

Complex soil mass redistribution along a catena using meteoric and in-situ ^{10}Be as tracers

Francesca Calitri^{1,2}

Markus Egli¹, Michael Sommer^{2,3}, Dmitry Tikhomirov¹, Marcus Christl⁴

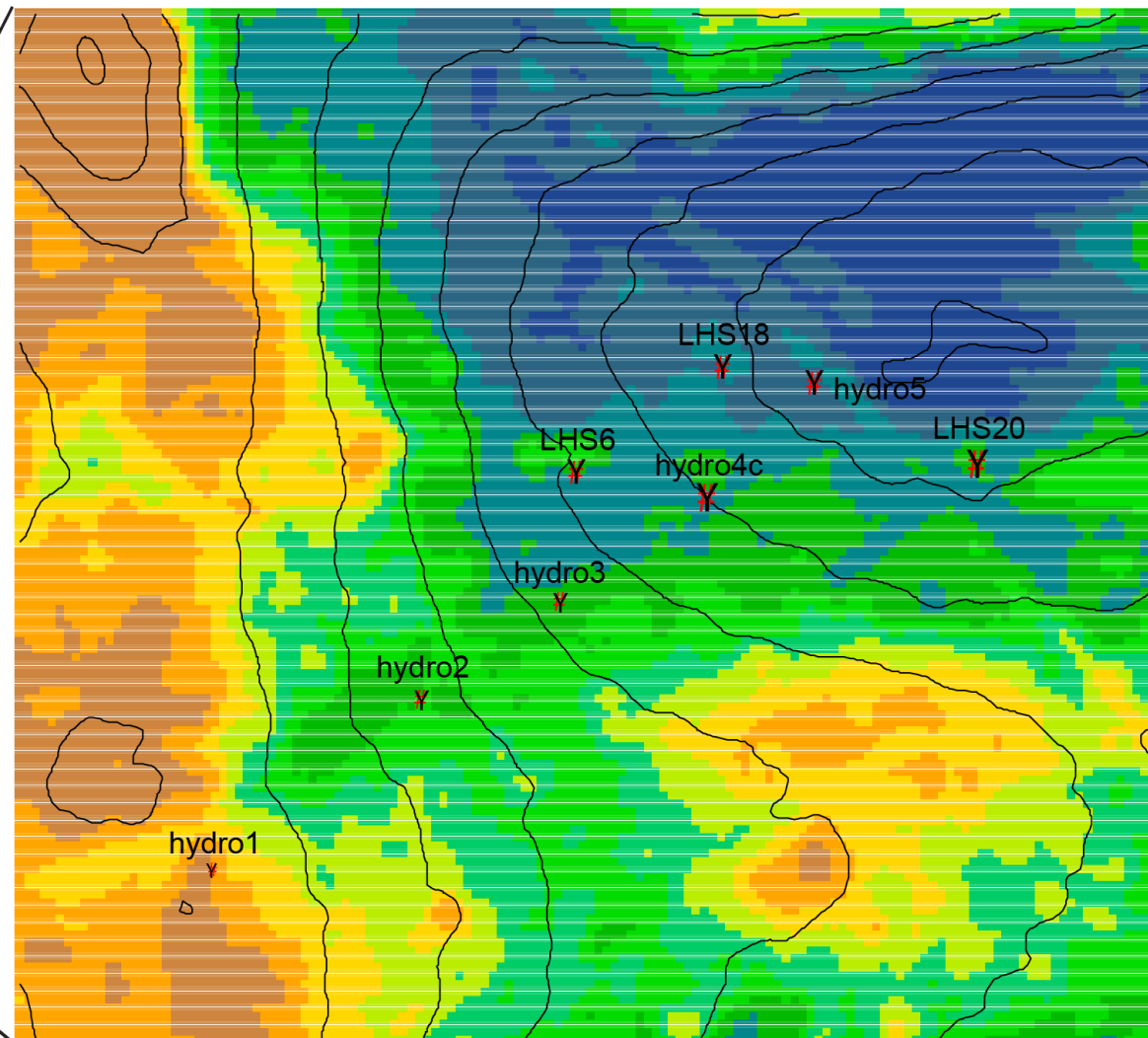
¹ Department of Geography, University of Zurich, Zürich, Switzerland

² Leibniz-Centre for Agricultural Landscape Research (ZALF), Müncheberg, Germany

³ University of Potsdam, Institute of Environmental Science and Geography, Potsdam, Germany

