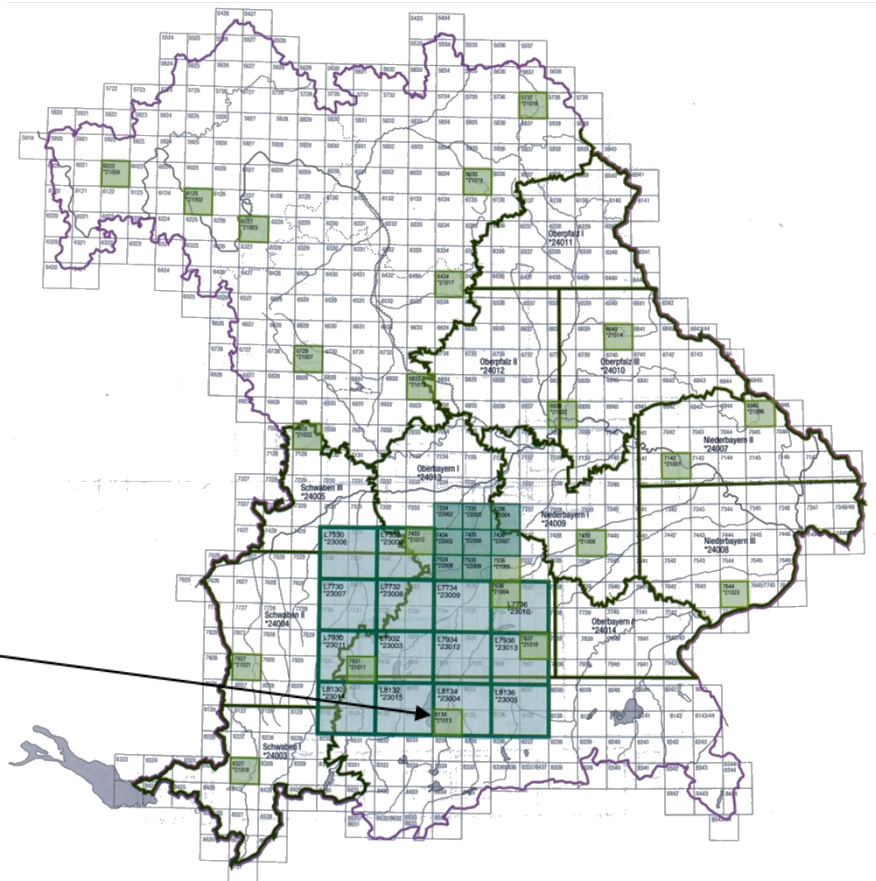
Bayerisches Landesamt für Umwelt

Soil mapping in the Bavarian Alps– An experience report

- **Between 1955 and 1978 23 soil maps (scale 1:25 000) from different landscapes have been published to get a general idea about appearing soils in Bavaria – none in the Alps**

- **Due to german standard mapping was carried out at a scale of 1:50 000 later on - none in the Alps**



Bayern:	**70 549 km²**
Catalunya:	**32 091 km²**
Emiglia - Romagna:	**22 123 km²**

