Old lime kiln buried in Val Chavagl (Swiss National Parc)

Laboratory of Ion Beam Physics ETH

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The picture taken in August 2018 upstream with a view of the left bank terrace slope of the Ova dal Val Chavagl (see maps) with the washed-out furnace ruin. In particular, its flat foundation and the white sinter blocks in the embankment are visible (left) (photo: Ch. Schlüchter).

Motivation

Remains of numerous lime kilns in the region of the Swiss National Parc document local use of resources (limestone/dolomite and forest) going back to the 16th century (see maps). The mass movement in such a mountainous region might obscure the location of some of the ovens, but occasionally it might uncover them. White structures of the kiln ruin become visible following heavy rains of September 2017. The eroded sediments, which covered the structure, were a product of an earlier event. Stratigraphic correlation to deposits up the valley and discovery of tree logs, allows for indirect dating of the events (Parolini 2012).
Here we applied dendrochronology and radiocarbon dating to date the time when kilns were in use.

Larix decidua tree logs for chronology

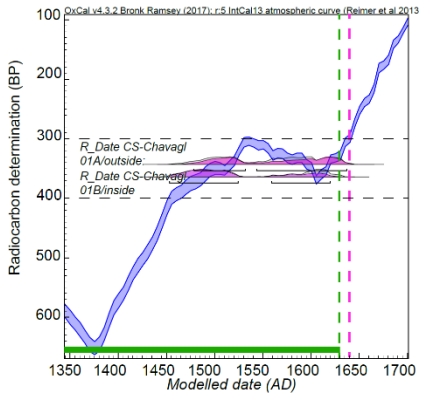
Remains of sever storm and mass movement. The front of the rubble cone with stratification in the Val Chavagl at the confluence of the two channels (see maps) with the embedded «wood storage» (photo Ch. Schlüchter).

The larch trunks, > 10 m long and up to 60 cm in diameter provided excellent material for dendrochronology. 2 slabs were cut for analyses. (photo Ch. Schlüchter).

In August 2018 the smaller trunk that was sampled for ^{14}C dating. In the laboratory 2 samples were taken: one from inside and one from outside and prepared for AMS analysis (photo Ch. Schlüchter).

Results

Dendrochronology (green) dates dates the outermost rings of 2 larch logs to ca. 1630. Due to the 300-400 BP age plateau ^{14}C dating results in a wide range of calendar ages, with the youngest boundary at 1650 AD (see details of the figure below)



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If you have specific Questions and comments you can contact us via email

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This research is in press: **Jahresbericht der Naturforschenden Gesellschaft Graubünden**
Der verschüttete Kalkbrennofen in der Val Chavagl (Schweizerischer Nationalpark)
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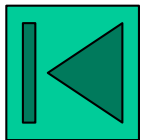

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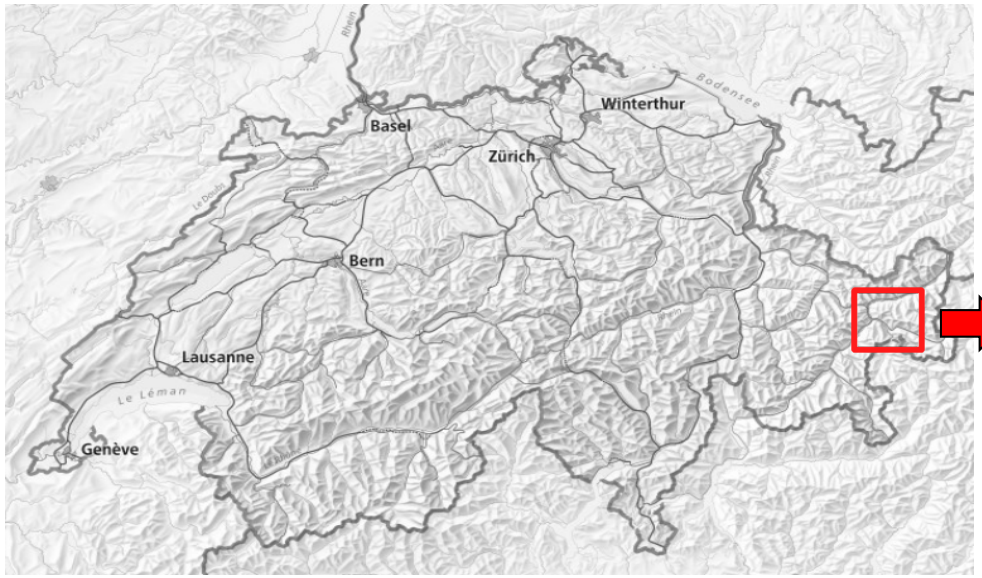

