Strange soils and where to find them

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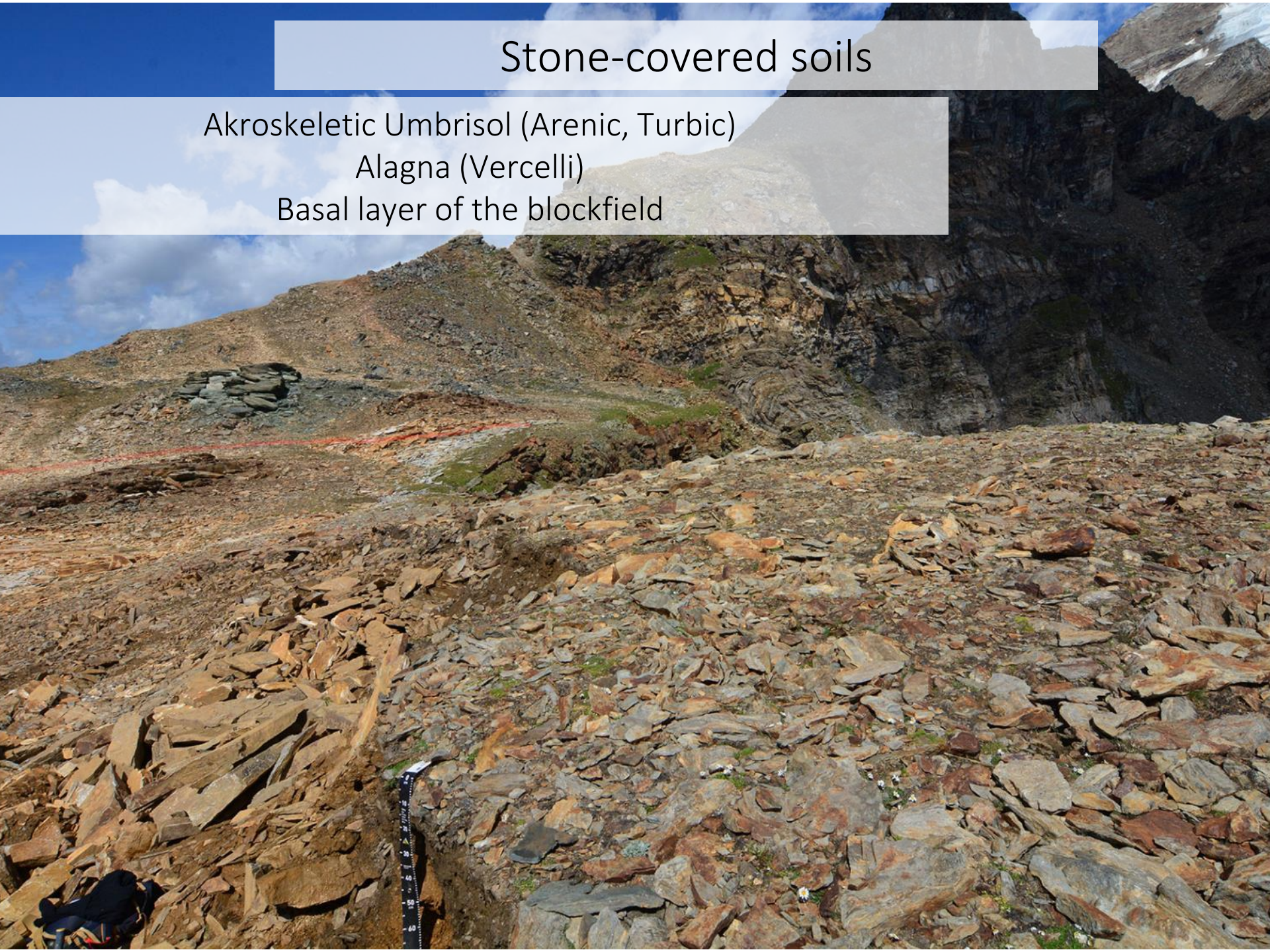
Stone-covered soils

Akroskeletic Umbrisol (Arenic, Turbic)
Alagna (Vercelli)
Basal layer of the blockfield