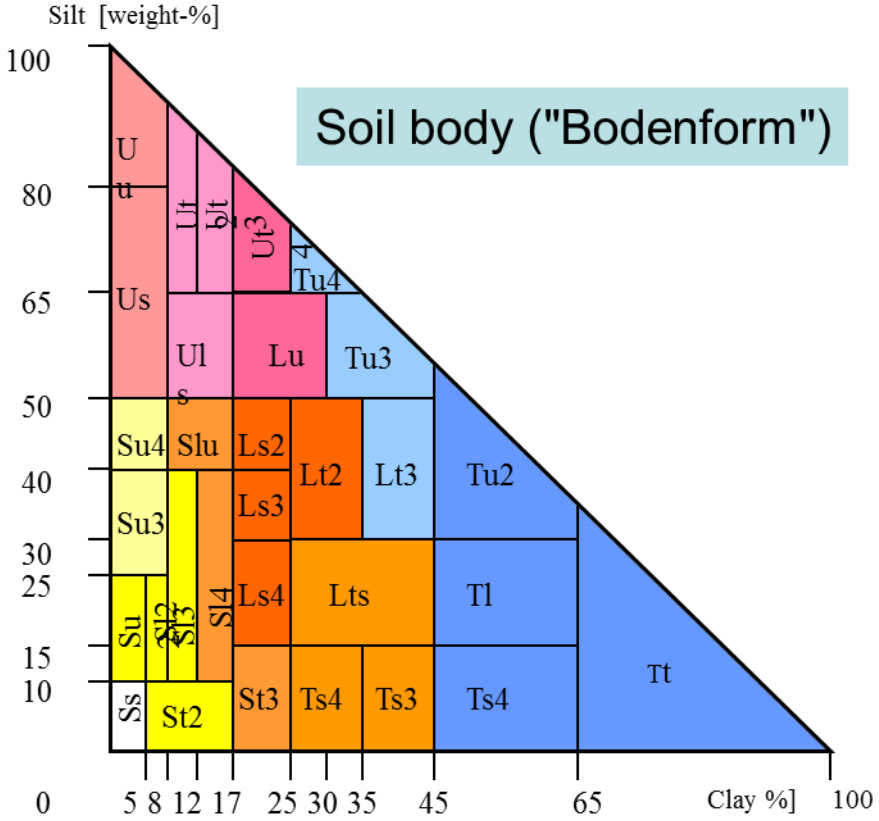
In order to complete a first countrywide soil survey of Bavaria in a reasonable time period, the compilation of an outline soil map ("Übersichtsbodenkarte") 1:25 000 (ÜBK 25) started in the early 90ies - without experience in the Alps

Requirements

- Smooth integration of the alpine mapping units into the existing General Legend of Bavaria➔ concept should not drift away from the existing one
- Mapping must be possible even in the case of fragmentary or missing data (e.g. geological map)
- Using the German Guideline for Soil Description is a must.
- Indicating the characteristics of the landscape
- A tight time schedule must be adhered to

The core of *every* map: the mapping unit with 3 fundamental particulars

Soil type
incl. spatial ratio



Texture (fine and coarse fraction)

Parent material

Soil mapping unit - an example

Predominat Cambisol, rare Podsol on sandy loam over sand (Sandstone)

