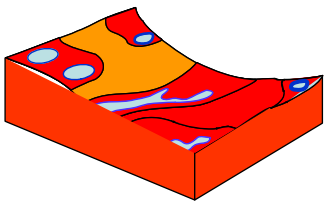
The Soil Typological Unit

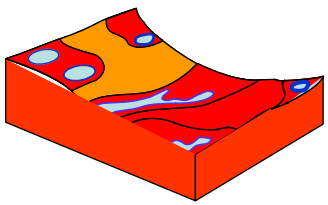
Dominique King and Christine Le Bas
INRA Orleans, France



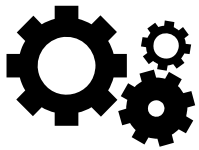
ESBN 2007 Plenary meeting
Hannover, 23-24/04/07

INTRODUCTION

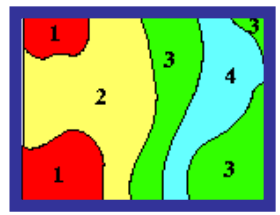
Objective : Definition of soil risk areas



Soil cover



Data processing



Soil map

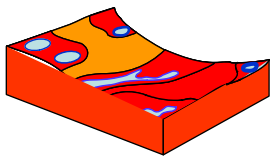
Soil risk areas

1

2

1

Diversity and variability of soils

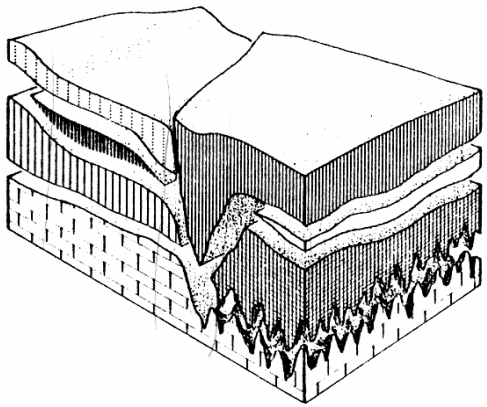


→ Soil variability is the result of processes of soil formation

→ Soil formation processes lead to « **natural soil bodies** »

→ Soil formation knowledge = best tool for soil typology and soil mapping

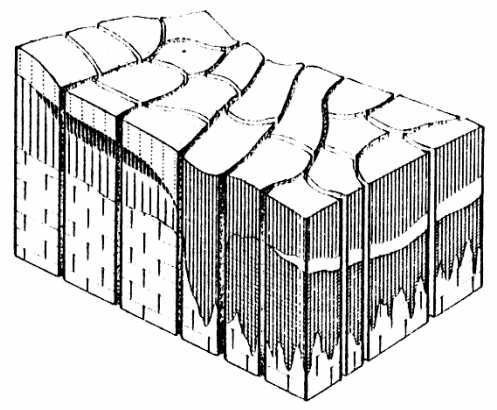
1 Natural Soil bodies (3D volume)



horizontal view :

↔ **HORIZON**

Attributes : Clay content, color, thickness, etc.



vertical view :

↔ **SOIL TYPOLOGICAL UNIT (STU)**

Attributes : Horizons list, root depth water table, etc.

1 Definition Soil Typological Unit

- Summary (In : Georeferenced Soil Database for Europe - EUR 18092, 1998 – p. 8)

« STU is a portion of the soil cover with diagnostic characteristics resulting from similar processes of soil genesis »

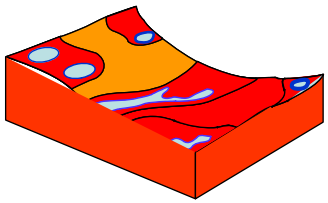
« STU description »… is based on … « morphological and analytical attributes of the main horizons »

« STU corresponds to a real portion of the soil cover, but delineation on a map is not always possible »

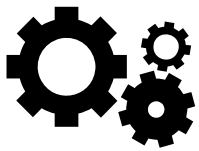
1 Definition Soil Typological Unit = Table

