

Creating map legends with WRB

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WRB - Third Edition 2014, Update 2015



WORLD
SOIL
RESOURCES
REPORTS

106

World reference base for soil resources 2014

International soil classification system
for naming soils and creating legends for soil maps

Update 2015



IUSS Working Group WRB (2014/15):

World Reference Base for Soil Resources 2014. Update 2015

Responsible:

Peter Schad, Cornie van Huyssteen and Erika Micheli.
FAO World Soil Resources Reports 106, Rome.

WRB at FAO:

<http://www.fao.org/soils-portal/soil-survey/soil-classification/world-reference-base/en/>

Apps:

Android

[:https://play.google.com/store/apps/details?id=ru.orlovdo.wrbv2](https://play.google.com/store/apps/details?id=ru.orlovdo.wrbv2)

iPhone

<https://itunes.apple.com/us/app/wrb-mobile-tool/id1207585348?mt=8>

Windows

<https://www.microsoft.com/store/productid/9N5DG4PPTQD0>

also available: Spanish, Polish, Georgian
coming soon: French, Russian

The architecture of the WRB

first level:

32 Reference Soil Groups (RSGs)

second level:

constructed soil names:

names of qualifiers

added to the name of the RSG

The first level

32 Reference Soil Groups (RSGs)

identified using a key:

Histosol	Chernozem
Anthrosol	Kastanozem
Technosol	Phaeozem
Cryosol	Umbrisol
Leptosol	Durisol
Solonetz	Gypsisol
Vertisol	Calcisol
Solonchak	Retisol
Gleysol	Acrisol
Andosol	Lixisol
Podzol	Alisol
Plinthosol	Luvisol
Nitisol	Cambisol
Ferralsol	Arenosol
Planosol	Fluvisol
Stagnosol	Regosol

The second level

185 qualifiers: defined in a list

some can be combined with many RSGs, others with a few ones or with just one

for every RSG:

individual list of available qualifiers

subdivided into principal qualifiers and supplementary qualifiers

principal qualifiers: ranked, listed according to their importance

supplementary qualifiers: not ranked, listed in alphabetical order

per RSG: 35 to 68 available qualifiers

(Nitrisols, Gypsisols: 35; Cambisols: 68)

many qualifiers: mutually exclusive

in praxi: most soils have (far) less than 10 qualifiers

Classifying soils

for every RSG:

- individual list of available qualifiers:

 - subdivided into principal qualifiers and supplementary qualifiers

check the lists from top to down

- add **all** applying qualifiers

principal qualifiers

added before the name of the RSG

from right to left

(the uppermost qualifier in the list is placed closest to the name of the RSG)

supplementary qualifiers

added after the name of the RSG, in brackets and separated from each other by commas

from left to right

(the first qualifier according to the alphabet is placed closest to the name of the RSG)

Classifying soils: example Gleysol

gleyic
properties
and
reducing
conditions



- a layer ≥ 25 cm thick, and starting ≤ 40 cm from the mineral soil surface, that has
- gleyic* properties throughout; *and*
 - reducing conditions* in some parts of every sublayer

→ **Gleysol**

Classifying soils: example Gleysols

list of available qualifiers:

principal qualifiers

Thionic	Oxygleyic/
Reductic	Reductigleyic
Subaquatic/	Ferralic/
Tidalic	Sideralic
Hydragric/	Gypsic
Anthraquic	Calcic
Folic/ Histic	Spodic
Chernic/ Mollic/	Fluvic
Umbric	Dolomitic/
Pisoplinthic/	Calcaric
Plinthic	Dystric/ Eutric
Stagnic	

supplementary qualifiers

Abruptic	Novic
Acric/ Lixic/ Alic/	Petrogleyic
Luvic	Raptic
Alcalic	Relocatic
Andic	Salic
Arenic/ Clayic/	Skeletal
Loamic/ Siltic	Sodic
Aric	Sulfidic
Colluvic	Takyric/ Aridic
Drainic	Technic
Fractic	Tephric
Gelic	Toxic
Humic/ Ochric	Turbic
Inclinc	Uterquic
Limnic	Vertic
Nechic	Vitric



Classifying soils: example Gleysols

list of available qualifiers (**applying in red**):

principal qualifiers

Thionic	Oxygleyic/
Reductic	Reductigleyic
Subaquatic/	Ferralic/
Tidalic	Sideralic
Hydragric/	Gypsic
Anthraquic	Calcic
Folic/ Histic	Spodic
Chernic/ Mollic/	Fluvic
Umbric	Dolomitic/
Pisoplinthic/	Calcaric
Plinthic	Dystric/ Eutric
Stagnic	

supplementary qualifiers

Abruptic	Novic
Acric/ Lixic/ Alic/	Petrogleyic
Luvic	Raptic
Alcalic	Relocatic
Andic	Salic
Arenic / Clayic/	Skeletal
Loamic/ Siltic	Sodic
Aric	Sulfidic
Colluvic	Takyric/ Aridic
Drainic	Technic
Fractic	Tephric
Gelic	Toxic
Humic / Ochric	Turbic
Inclinic	Uterquic
Limnic	Vertic
Nechic	Vitric