German guideline for soil mapping

How to structure the map legend?➔ MAIN TECTONIC UNITS Highest level

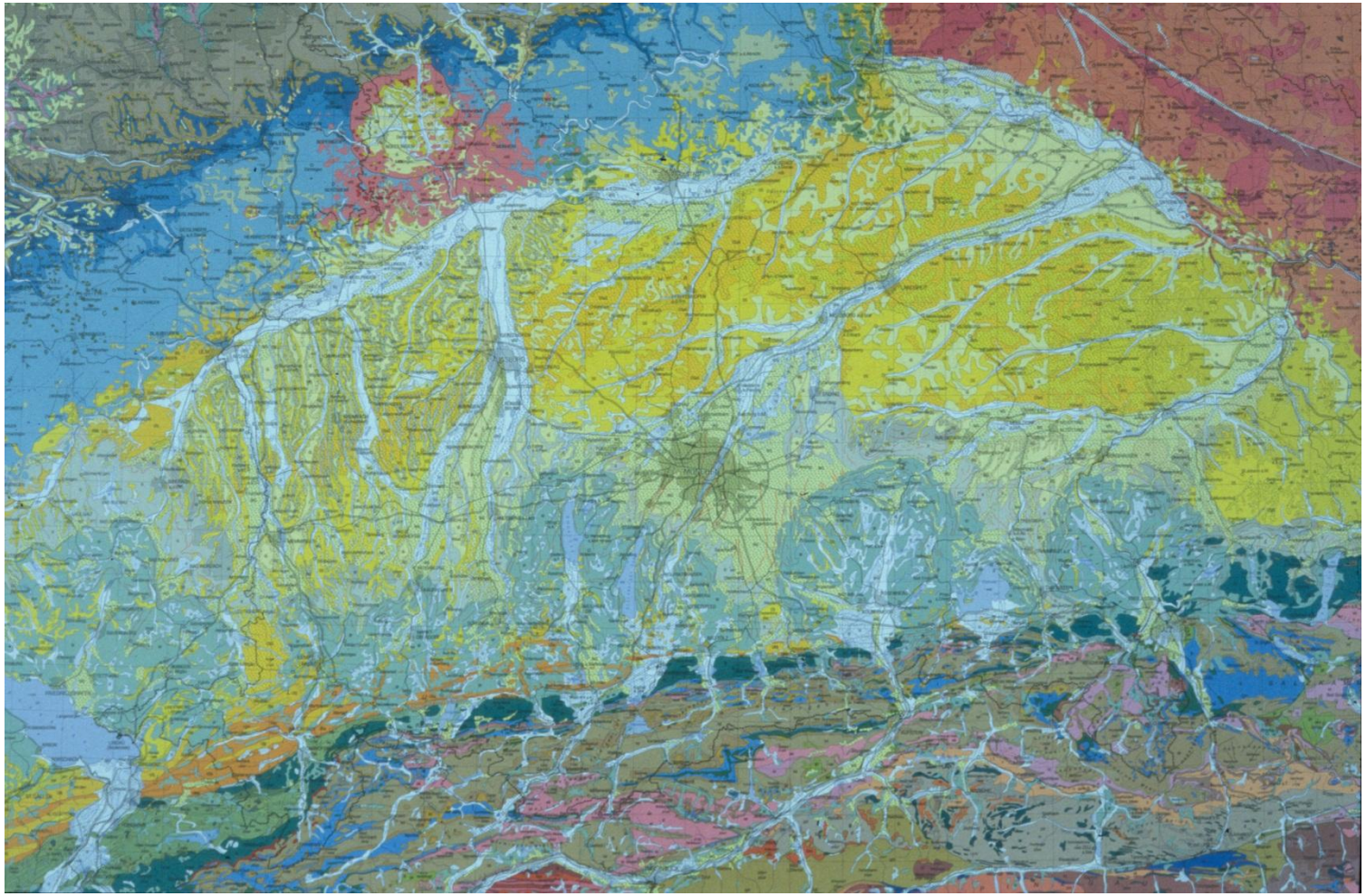
1 Folded Molasse (northern margin)

2 Helvetian Zone

3 Flysch Zone

4 Northern calcerous zone

Geology of Southern Bavaria – an Overview



Strong morphodynamic and morphologic interaction =>parent material?