STU n°	Horizon n°	Clay content				Thickness				Soil classification				
		Mode	Q1	Q5	...	Mode	Q1	Q5	...	WRB				
1	1													
	2													
2	1													
3	1													
	3													

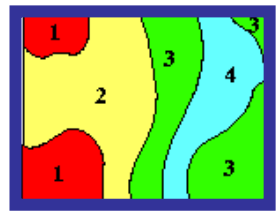
STU = spatial entity
Data estimated from statistics or expertise



Soil cover



Data processing



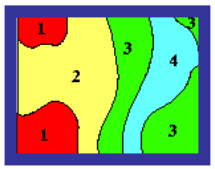
Soil map
Soil risk areas

1

2

2

Soil Map
Soil Geographical DataBase (SGDB)



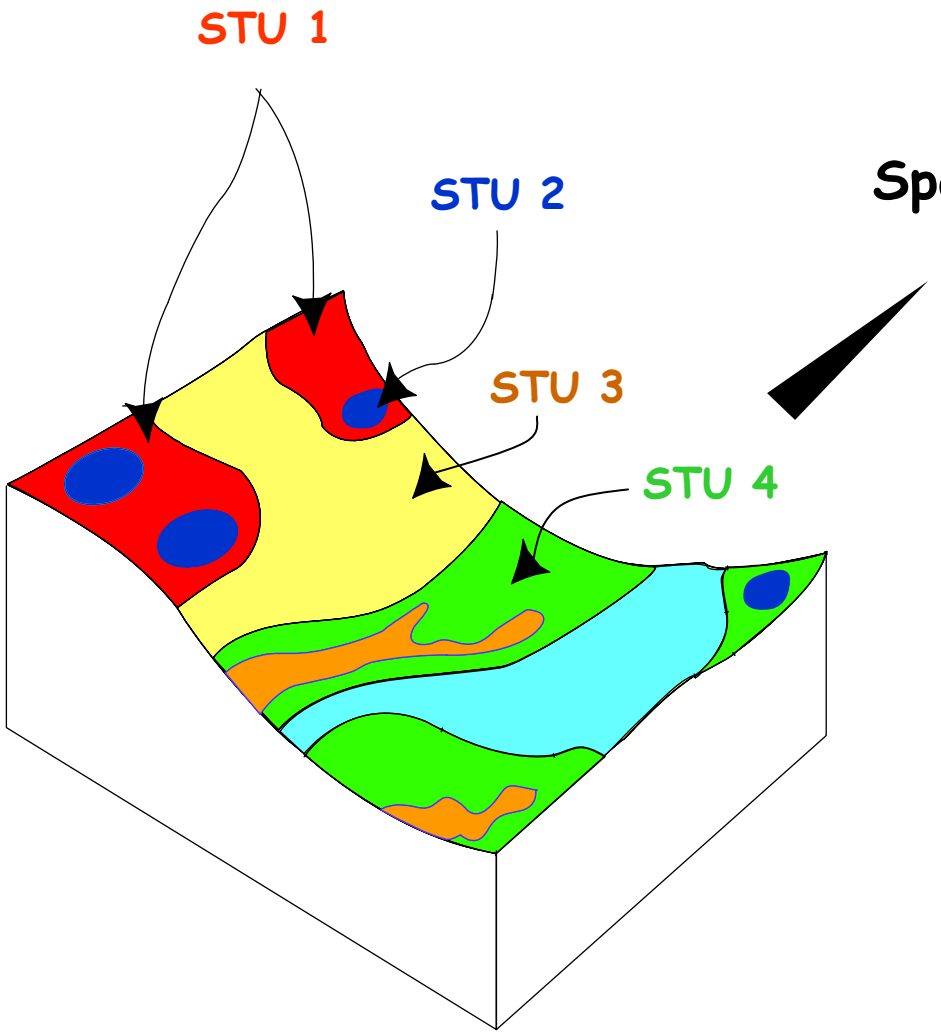
→ Soil Map = Representation of the soil variability in 2D
with scale constraints and poor information