⁴ Laboratory of Ion Beam Physics, ETH-Zürich, Zürich, Switzerland

francesca.calitri@geo.uzh.ch



Depth-to-C, cm

¥	20 - 37
¥	42 - 83
¥	85 - 154
¥	173 - 213
¥	214 - 241

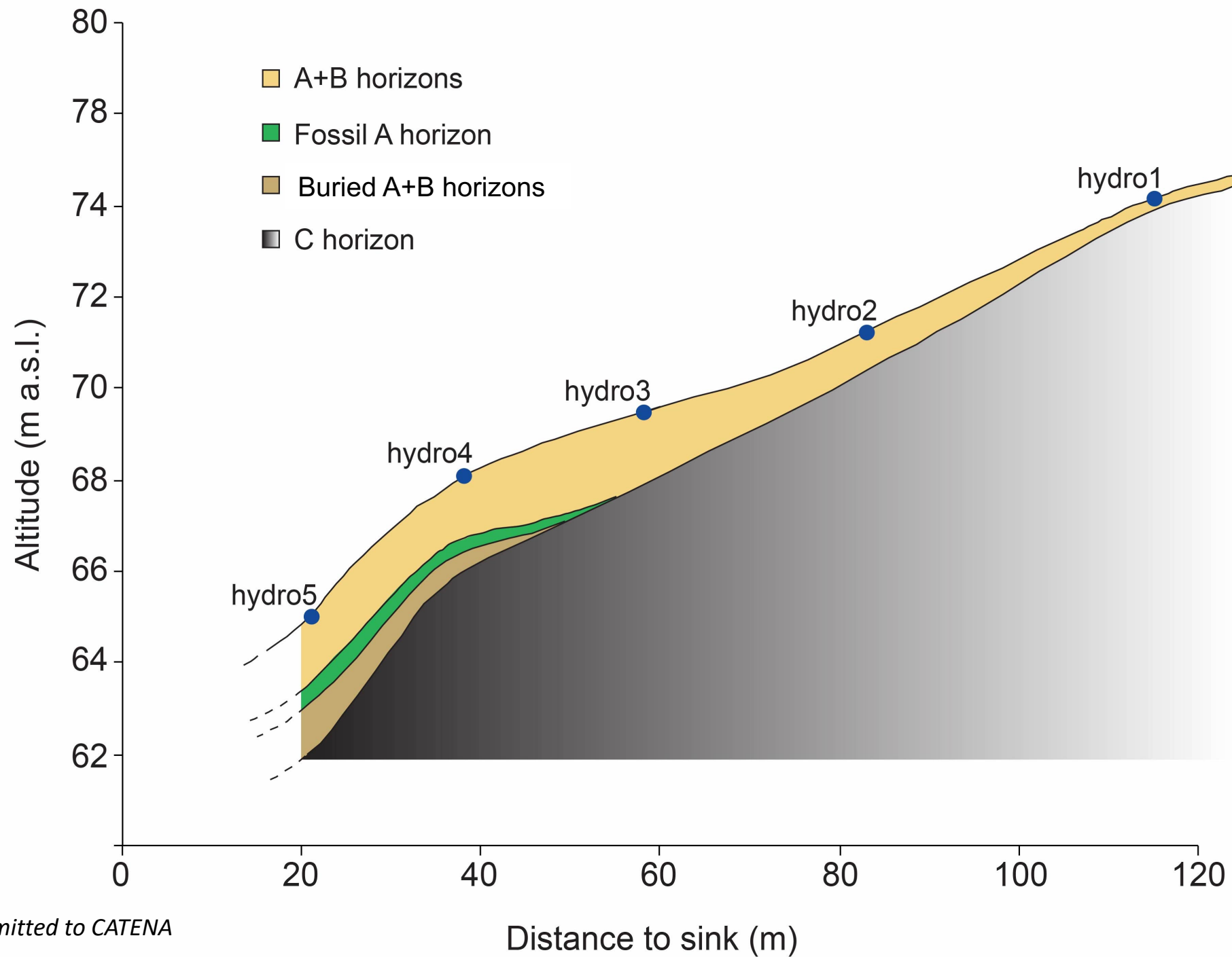
TPI 25, cm

	> 42
	30 - 41
	19 - 29
	8 - 18
	0 - 7
	-9 - -1
	-19 - -10
	-34 - -20
	-52 - -35
	< - 52