→ **Eutric Fluvic Gleysol (Arenic, Humic)**

Classifying soils ↔ creating map legends

classifying soils:

all applying qualifiers must be added

creating map legends:

number of qualifiers depends on the scale

first scale level: RSGs only:

e.g.: < 1 : 10 000 000

second scale level: RSGs with the first applying principal qualifier:

e.g.: 1 : 10 000 000 1 : 5 000 000

third scale level: RSGs with the first 2 applying principal qualifiers:

e.g.: 1 : 5 000 000 to 1 : 1 000 000

fourth scale level: RSGs with the first 3 applying principal qualifiers:

e.g.: 1 : 1 000 000 to 1 : 250 000

Rules for the definition of map units

principal qualifiers:

number according to the scale level: 0, 1, 2 or 3

added before the name of the RSG (see above)

after the name of the RSG, other qualifiers may be added **optionally**

at any scale level, in brackets and separated by commas

- additional principal qualifiers from further down the list
- supplementary qualifiers

optional qualifiers:

- according to the purpose of the map
- according to national traditions

Creating map legends: example Gleysol

principal qualifiers

Thionic	Oxygleyic/
Reductic	Reductigleyic
Subaquatic/	Ferralic/
Tidalic	Sideralic
Hydragric/	Gypsic
Anthraquic	Calcic
Folic/ Histic	Spodic
Chernic/ Mollic/	Fluvic
Umbric	Dolomitic/
Pisoplinthic/	Calcaric
Plinthic	Dystric/ Eutric
Stagnic	

supplementary qualifiers

Abruptic	Gelic	Sodic
Acric/ Lixic/ Alic/	Humic / Ochric	Sulfidic
Luvic	Inclinic	Takyric/ Aridic
Alcalic	Limnic	Technic
Andic	Nechic	Tephric
Arenic / Clayic/	Novic	Toxic
Loamic/ Siltic	Petrogleyic	Turbic
Aric	Raptic	Uterquic
Colluvic	Relocatic	Vertic
Drainic	Salic	Vitric
Fractic	Skeletal	

optional qualifiers (examples)

scale level

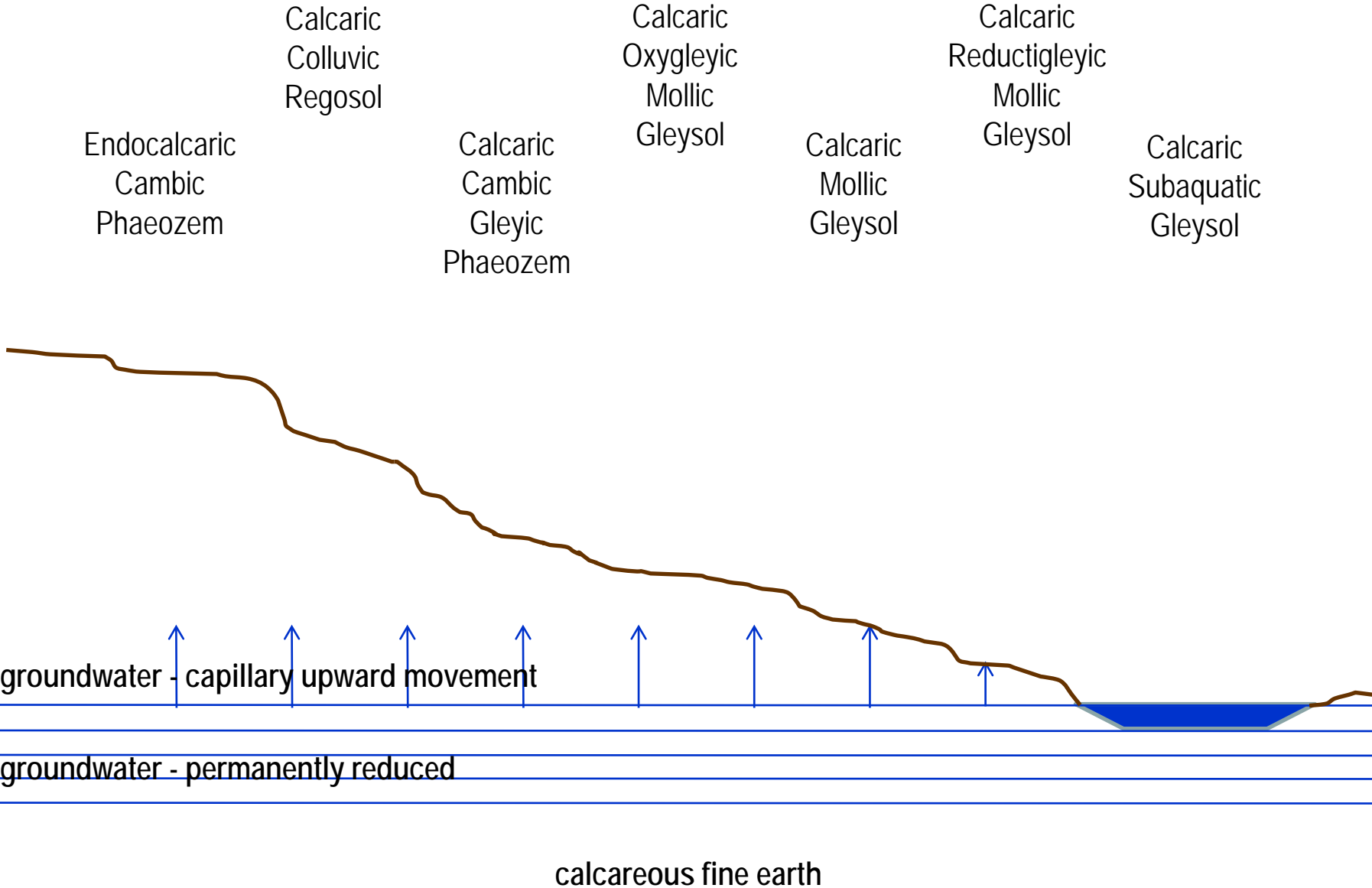
first:	Gleysol
second:	Fluvic Gleysol
third:	Eutric Fluvic Gleysol
fourth:	Eutric Fluvic Gleysol