→ SGDB = GIS concepts with 2 separate data sets
- Geometric set = delineation
- Semantic set = soil attributes

STU definition : Semantic set > Geometric set

2

STU identification

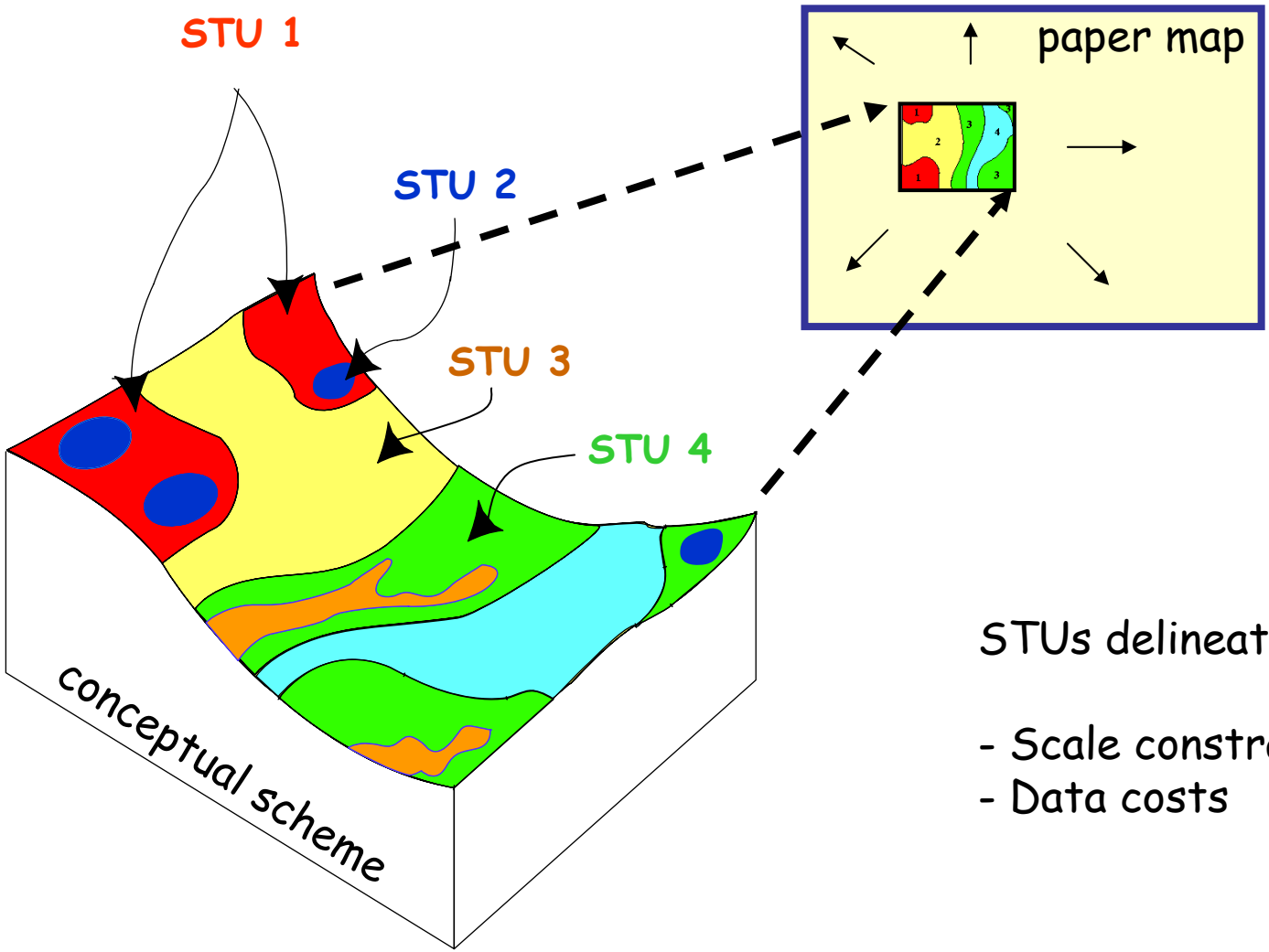


Conceptual scheme :