A photograph of a forest floor covered in brown leaves and fallen branches. A yellow arrow points from the text 'shallow soils ~30 cm' on the right to the text 'buried soils ~160 cm' on the left. The forest is composed of many thin, bare trees.

shallow soils
~30 cm

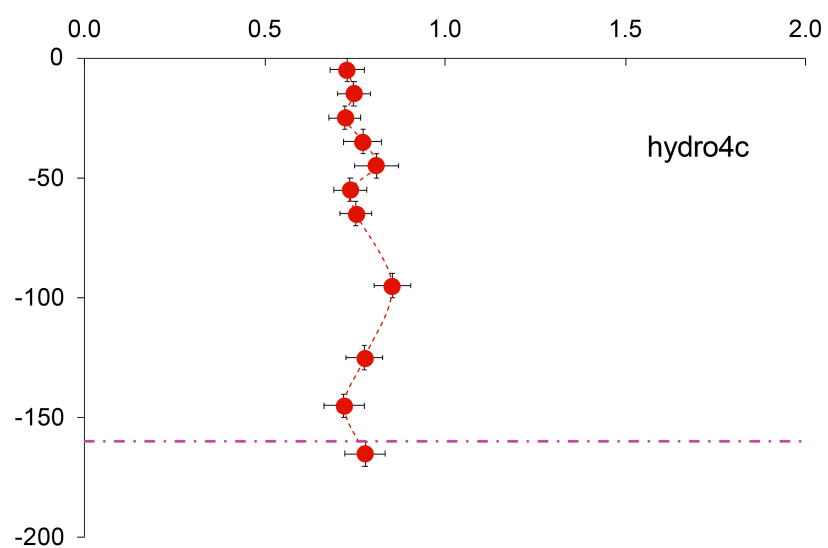
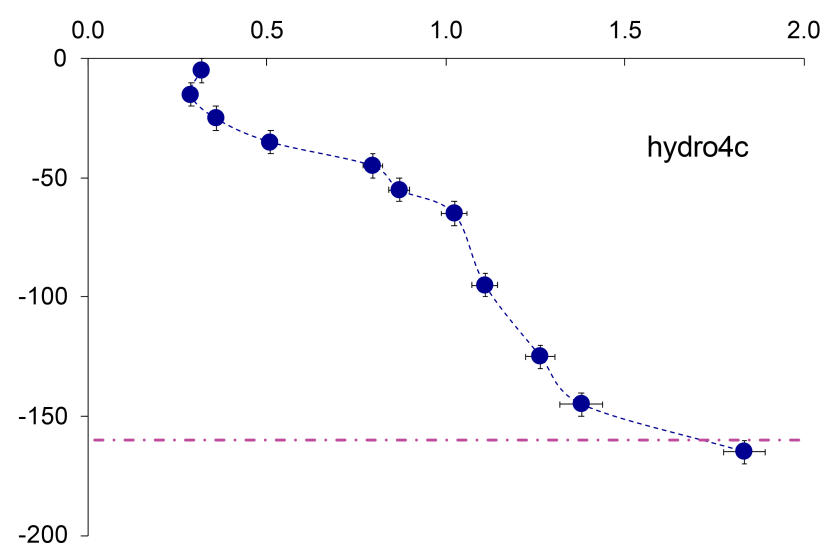
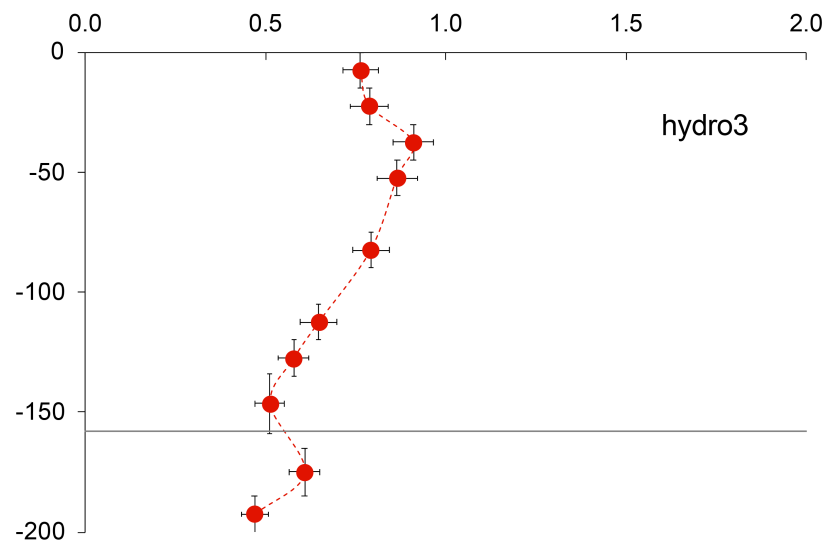
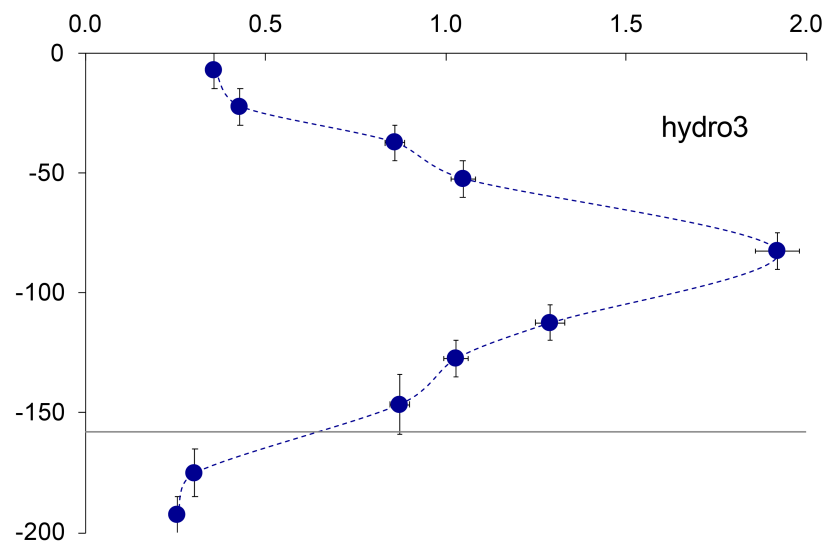
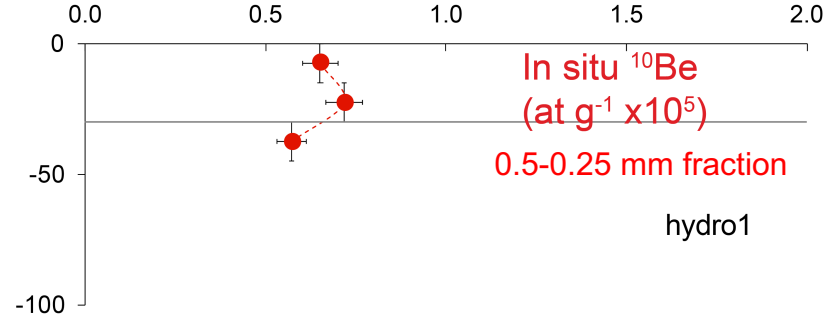
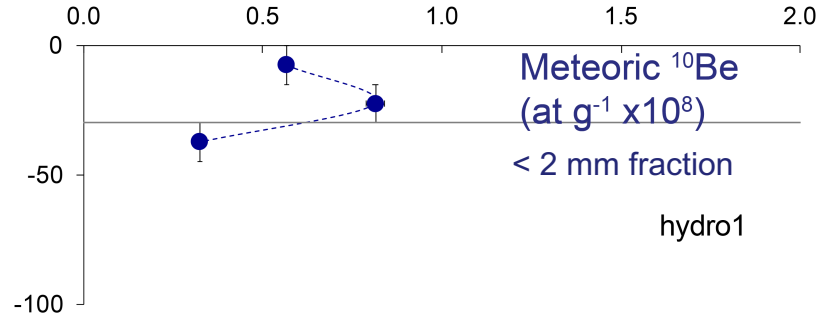
buried soils
~160 cm