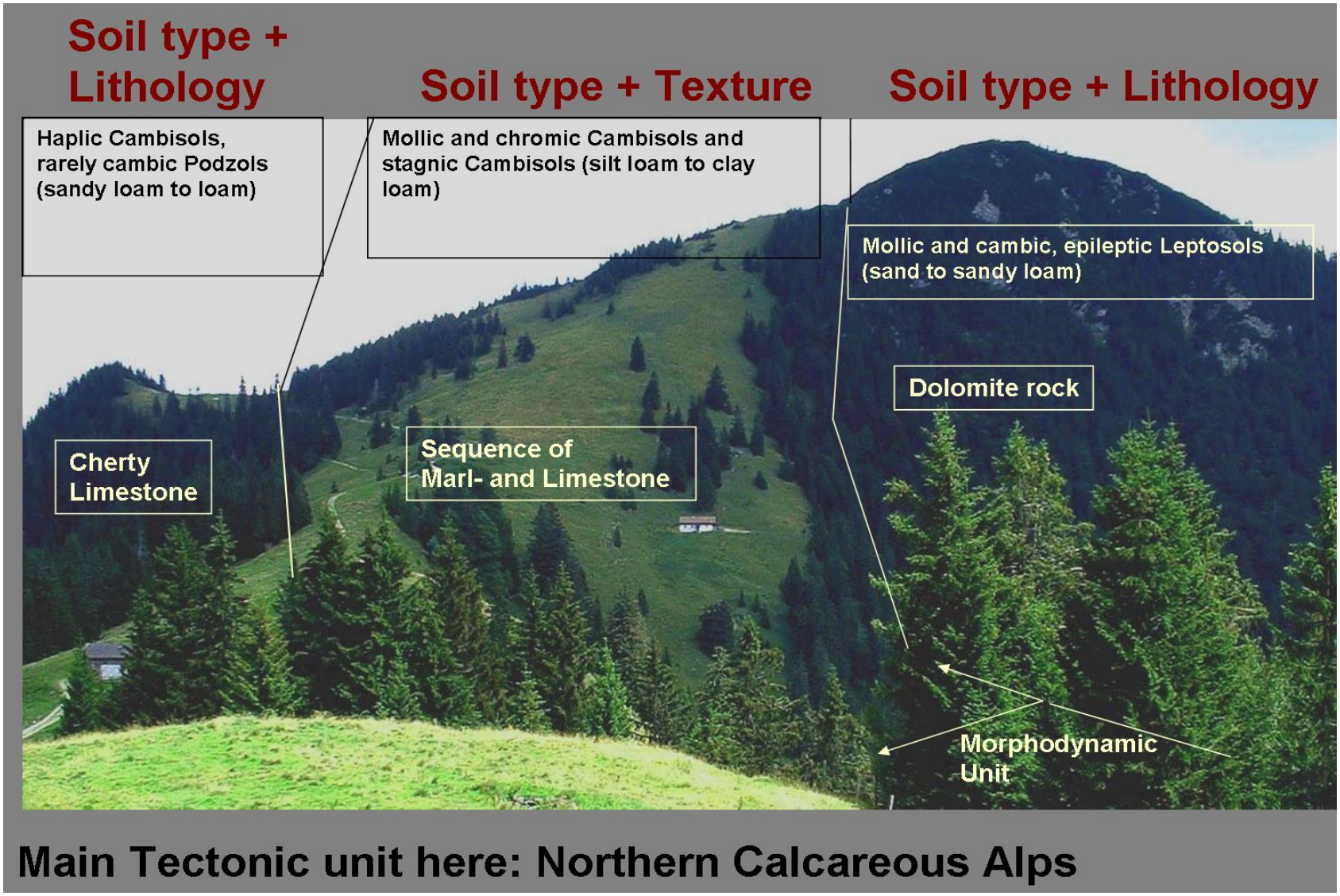
MAIN TECTONIC UNITS
Highest level

Soil type …derived from

Texture	*Lithology (parent material)*
Stony loam	(marlstone)

„NEW":
Substratum (Texture + proportion of chert)