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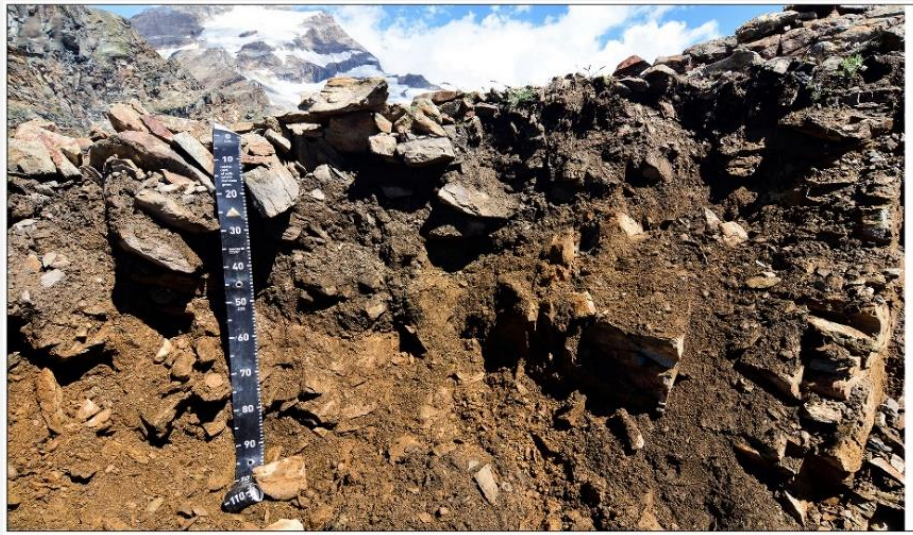
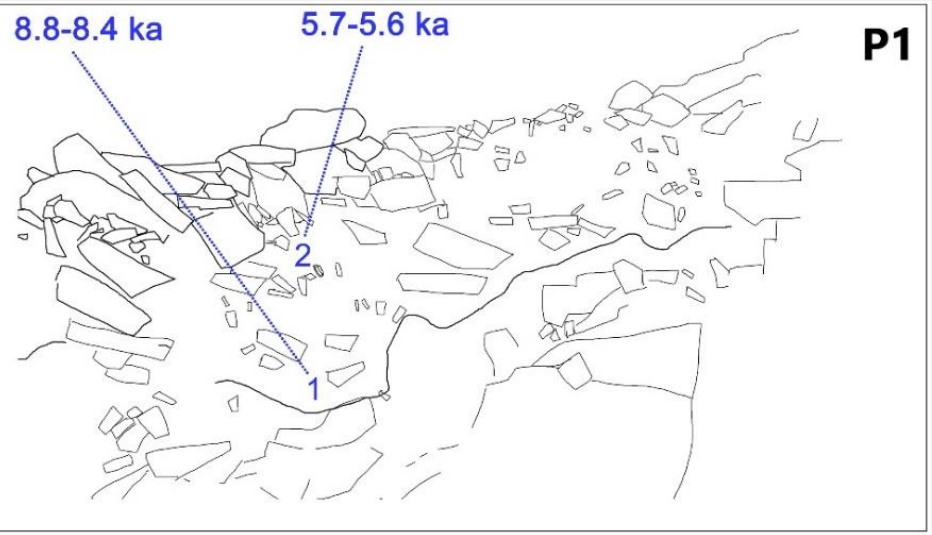
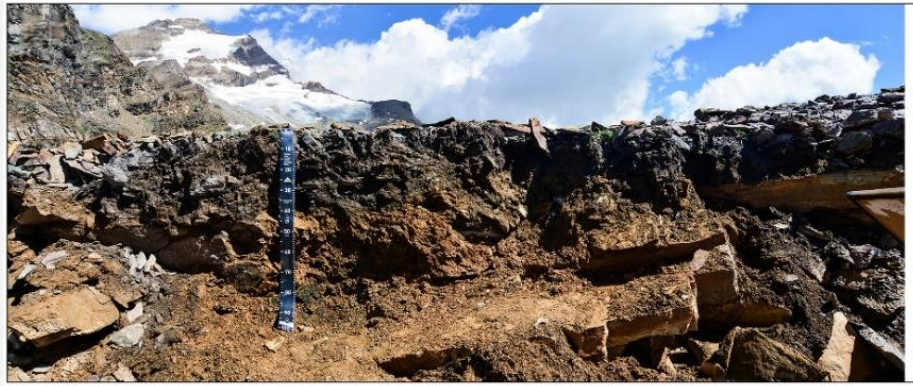
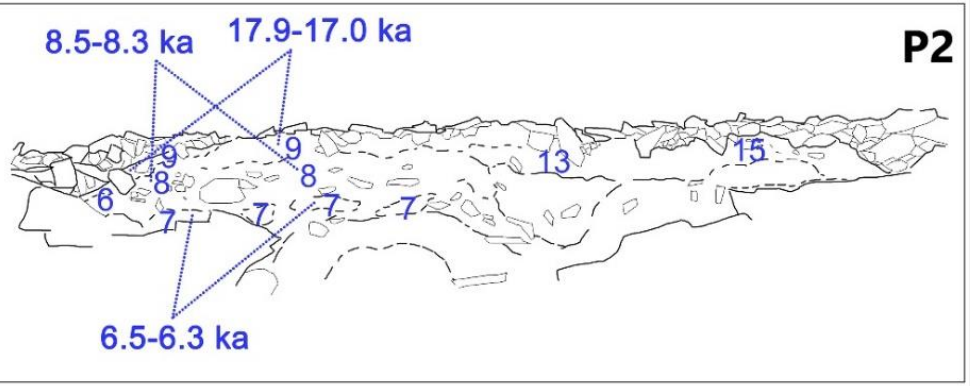
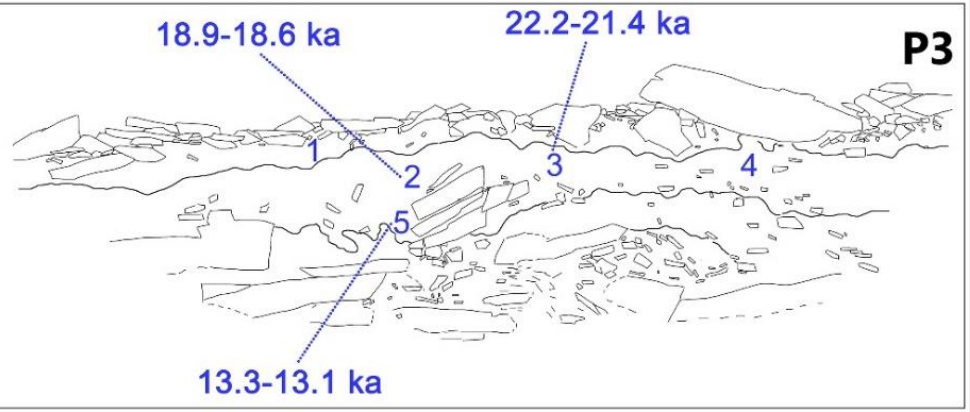



8.8-8.4 ka
5.7-5.6 ka
P1
2
1




8.5-8.3 ka
17.9-17.0 ka
P2
9
9
8
8
6
7
7
7
7
13
15
6.5-6.3 ka


18.9-18.6 ka
22.2-21.4 ka
P3
1
2
3
4
5
13.3-13.1 ka

Stone-covered soils

Akroskeletic Albic Ortsteinic Podzol (Loamic, Placic)
Fontainemore (Aosta)

