Testing the ideal ice-core record for past temperature reconstructions using combined isotope and impurity analyses

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Characterised by
- low accumulation (~ 20 cm snow per year)
- high stratigraphic noise level (Münch et al. 2016, 2017)
- strong noise from precipitation intermittency (Laepple et al. 2018, Casado et al. 2020)

We created a new trench of 50 m length x 4 m depth to obtain combined, representative and subannually resolved profiles of isotope and impurity composition.
The 2D stratigraphy allows testing for a common deposition history.
Studying depositional characteristics: Mean profiles

Comparison of the trench mean profiles enables us to study the influence of precipitation intermittency:

- strong isotopic maxima (summer) coincide with very low Na\(^+\) concentration.
- weak isotopic maxima tend to occur with strong Na\(^+\) signals.
First tentative results...

- Residual 2D stratigraphy around the mean profiles suggests a common redistribution:
  - positive correlation between $\delta^{18}$O and Na$^+$ residuals
  - however weak: $\sim$ 0.3
  - what explains the remaining variability around the mean?
- Preliminary dating (layer counting) suggests a link between the summer signals:
  - strong negative correlation ($\sim$ −0.75) observed between isotopic and Na$^+$ summer signals
  - this could indicate the strength of the intermittency of summer precipitation.
- Extending these analyses can potentially yield a way to actively reduce the intermittency noise and so improve isotope-based temperature reconstructions.