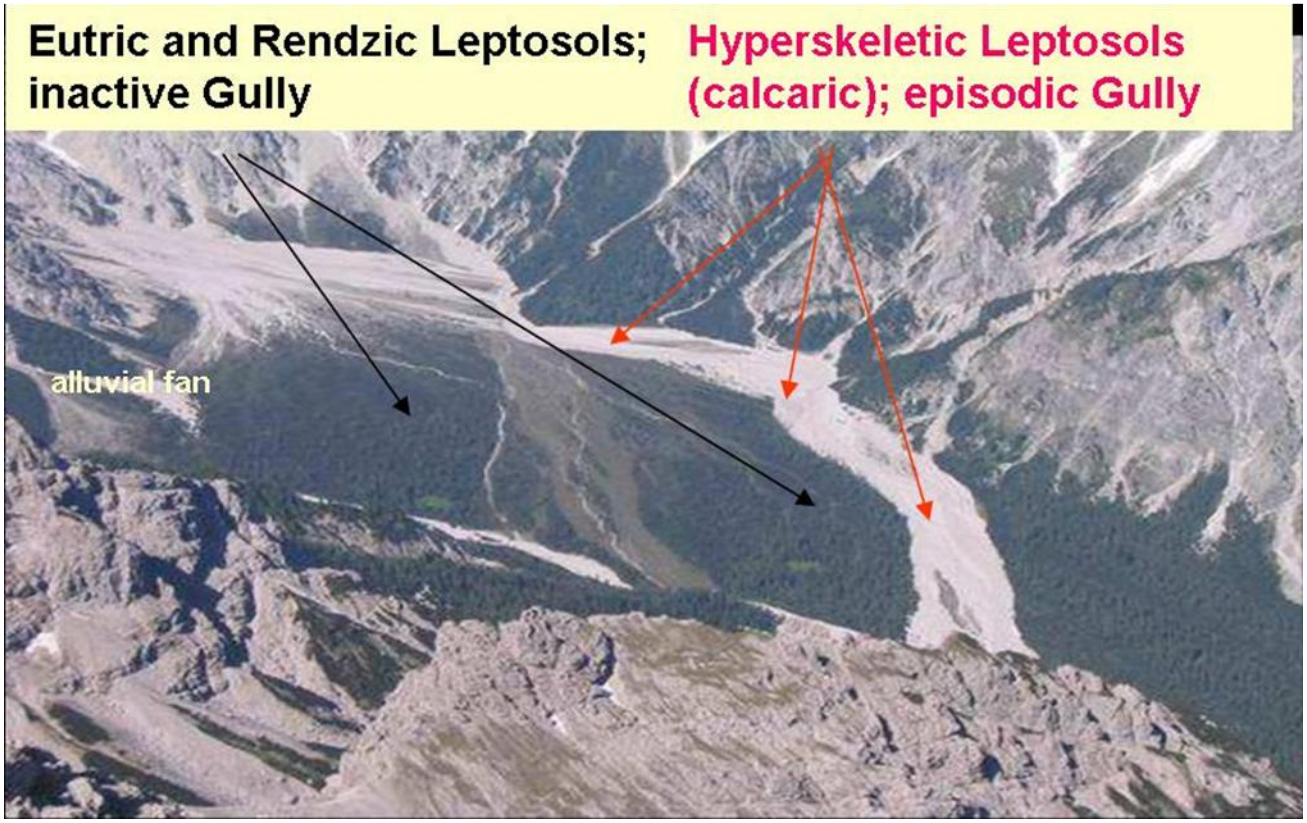
"New":
Morphology
(local moraine instead of parent material)
"New":
Morphodynamic
(alluvial fan instead of parent material)