map unit

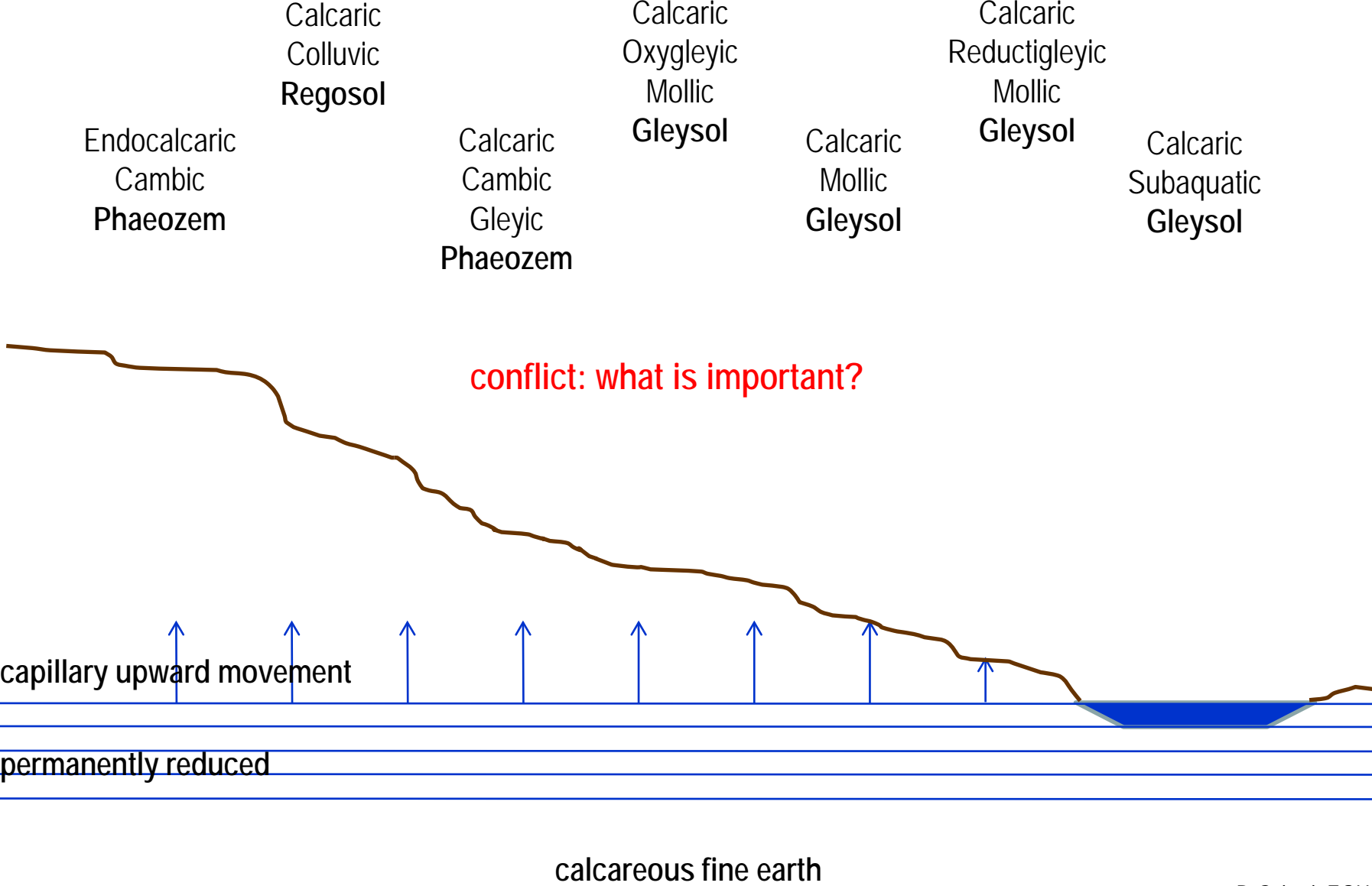
(Eutric)
(Eutric, Humic)
(Humic)
(Humic)