Spatial Organisation Model

2

STU representation

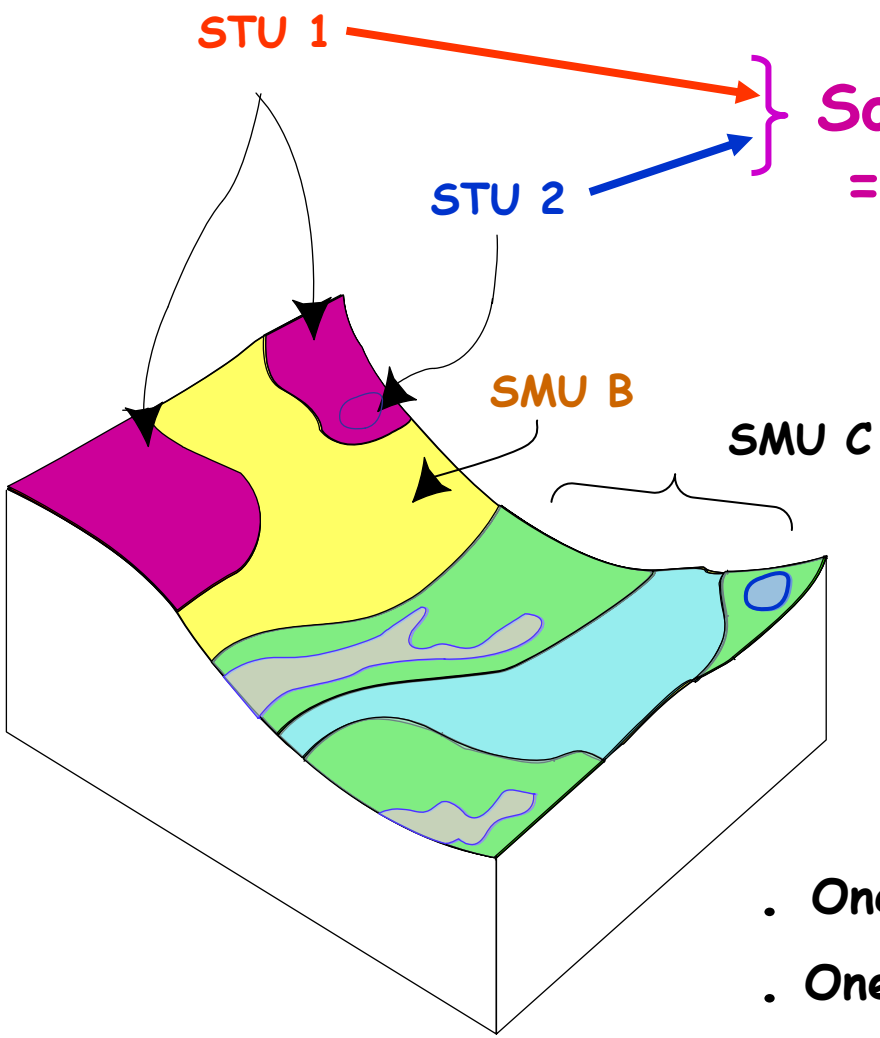


STUs delineation :