Morphological/Morphodynamic structure

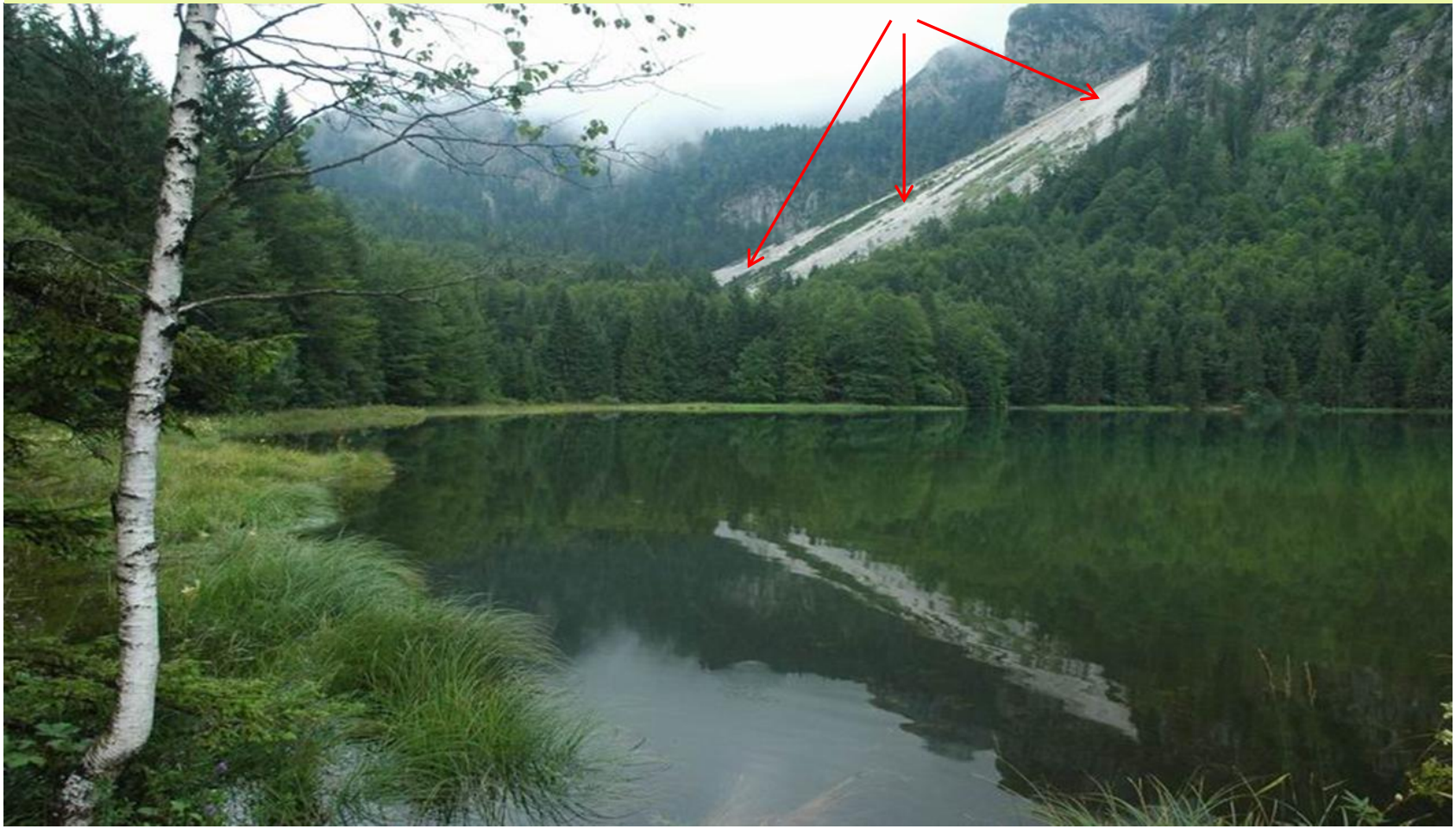
- **Local moraine**
- **Allochthonous moraine**
- **Karstified plateaus**
- **Mass movements**
  (rockslides, landslides, mudflows, talus, alluvial fans, avalanche slide)
- **Valley sediments in general**
- **Glacial deposits**