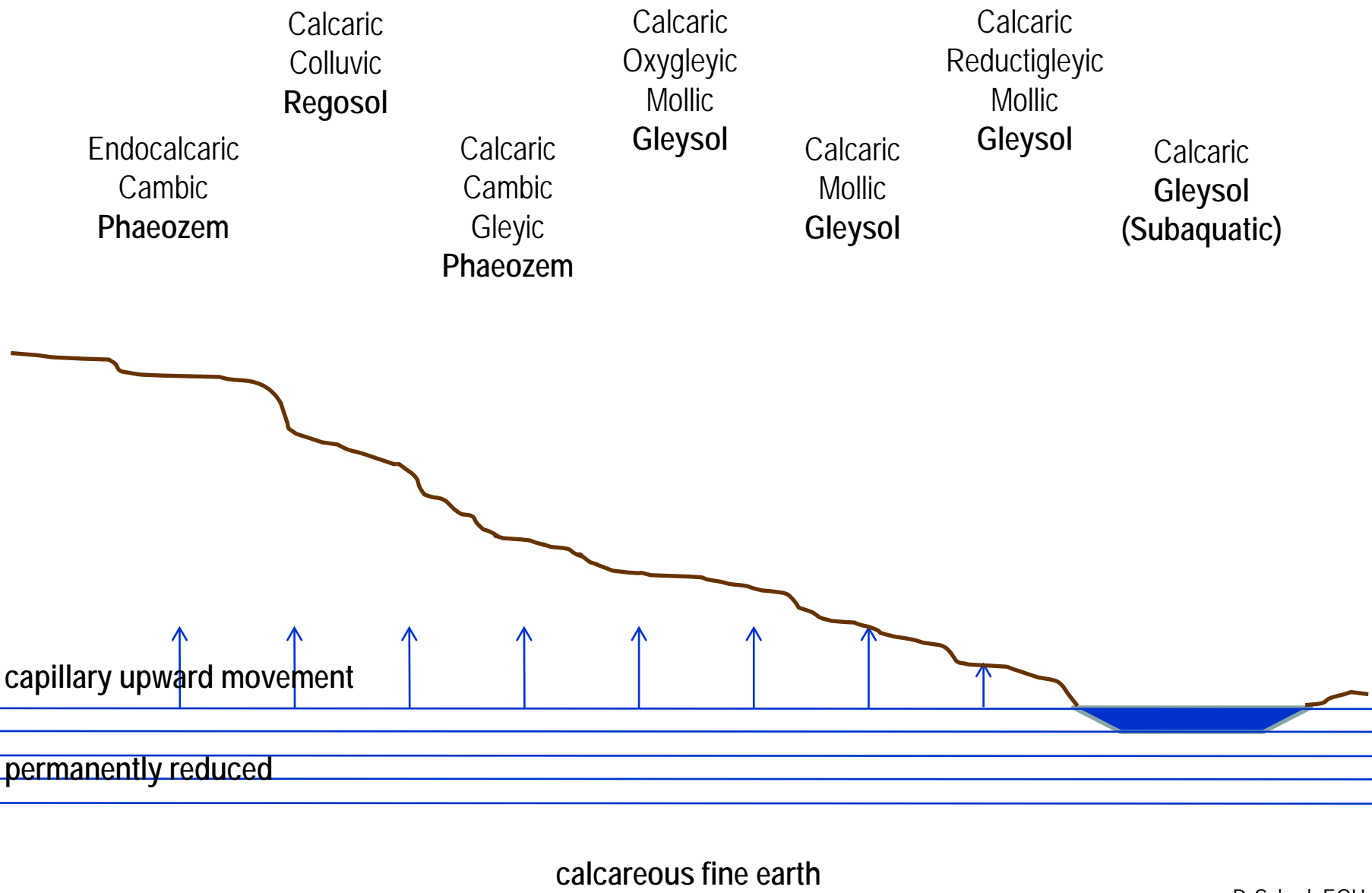
Soils in the landscape



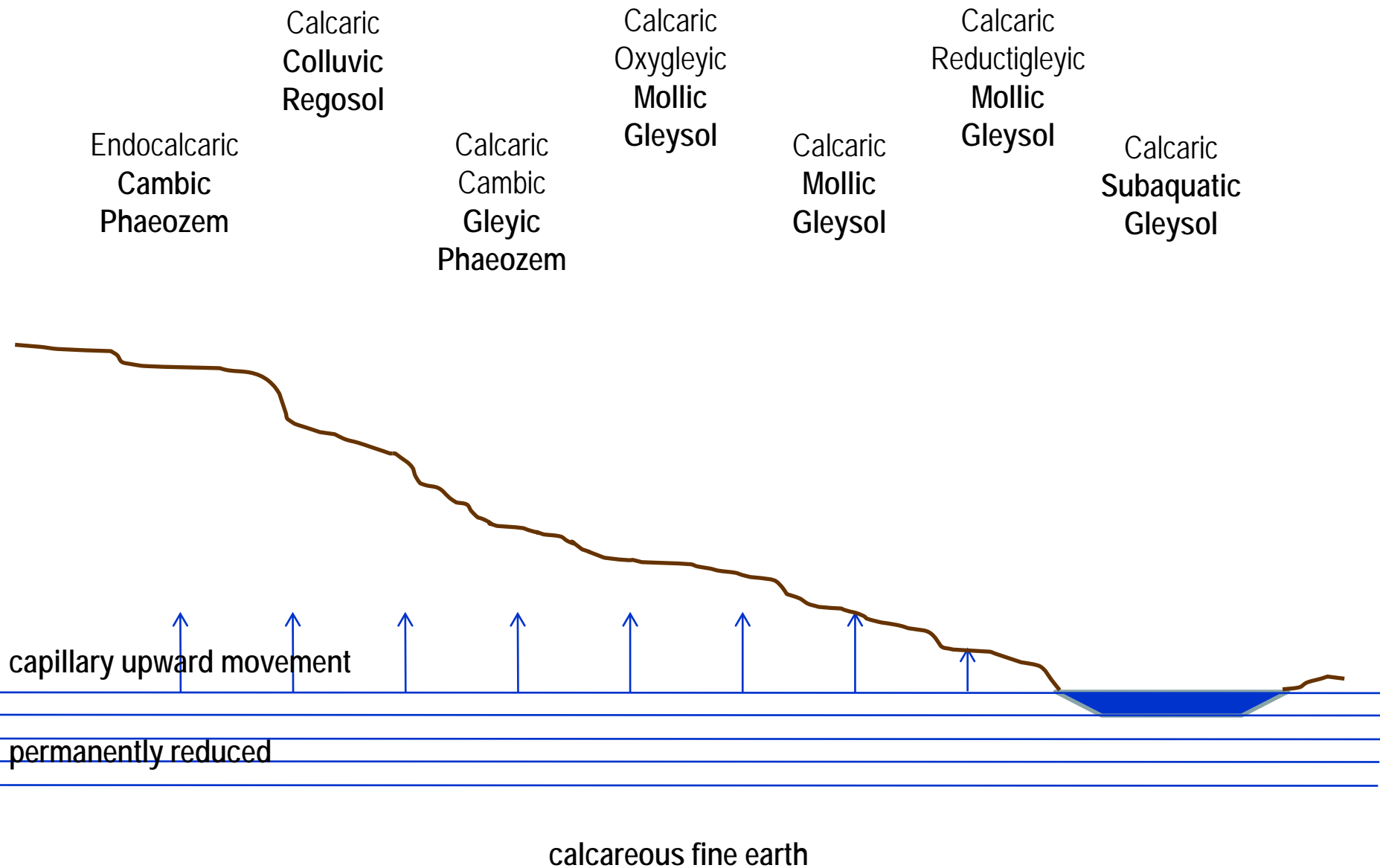