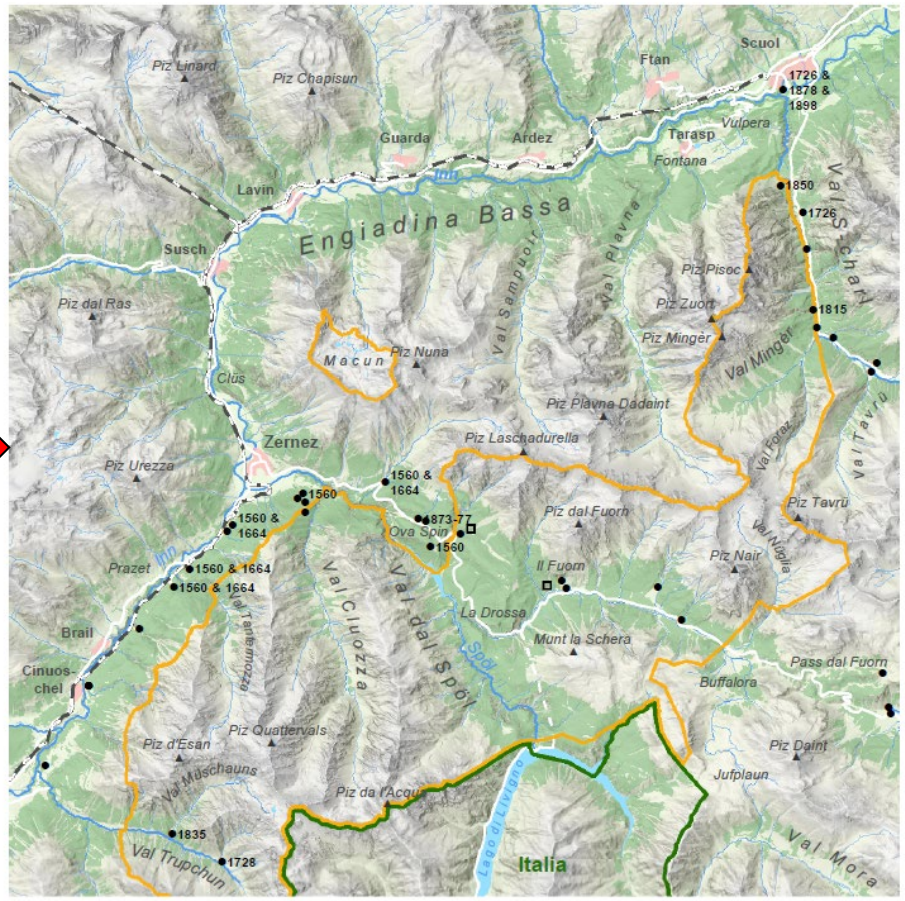

GoogleEarth link [Val Chavagl, Swiss National]

Site location N 46.66153, E 10.21972

- Position of lime kilns
- 1728 Date in historic sources of first reference to lime kilns and/or wood use
- Position of furnaces with no clear purpose
- Boundary of Swiss National Parc
- Swiss-Italian Border

0 1 2 3 4 5 km

N

Modified Map 10 from Parolini, J.D., 2012. Vom Kahlschlag zum Naturreservat: Geschichte der Waldnutzung im Gebiet des Schweizerischen Nationalparks. Haupt.