Research questions:

1. How do meteoric and in-situ ^{10}Be compare to each other?
2. What do they really indicate in terms of soil processes (erosion, sedimentation, reworking)?

Site Name	Location	Land Use	Position
Hydro1	Melzower Forst	Deciduous Forest	Summit
Hydro3	Melzower Forst	Deciduous Forest	Shoulder
Hydro4c	Melzower Forst	Deciduous Forest	Backslope
LP4*	CarboZALF	Arable land	Flat
LP7O	CarboZALF	Arable land	Backslope
LP12*	CarboZALF	Arable land	Backslope
VAMOS*	CarboZALF	Arable land	Footslope

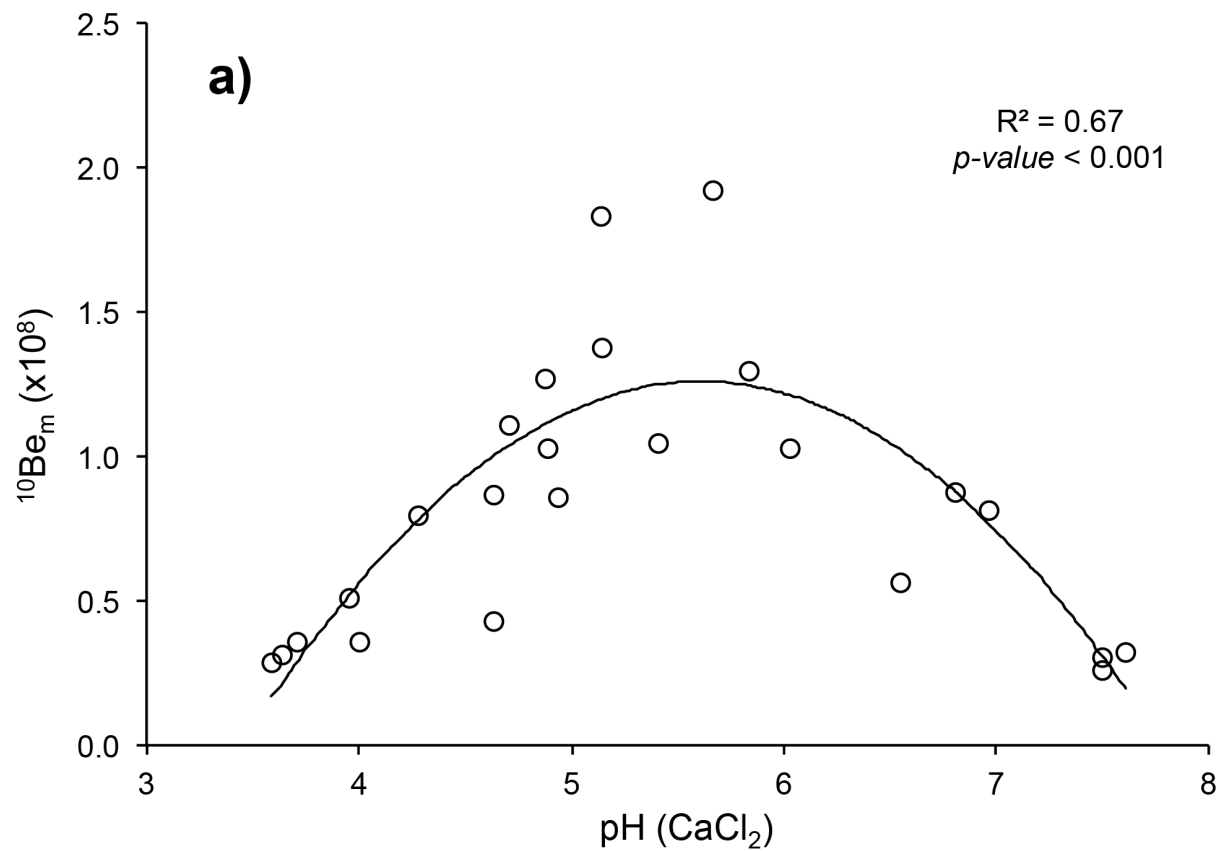


fA- ^{14}C dating
6845-6731 calBP

Relationship between physical/chemical properties and meteoric and in-situ ^{10}Be .
Numbers reported refer to R^2 values

	clay	pH	Fe _{ox}	Fe _{dith}	Al _{ox}	Mn _{dith}
	%	(CaCl ₂)	g kg ⁻¹	g kg ⁻¹	g kg ⁻¹	mg kg ⁻¹
met ^{10}Be	n.s.	0.67***	0.35**	0.26*	n.s.	0.37**
in-situ ^{10}Be	0.31**	0.60***	0.26**	0.26*	0.27*	0.20*

n.s.= not significant; * = p-value < 0.05; ** = p-value < 0.01; *** = p-value < 0.001



TAKE HOME MESSAGES

- Similar meteoric ^{10}Be depth profiles despite an acceleration of soil formation processes due to agricultural activities at CarboZALF
- C horizons in Melzower Forst and CarboZALF have the same in situ ^{10}Be content (same glacial till for both sites)
- The strong erosion and redistribution events and soil patterns in Melzower Forest are mainly a result of ancient natural events as showed by the ^{14}C dating of some buried horizon samples