Map: first scale level



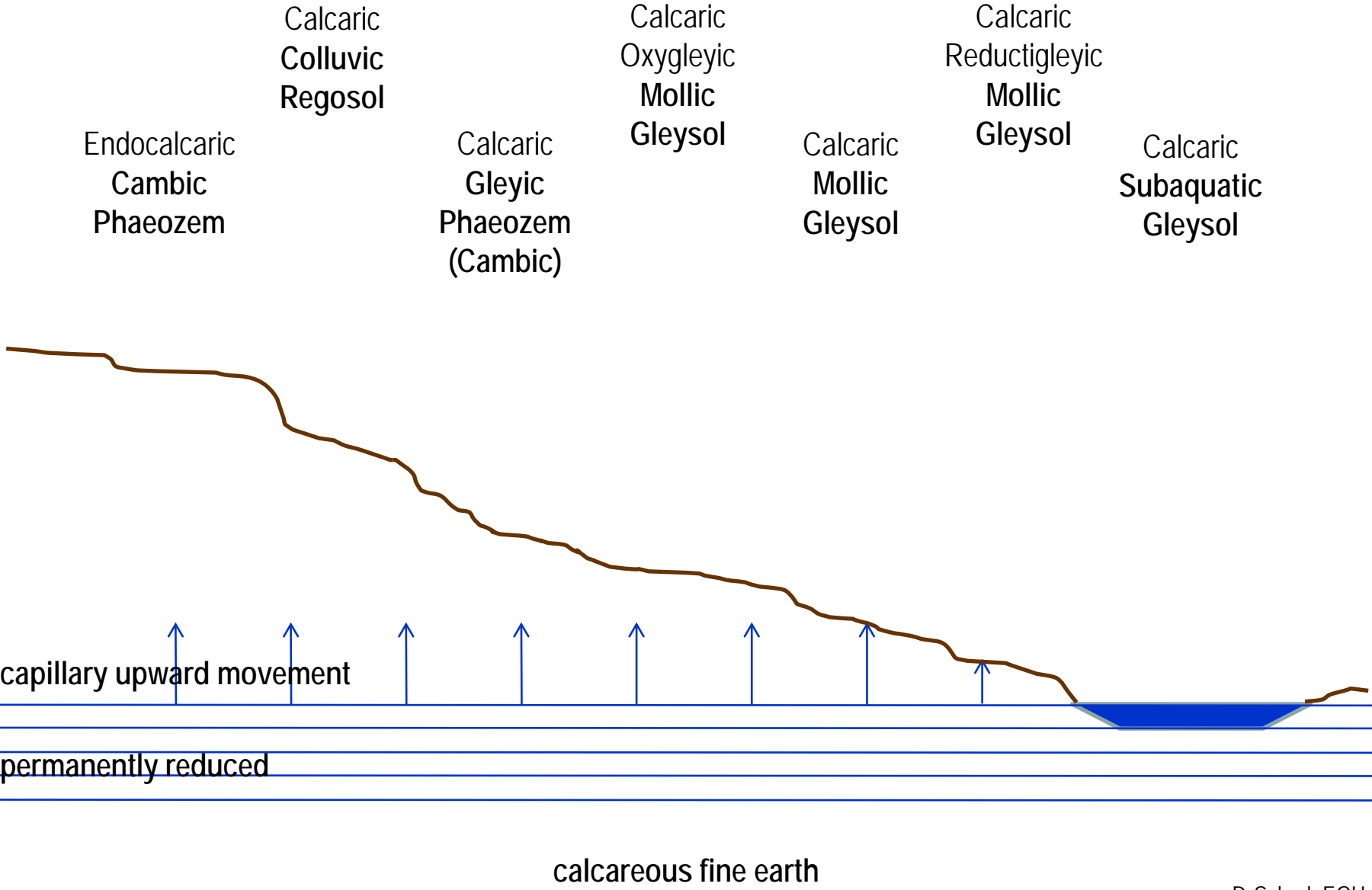
Map: first scale level with optional qualifiers