Stone-covered soils

Akroskeletic Albic Ortsteinic Podzol (Loamic, Placic)
Fontainemore (Aosta)

Basal layer of the blockstream

Stone-covered soils

Akroskeletic Albic Ortsteinic Podzol (Loamic, Placic)
Fontainemore (Aosta)

Stone-covered soils

Croagh Patrick, Ireland, above LGM «official» trimline

Stone-covered soils

Croagh Patrick, Ireland

Antigoritic serpentinite soil, 1450 m a.s.l. Viù (Torino) – Lanzo Ultramafic Massif

Soil developed under Pleistocene periglacial blockslope/blockstreams (geomorphologically it is the basal layer of the blockslope);

imbrications in the stony cover (strong ancient cryoturbation, probable permafrost during LGM);

Akroskeletic Umbric Hyperalbic Podzol (Siltic, Placic)

Soil in peridotitic alluvial fan, 630 m a.s.l.

Soil developed in Pliocene alluvial fans

Strongly cemented, red subsoil, harder than weathered stones.
Might resemble «young» soils in Uganda, where stones are still preserved

Classification???

Cemented horizons in Uganda

«young» soils on hillslopes (Cambisols)
Strongly cemented, red subsoil, but with stones preserved.

Cemented horizons in Uganda

«young» soils on hillslopes (Cambisols)
Strongly cemented, red subsoil, but with stones preserved.

More developed Ferralsols with pisolithic lateritic crusts

Soils of middle alluvial terraces - Uganda (6-15 m above the river)

Stagnic Petric Plinthosol

Quite similar Petroplinthic horizons, in the Po plain

Series of fragipan Bx with mottling from hydromorphy caused by compaction;

Thick Bvm

Fiano (To)

Other cemented horizons: ortstein podzols in the Alps

Hyperalbic Ortsteinic Podzol (Arenic, Folic)
Cogne (Aosta)

MAP: 600 mm/year

Cemented horizons

Entic Ortsteinic Podzol (Arenic)
Val Veny (Aosta)


istic? Entic Ortsteinic Podzol (Arenic)
Passo Mortirolo (Brescia)

Convoluted horizons in hummocky grasslands

Torgnon (AO)
Mortirolo (SO)

Chernozem in the Siberian steppe (Ulan Ude, Buryatia, Russia):
Thick mollic A horizon (soft, well-structured, biologically active, thick);
Subsurface horizons with accumulation of secondary carbonates (Bk@), salts (Bz@), affected by cryoturbation

Bric Mindino – ca 1600 m a.s.l.