- Scale constraints
- Data costs

2

STU representation

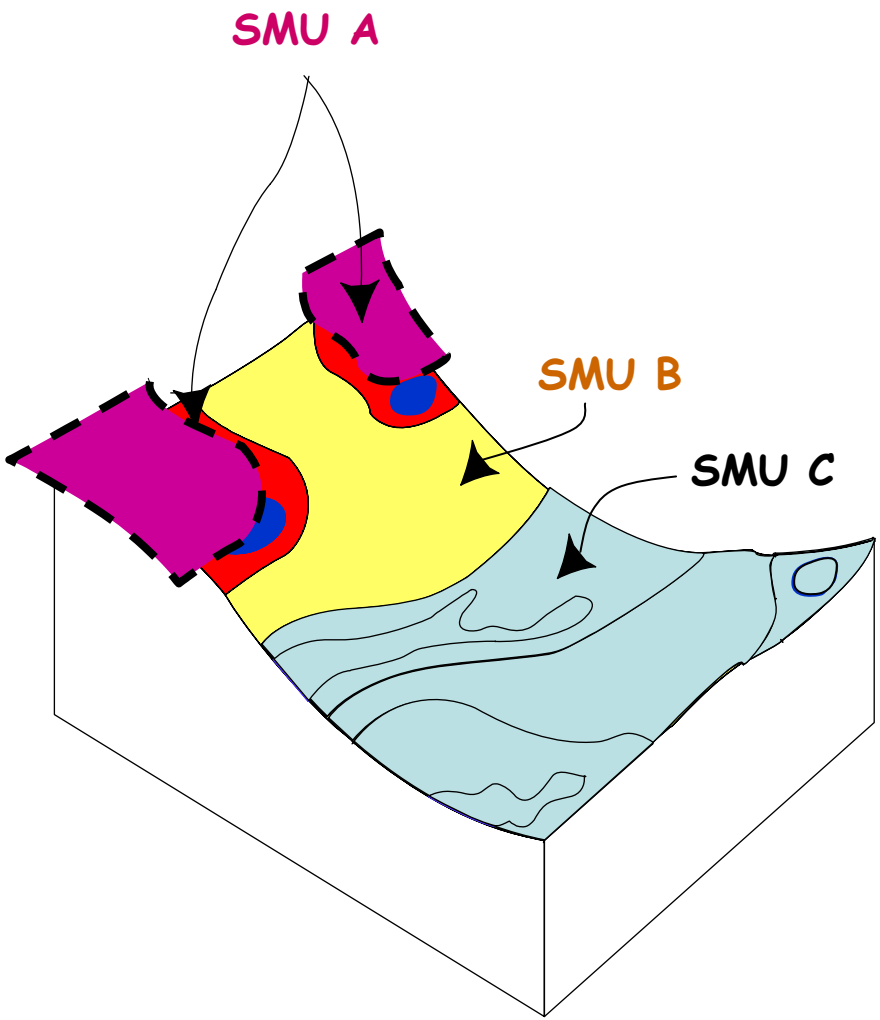


Soil Map Unit A (SMU A)
= Soil Association concept

. One SMU can get only one STU

. One STU can belong to several SMUs

2 STU representation through SMU



SMU n°	STU n°	% area	Geometric delineation
A	1	60	Polygons i, j…
A	2	40	…. ….
B	3	100	…. ….
C	4	90	…. ….
C	2	10	…. ….

SMU/STU relational table

Conclusion

STU = Soil body defined by **attributes** and related to a soil classification

Location of STUs is known through Soil Map Unit delineation
AND **percentage** within SMU

→ *SMUs and STUs are defined and mapped thank to soil attributes*
→ *Soil attributes are used to derive criteria for soil risk assessment*

STU/SMU concepts allow to have :
- **rigour to characterise** soils on common criteria at European level
- **flexibility to map** soil areas at regional level

Recommendation

Soil Geographical DataBase can deliver information for soil risk areas
→ **Soil risk area maps derived from STUs attributes**

2 last remarks, with 2 proposals :

Soil attributes have an uncertainty
→ **Uncertainty maps (confidence level)**

Risk area are mapped from SMU delineation
AND percentage of STU within SMU
→ **Representativity maps (% STU within SMU)**