Radiocarbon dating

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CS-Chavagl-01/outside

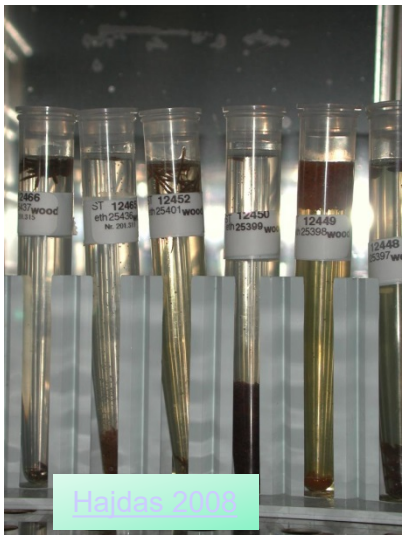
CS-Chavagl-01/inside

ABA Treatment

Acid 0.5 M HCl, 60°C, 15 hrs

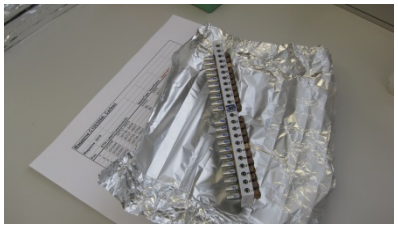
Base 0.1M NaOH, 60°C, 5 hrs

Acid 0.5 M HCl, 60°C, 15 hrs

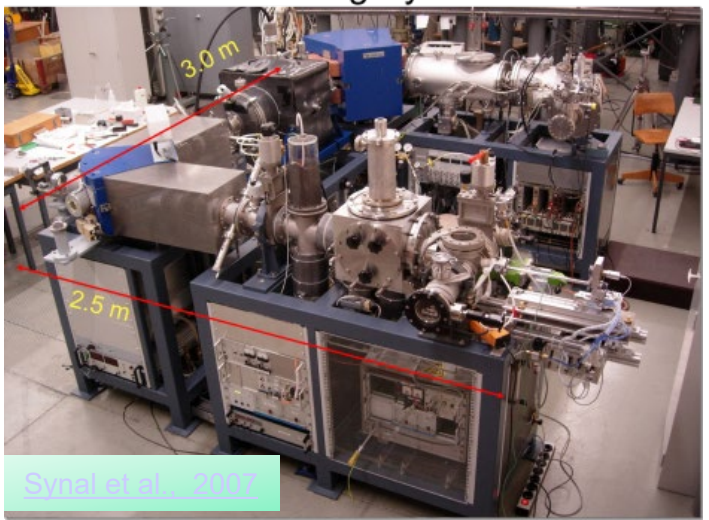


Graphite&AMS

- **ca. 3 mg**
- sample =>1 mg of
- Graphite
- AMS



MIni CArbon DAting System 0.2 MV



Results

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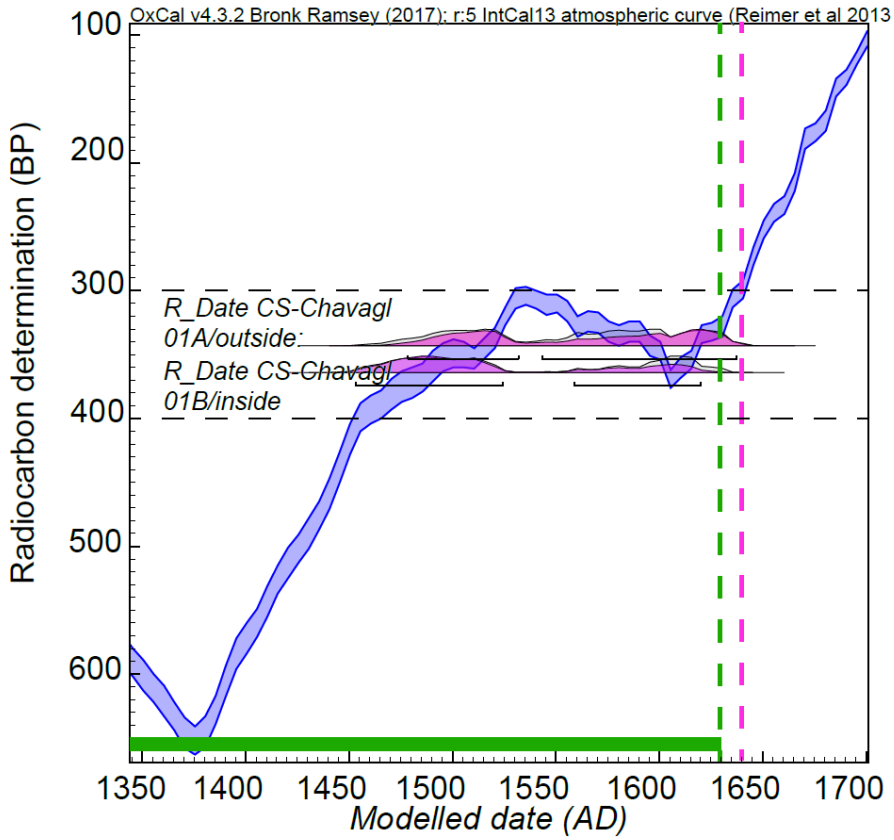
Dendrochronology:

Sample	Diameter	Results
CS-Chavagl-02	48 x 56 cm	383 rings AD 1256–1638
CS-Chavagl-03	32 cm	308 rings AD 1320–1626

Radiocarbon dating:

Sample	^{14}C age±1sigma (BP)	Calibrated ages AD (95.4%)
CS-Chavagl-01A/outside	343 ±21	cal AD 1470–1635
CS-Chavagl-01B/inside	364 ±20	cal AD 1453–1631
Modelled phase		cal AD 1450-1650

Summary:
Radiocarbon ages were calibrated using OxCal (Bronk Ramsey 2017) and Intcal13 calibration curve (Reimer et al.,2013). The wide range of calibrated ages is due to the age plateau (300-400 BP). The youngest limit of the Modelled calibrated range (1650 AD) is close to the youngest dendro-dated tree ring (1638 AD).



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