Quartzitic conglomerate and gneiss

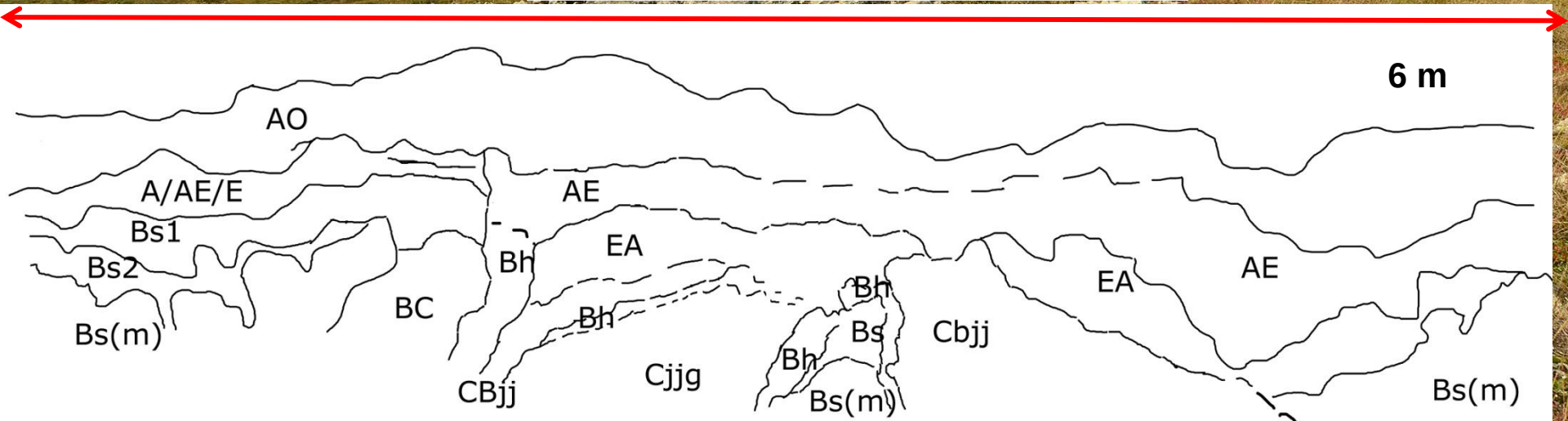
Slope ca. 15°-20°

Blockfields / blockstreams – unglaciated terrain

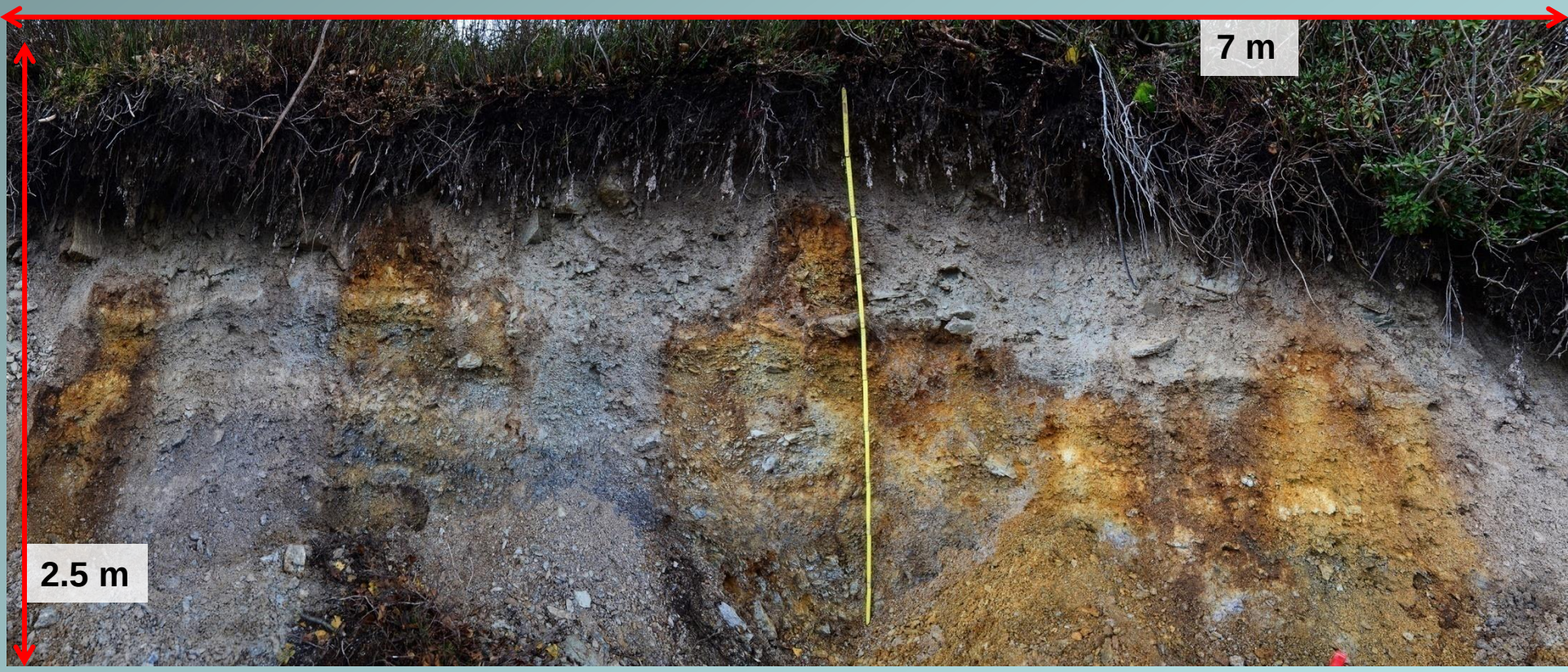
Large-scale sorted stripes (6-20 m, hidden by heath vegetation or by beech litter)

Bric Mindino – ca 1500 m a.s.l., SE aspect

Upwelled diapiric inclusion, 10% strongly weathered stones, high density (>1.7 g cm^{-3})



Colma di Casotto – 1400 m;
E aspect
Garessio (CN)



Colma di Casotto – 1400 m; W aspect
Valcasotto (CN)

