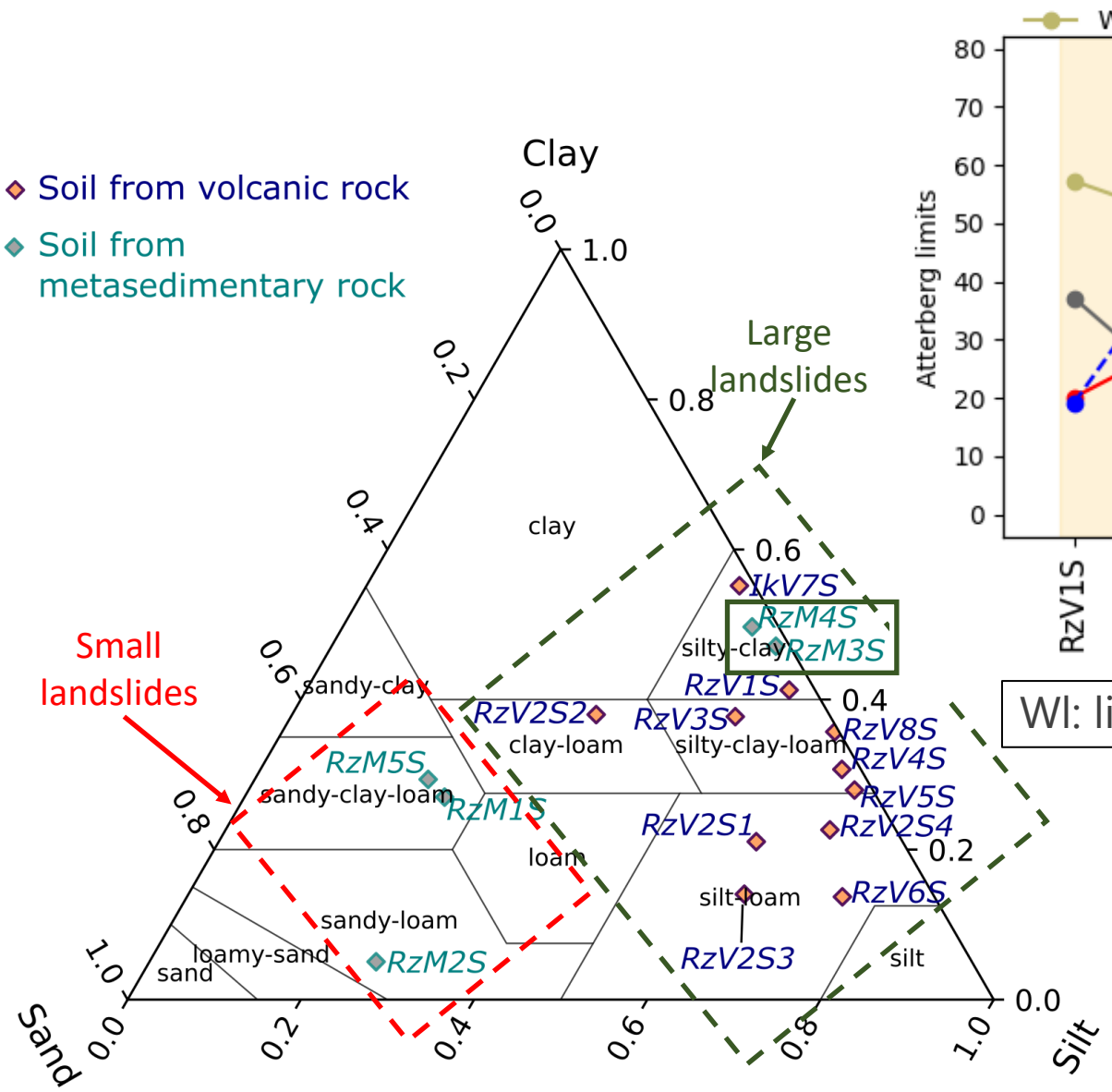
Soil mineralogy : from metasedimentary rocks

