

# Reconstruction constraints on the Estero Parraguirre ice-rock avalanche in 1987, Central Andes of Chile: New insights from remote sensing and numerical modeling.

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**Research aim:** Reconstruction of the characteristics of the Estero Parraguirre landslide with new remote sensing data and a numerical model.

## Event introduction:

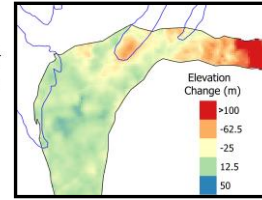
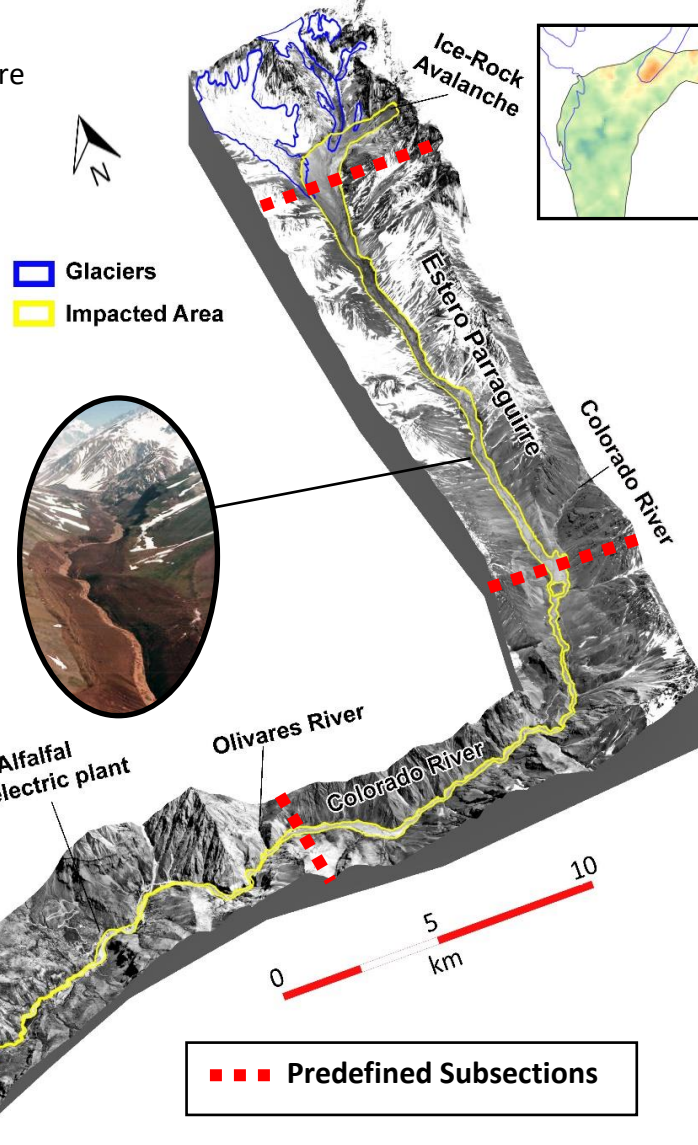
- Where: Estero Parraguirre 60 km east of Santiago
- When: 29.11.1987
- Run-out distance: 57km
- Estimated release volume:  $\sim 6 \times 10^6 \text{ m}^3$  (HAUSER 2002)

## Data:

- DEM derived from 1:50,000 maps from 1955 (using kriging method)
- DEM derived from aerial photographs from 4.12.1987 using SfM techniques
- Elevation changes derived from the 3D co-registered DEM between 1955 and 1987
- Impacted area derived from 1987 orthomosaic
- Glacier outlines derived from aerial photographs 1955 (MARANGUNIC, 1979)

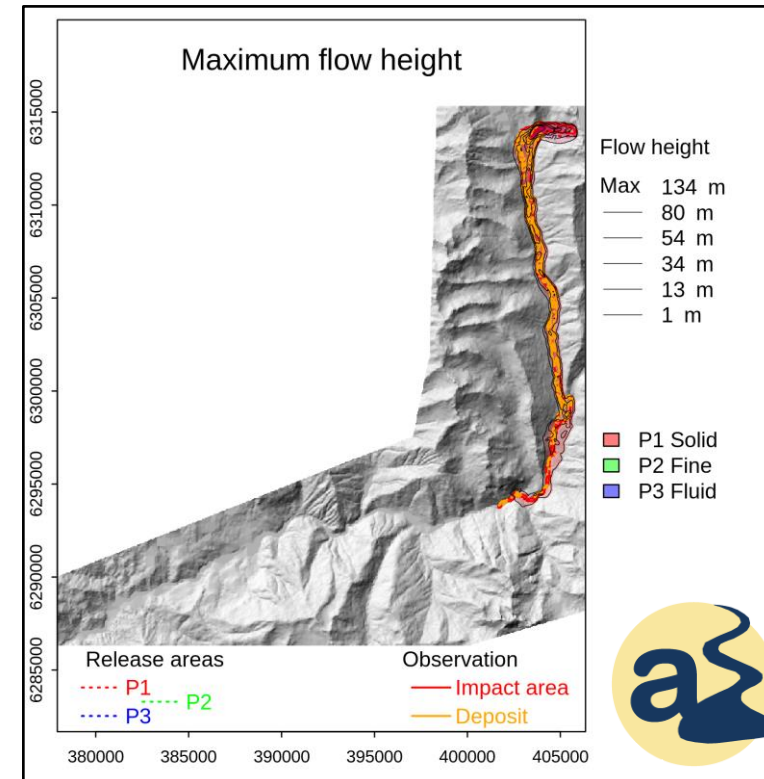
## Methods:

- Preprocessing of raster data
- Multi-Phase mass flow model (r.avaflow)
- Sensitivity analysis on release volume, friction parameters and entrainment heights



## Preliminary results:

- Elevation change and model results indicate higher release volume:  $\sim 17 \times 10^6 \text{ m}^3$
- Impacted area (until Maitenes plant):  $\sim 12 \times 10^6 \text{ m}^2$
- Entrainment and melting of ice in the upper part led to lower friction angles
- Presence of river system in lower valley facilitated large areal extent  
--> river discharge effect is difficult to include



- Estimates of propagation time appear too low. Simulations indicate faster advance of debris flow (default settings)

## Outlook

- Appropriate simulations of the rivers within the model
- Consider dam breach near Colorado/Parraguirre river junction
- Increase of computational power to run multiple model runs with highest spatial and temporal resolution