Podzols on the beach in Guinea Bissau

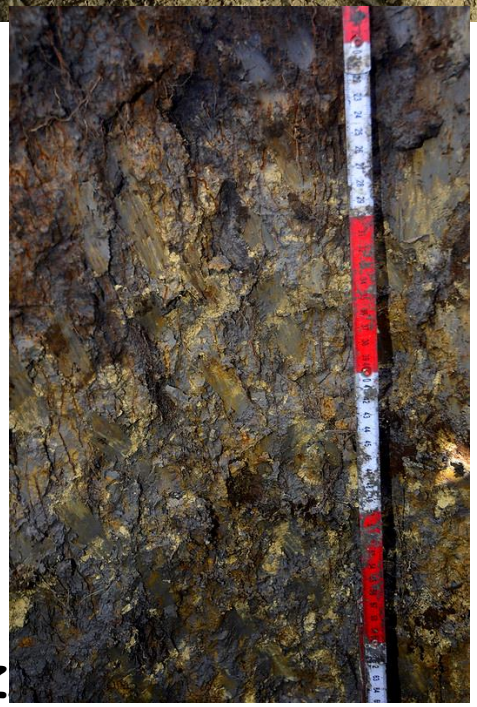
Podzols on the beach in Guinea Bissau

Podzols on the beach in Guinea Bissau

Crabs take up Bs aggregates, after coastal erosion

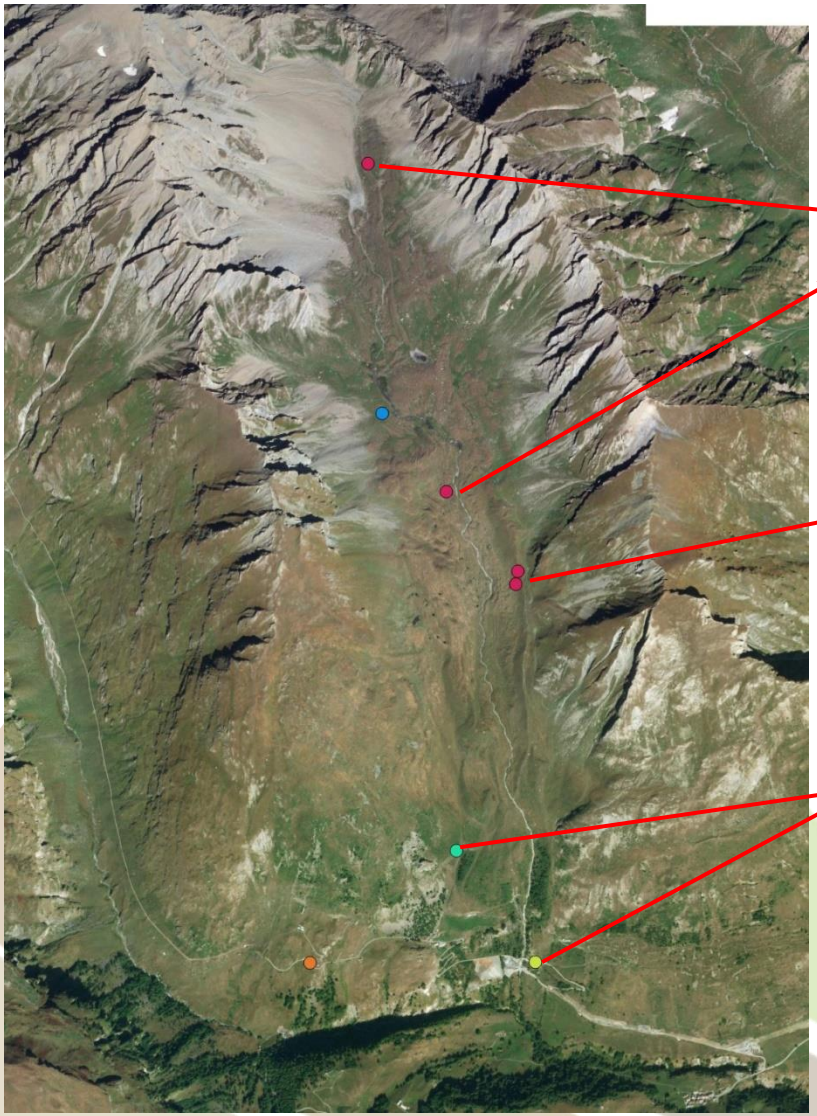


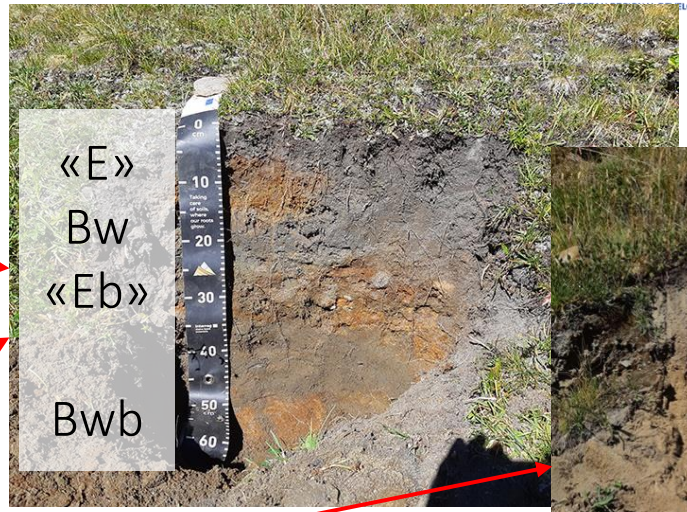


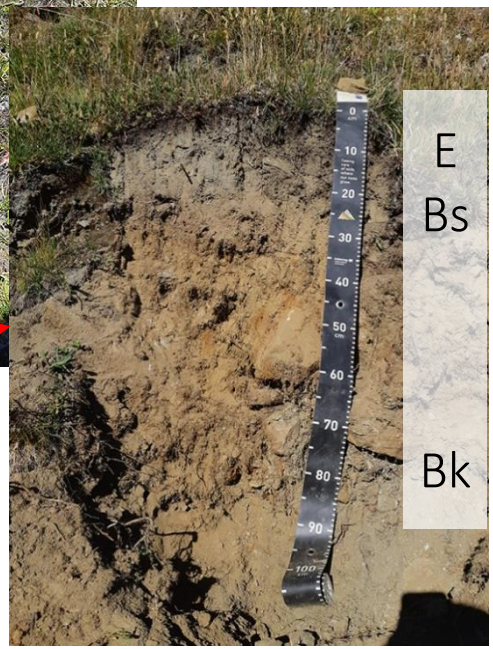



From mangrove soil (never oxidized, deep blue, with pyrites, in a few years we get to the formation of acid sulfate soils, which are no longer productive.
Es: Guinea Bissau

Climo-toposequence on calcschists
Vallèe des Orgeres - La-Thuile (Aosta)







Morgex (AO)

South aspect, 600 mm/y

Skeletic Petric Calcisol

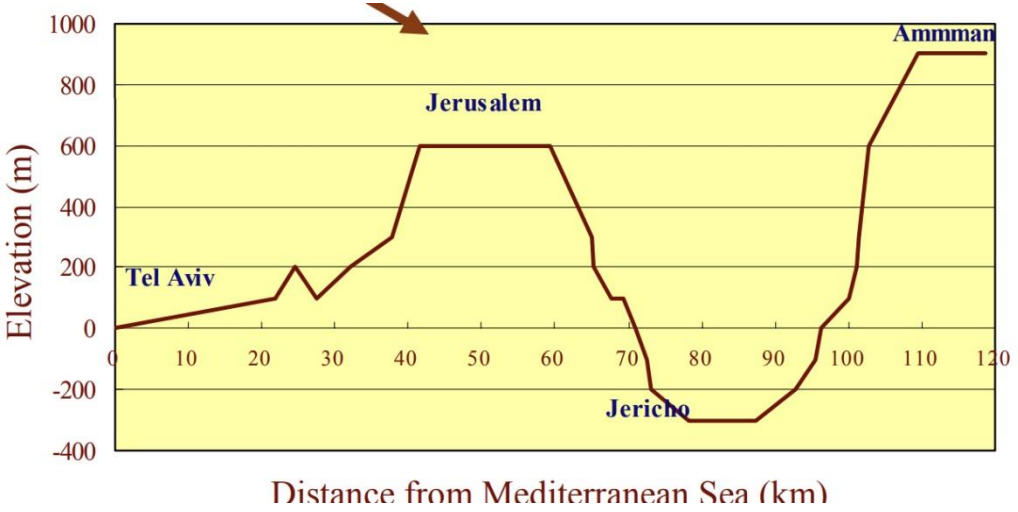
Ak: CaCO3 covers on stone fragments

Bk horizon with efflorescence and covers

Bkm (pure CaCO3)