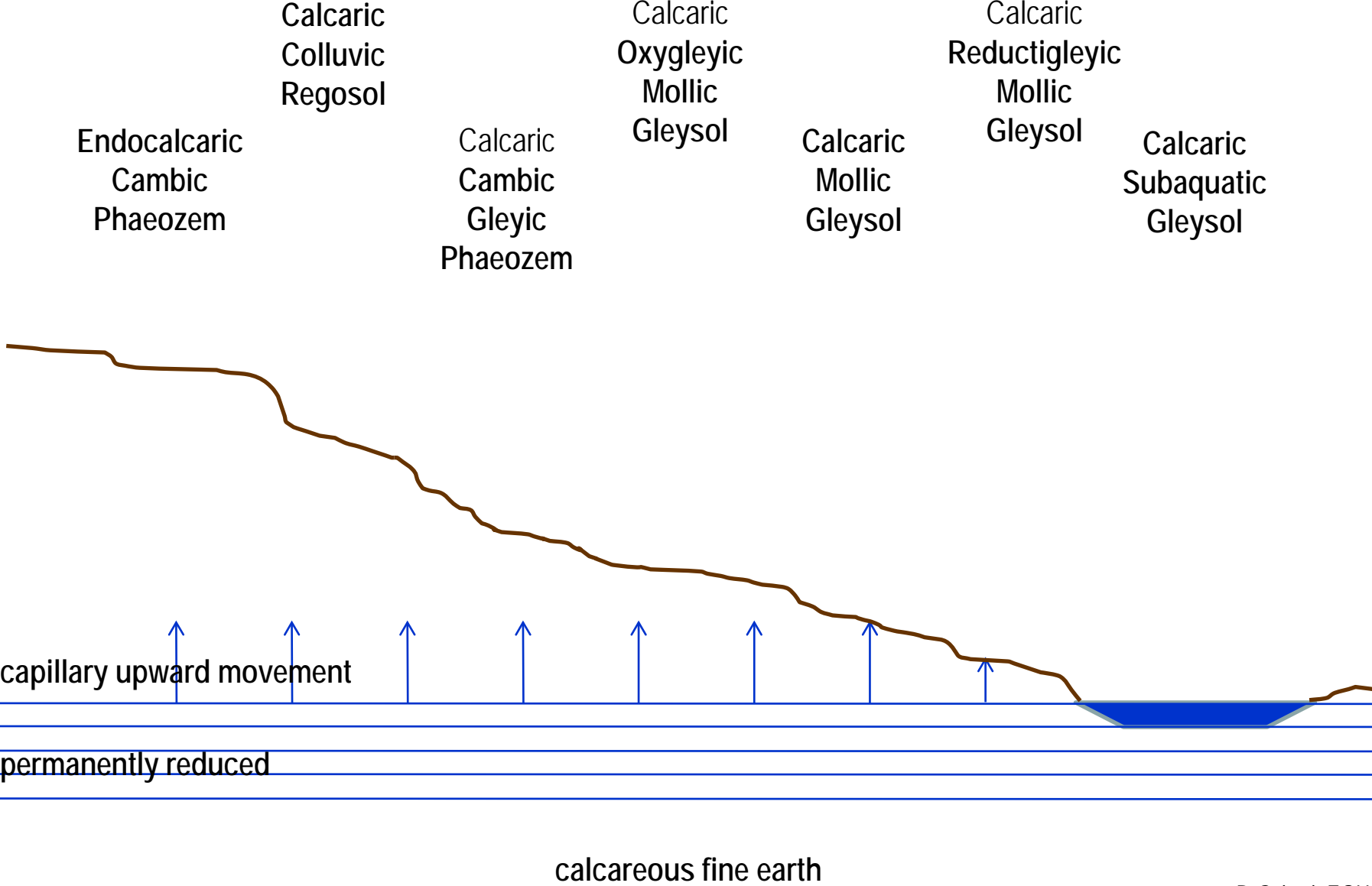
Map: second scale level



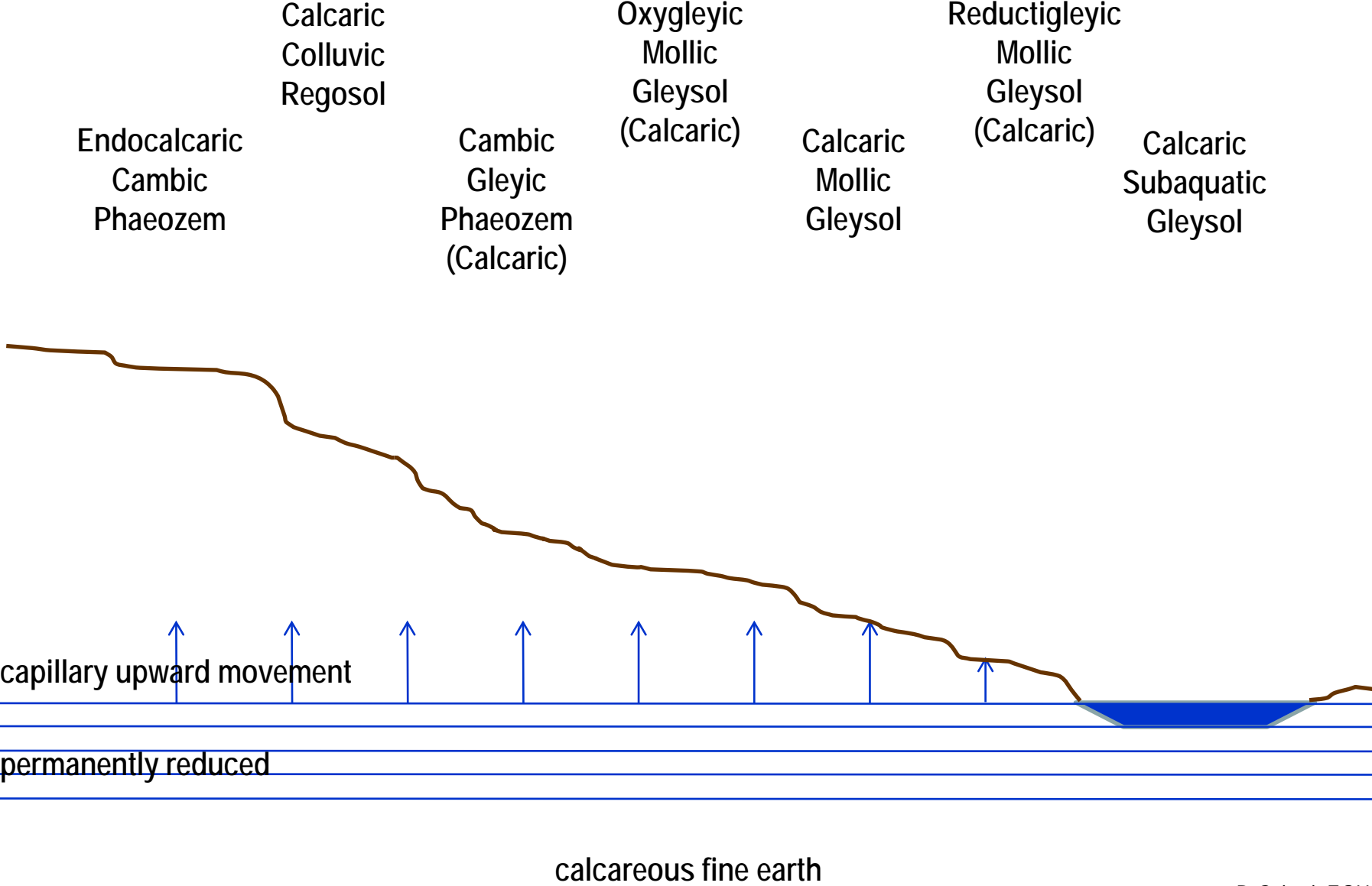
Map: second scale level with optional qualifiers



Map: third scale level



Map: third scale level with optional qualifiers



Soil maps should tell us

1. the major soil characteristics changing in the landscape:

here: groundwater influence:

Subaquatic Gleysol

Reductigleyic Gleysol

Gleysol

Oxygleyic Gleysol

Gleyic Phaeozem

2. the common characteristics of the landscape:

here: calcareous material → Calcaric

3. the state of weathering:

here: cambic horizon → Cambic

4. about plant growth, land use, ecosystem services:

here:

groundwater → Gleysol, Gleyic

mollic horizon → Phaeozem, Mollic

calcareous material → Calcaric

Everything depends on a correct classification

automated soil classification:

German Federal Institute for Geosciences and Natural Resources and the TUM

already available:

- for all soils existing in Germany
- according to WRB 2007
- field input data: according to the German Field Guide
- laboratory input data: international

http://www.bgr.bund.de/DE/Themen/Boden/Projekte/Informationsgrundlagen-geschlossen/Uebersetzungsschluessel/UeSchluessel_AblSchluessel/AblS_KA5_WRB.html?nn=1541164

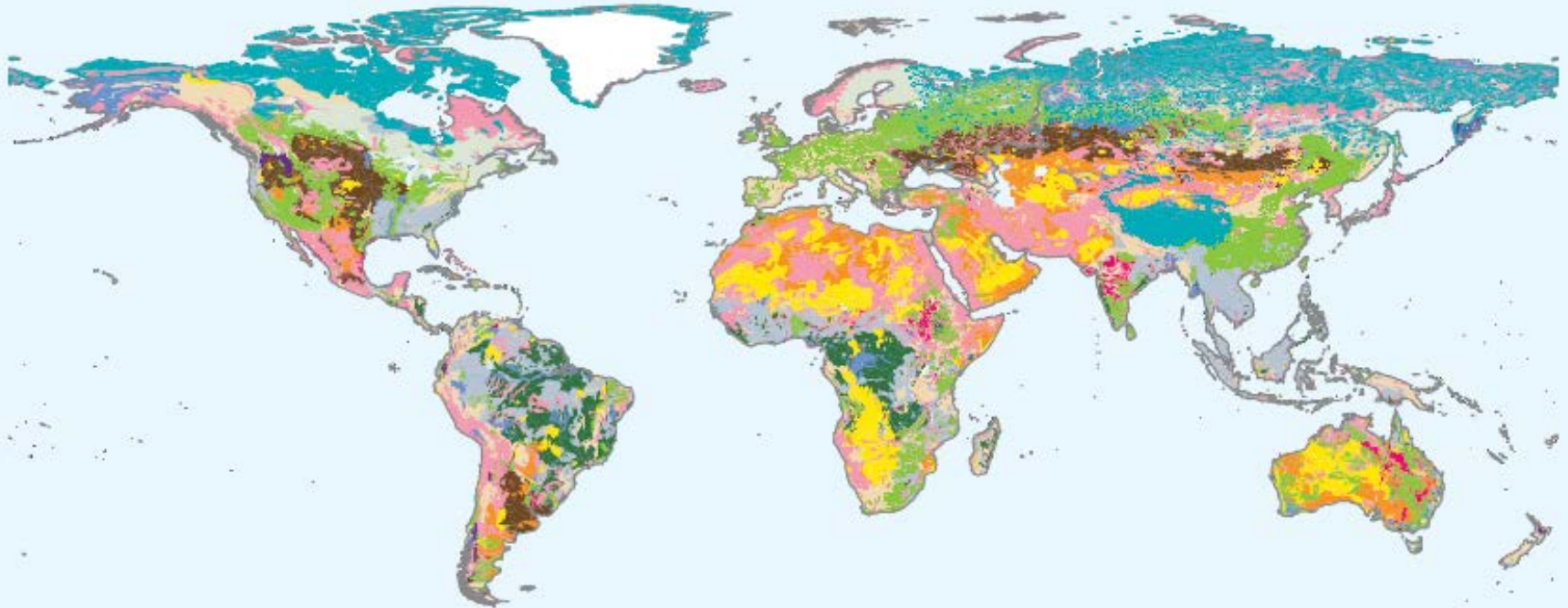
ready by December 2017:

- for all soils of the world
- according to WRB 2015
- field input data: according to the FAO Guidelines





ready by December 2018:

- field input data: according to Schoeneberger et al., Field book for describing and sampling soils (we may need some help)

Soils of the World



Legend

- | | | |
|---|--|---|
|  Cryosols |  Gleysols, Planosols, Stagnosols |  Andosols |
|  Luvisols, Alisols, Retisols |  Ferralsols, Nitisols, Plinthosols |  Vertisols |
|  Lixisols, Acrisols |  Kastanozems, Chemozems, Phaeozems, Umbrisols |  Glaciers and permanent snow |
|  Cambisols |  Durisols, Calcisols, Gypsisols, Solonchaks, Solonetz |  Inland water |
|  Fluvisols, Leptosols, Regosols |  Podzols, Histosols |  No data |
|  Anthrosols, Technosols | | |

Cambisols, Umbrisols

thank you very much