Morphodynamic units



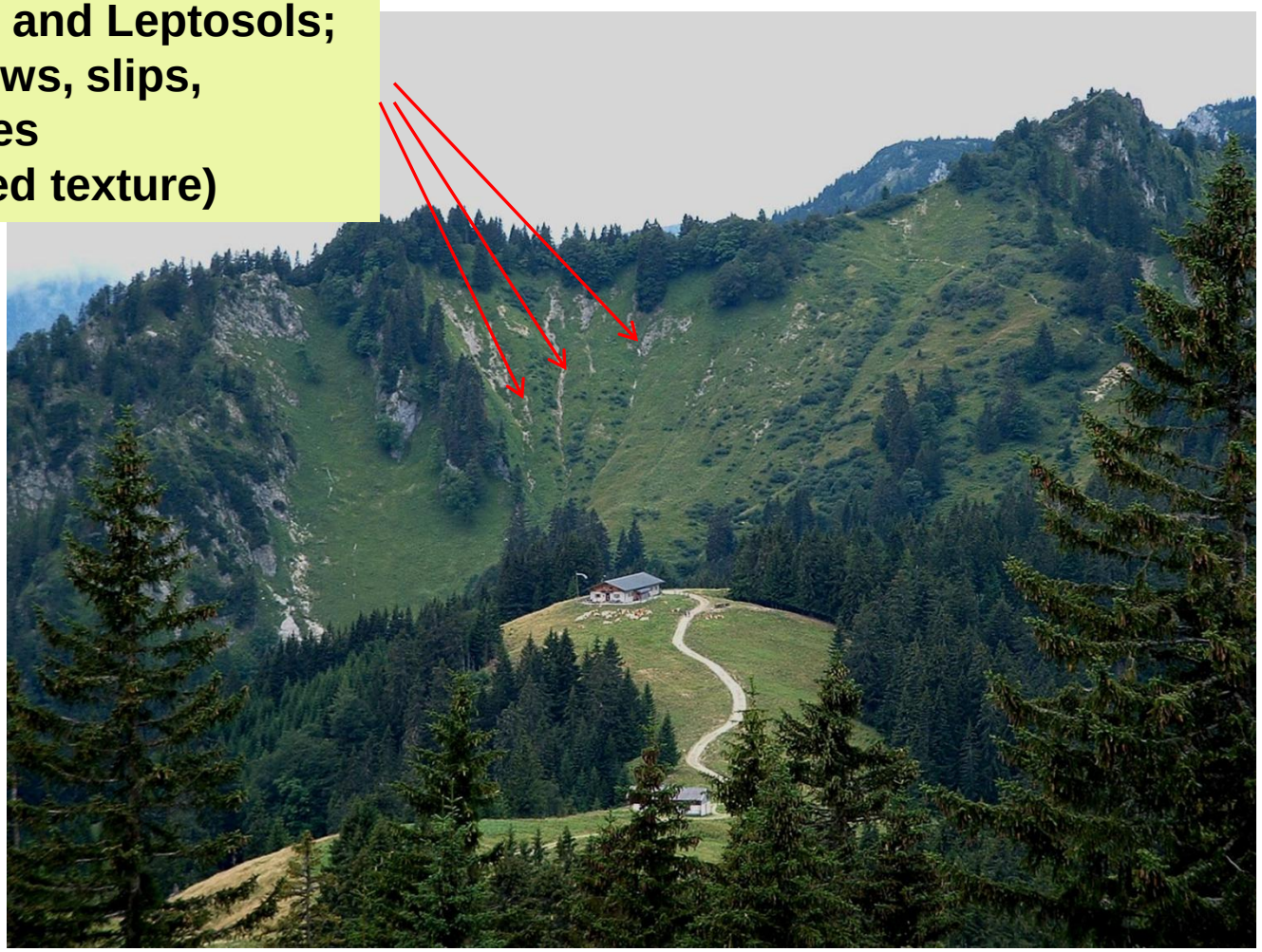
Morphodynamic unit

Hyperskeletic Leptosols (calcaric) and rendzic Leptosols; Talus detritus

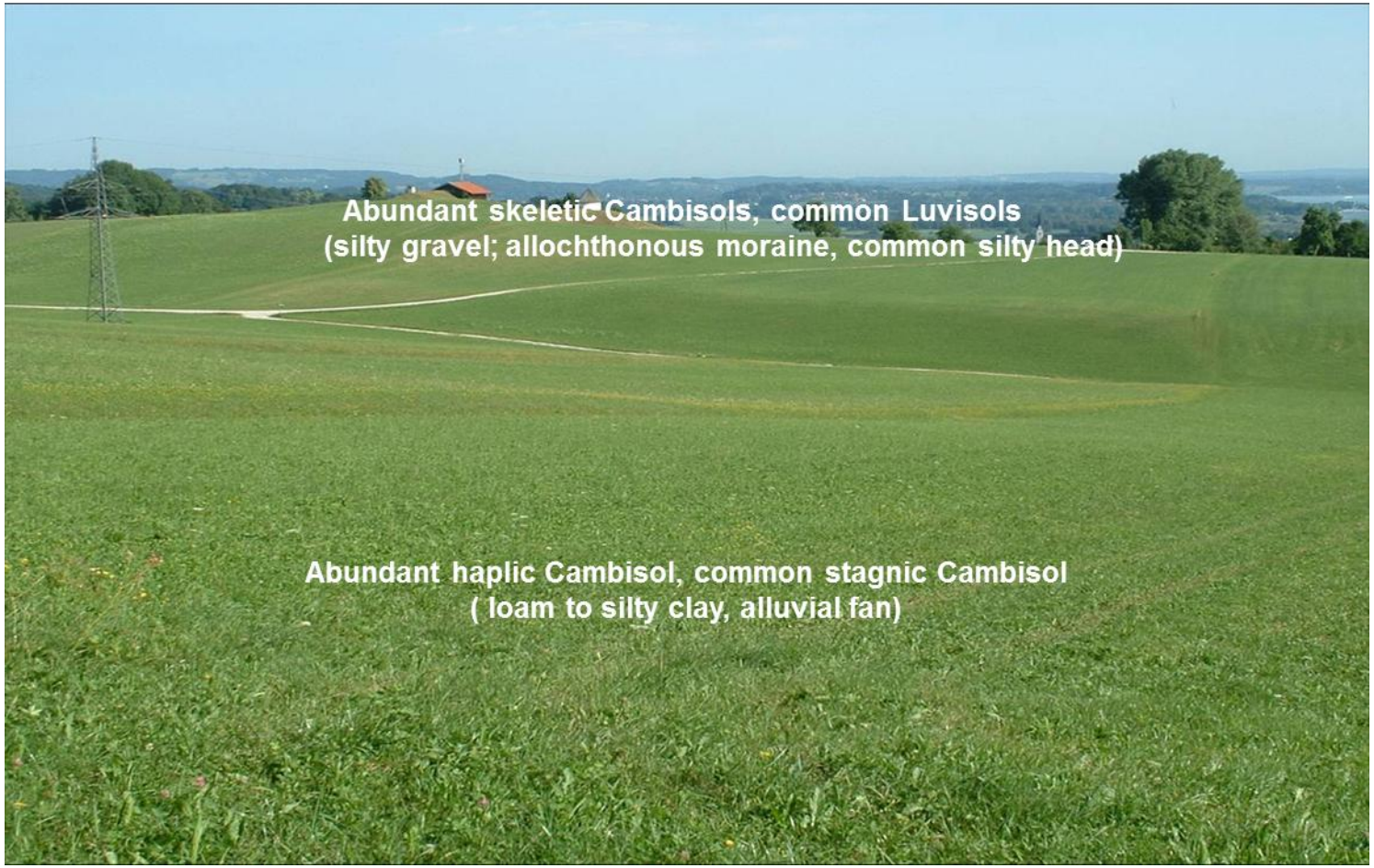


Morphodynamic unit

Regosols and Leptosols; debris flows, slips, avalanches (diversified texture)



Morphological division



PROBLEMS AND SPECIAL FEATURES OF THE ALPINE AREA

Logistical problems like limited traffic ability and accessibility

Topography causes a multiple area to map

Special climate and hydrologic balance➔special soil pattern

Almost permanent water supply

Distinction between recent and former pedological features

Missing or inadequate representation of the intense quaternary and Holocene coverage on geological maps

Small-scale changing of soil type and substrate conditions

- Tectonics
- Relief intensity
- Former and recent morphodynamics

Recent dynamics

Example for distinct soil development caused by recent morphodynamics

1

Moraine with crystalline debris➔Cambisol

Moraine with carbonatic debris➔ Regosol

Rockslide (montane Zone, altitude 1000 m)

Rockslide- internal structure – Classification?

Modern end moraine in recent pergiglacial zone

View at the moraine surface

Classification?

Organic rich debris below residual stone pavement (periglacial zone, altitude 2500m)

Conclusions

- A hierarchical mapping unit system was proofed to be a suitable approach for mapping in the Alps. This enables to use the most fitting level reflecting the reality at its best.
- But even using a hierarchical classification system like the German one some of the soils cannot be described correctly. They have been mapped by using the more general level.
- Regarding the small Alpine area of Germany it is understandable that the classification system was not created for alpine soils. Therefore upgrading knowledge of alpine soils and supplementation of the classification system is a necessary task for now.

Thank you for your attention !