Bkm (impregnated)

Other cemented soils i even drier habitats: petrogypsic horizons



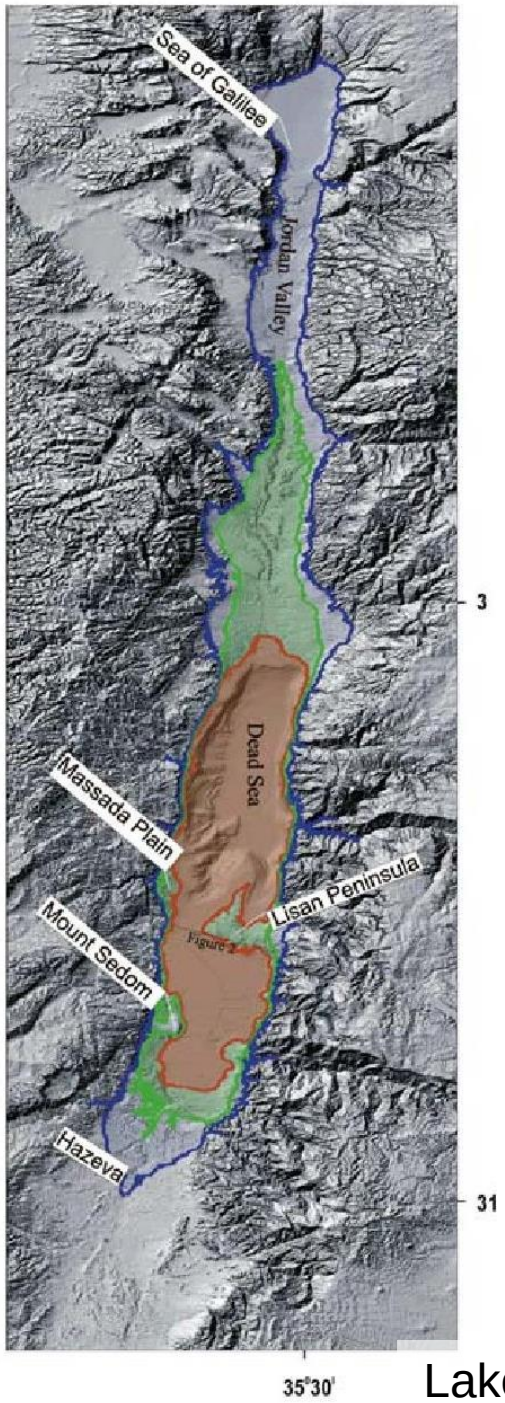
Jordan Valley:

Rift valley connected to the Red Sea-East African Rift, slowly splitting the continents

Deepest depression on Earth: strong influences on climate

275 mm/year

Geological substrate – parent material



Most of the bottom of the Jordan Valley, below 150 m b.s.l., were occupied by a salty lake, similar to present-day Dead Sea, called Lake Lisan. Its maximum extension was during the Glacial periods, 27-23 kyr B.P.

With climate changing towards modern conditions, evaporation increased and much of the water evaporated, leaving thick layers of gypsum, aragonite ($CaCO_3$) and salts

Lake Lisan during its maximum level ~ 150 m b.s.l. (27–23 kyr B.P.).