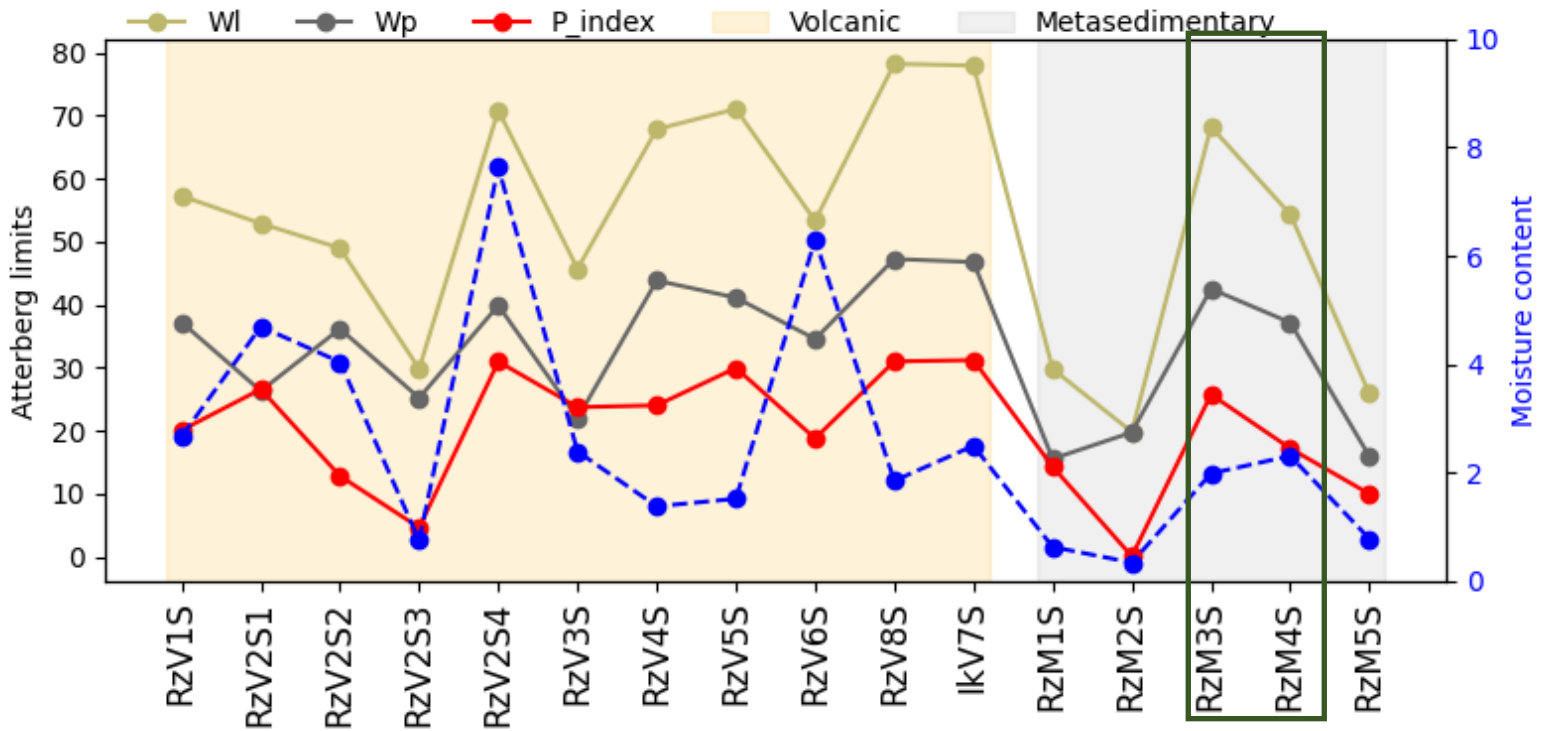




Ms: Muscovite, **Qz**: Quartz, **Ka**: Kaolinite, **Ma**: Magnetite, **He**: Hematite, **An**: Anatase

Soil mechanical properties





Wl: liquidity limit, Wp: plasticity limit, P_index: plasticity index

- The size and process of landslides vary with soil texture, plasticity and moisture.

Weathering and rock type have a control on landslide size and process distribution

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