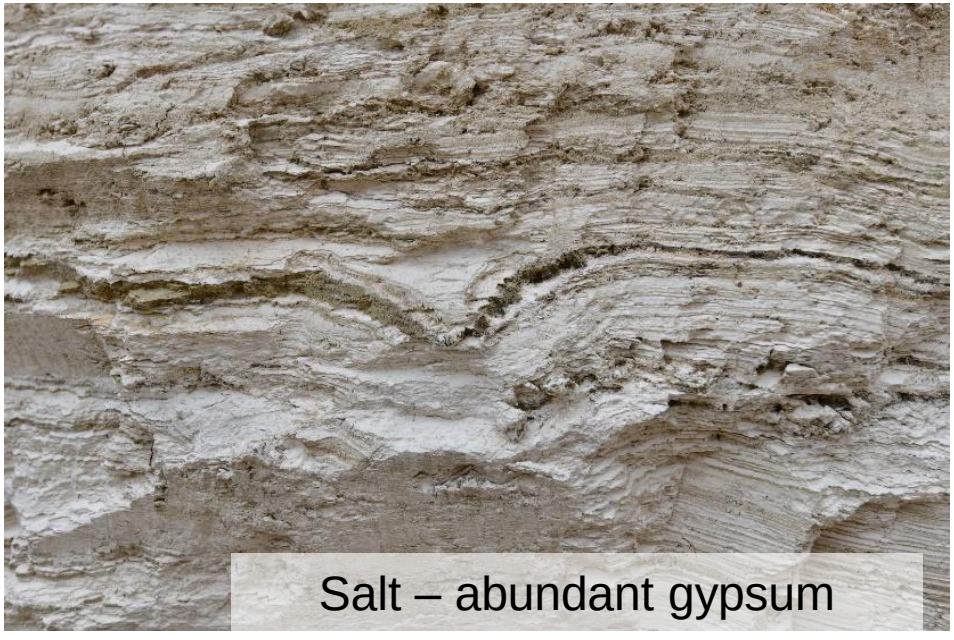
Geological substrate – parent material

Main limitations: salts! And other soluble materials

Salt crust


Salt crust

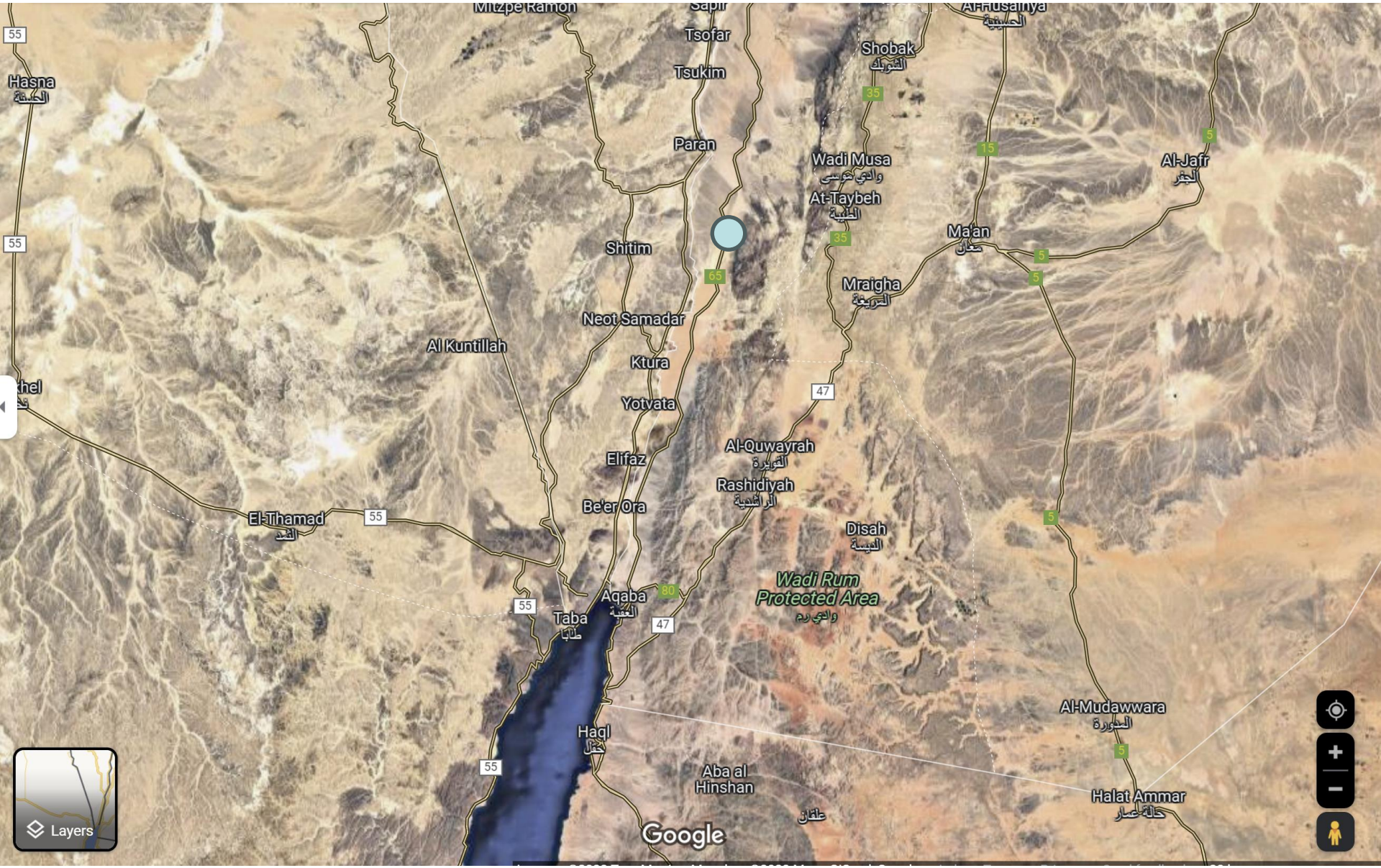

Salt crust – abundant gypsum


Salt – abundant gypsum

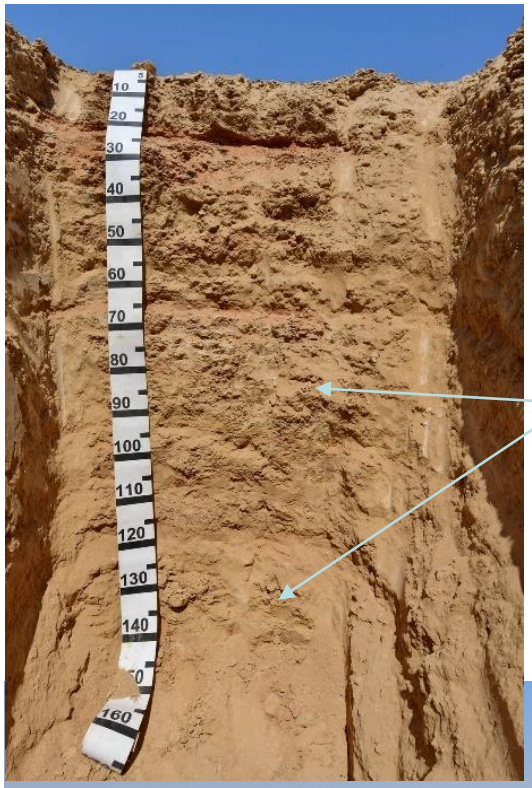
Main limitations: cemented or other impermeable layers

Petrogypsic horizon
fragmented by works

Even drier areas SOIL STUDY IN THE ARABA VALLEY (Aqaba, Jordan) – 70 mm/y



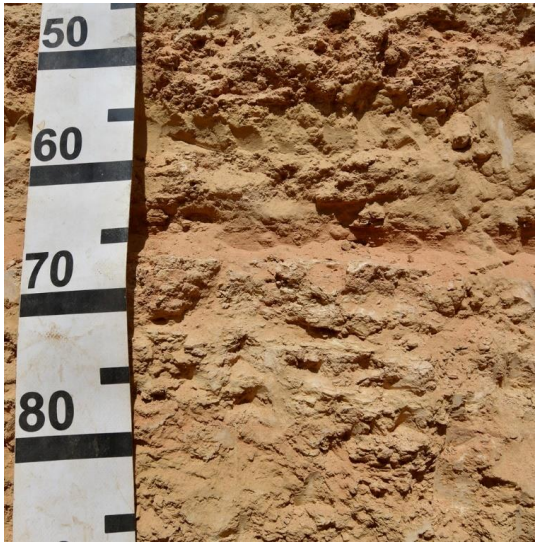
SOIL STUDY IN THE ARABA VALLEY (Aqaba, Jordan)



- Sabkha soils

Calcaric Pantofluvic Fluvisol (Siltic, Densic, Ochric)

- surface deflation crust
- platy structure and fine (silty and silty clay) texture: slow drainage, hard consistence; many buried crusty layers at depth as well
- deep horizons sometimes partly cemented by $CaCO_3$
- weak sodicity (ESP < 20% on average)
- slight salinity, particularly in subsurface horizons

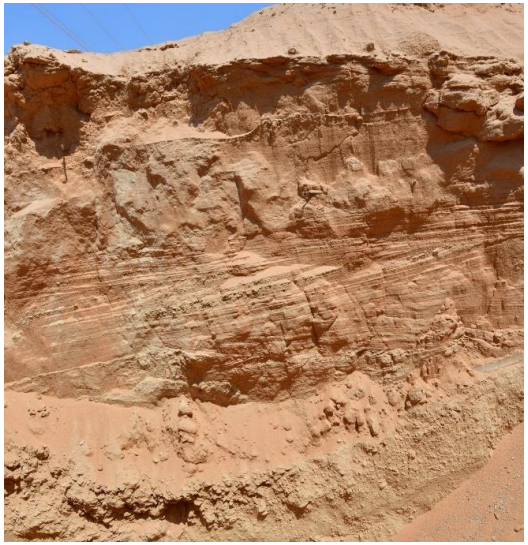


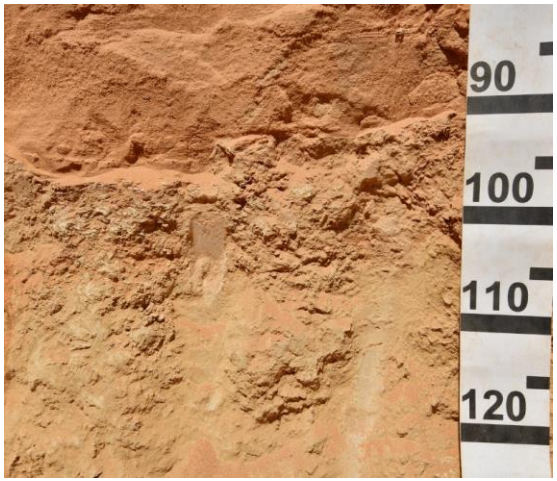
SOIL STUDY IN THE ARABA VALLEY

- Dune soils

Calcaric Chromic Arenosol (Geoabruptic, Aeolic, Ochric)

- deep horizons sometimes are buried Sabkha soils





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Emanuele Pintaldi [a], Michele E. D'Amico [a,*], Nicola Colombo [a,b,c], Chiara Colombero [d], Luigi Sambuelli [d], Claudio De Regibus [d], Diego Franco [d], Luigi Perotti [c], Luca Paro [c], Michele Freppaz [a,b]

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Hidden paleosols on a high-elevation Alpine plateau (NW Italy): Evidence for Lateglacial Nunatak?

E. Pintaldi [a], M.E. D'Amico [a,b], N. Colombo [a,b,c,*], E. Martinetto [c], D. Said-Pullicino [a], M. Giardino [b,c], M. Freppaz [a,b]

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ORIGINAL ARTICLE

European Journal of Soil Science WILEY

Origin and characteristics of ancient organic matter from a high-elevation Lateglacial Alpine Nunatak (NW Italy)

Emanuele Pintaldi [1] | **Veronica Santoro** [1] | **Michele E. D'Amico** [2] | **Nicola Colombo** [1,3,4] | **Luisella Celi** [1] | **Michele Freppaz** [1,3]

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ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/tjom20

Soil types of Aosta Valley (NW-Italy)

M. E. D'Amico , E. Pintaldi , E. Sapino , N. Colombo , E. Quaglino , S. Stanchi , E. Navillod , R. Rocco & M. Freppaz

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Contrasting environmental memories in relict soils on different parent rocks in the south-western Italian Alps

Michele E. D'Amico [a,b,*], Marcella Catoni [a], Fabio Terribile [c], Ermanno Zanini [a,b], Eleonora Bonifacio [a]

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Hummocks affect soil properties and soil-vegetation relationships in a subalpine grassland (North-Western Italian Alps)

Emanuele Pintaldi [a,*], Michele E. D'Amico [a], Consolata Siniscalco [b], Edoardo Cremonese [c], Luisella Celi [a], Gianluca Filippa [c], Marco Prati [a], Michele Freppaz [a,d]

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Pleistocene periglacial imprinting on polygenetic soils and paleosols in the SW Italian Alps

Michele E. D'Amico[a,*], E. Pintaldi[a], M. Catoni[a], M. Freppaz[a,b], E. Bonifacio[a]

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Aeolian inputs and dolostone dissolution involved in soil formation in Alpine karst landscapes (Corna Bianca, Italian Alps)

Michele Eugenio D'Amico [a,*], Enrico Casati [b], Davide Abu El Khair [b], Alessandro Cavallo [b], Marco Barcella [b], Franco Previtali [b]

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Thank you!
Albic Podzol on sandy dolostone – Salmezza (BG)