Danube Basin Soil Database

Beata Houšková
Land Management and Natural Hazards Unit,
Institute for Environment & Sustainability
JRC TP 280 Ispra (VA)
21020 Italy

E-mail: beata.houskova@jrc.it
http://http://eusoils.jrc.ec.europa.eu/esbn/

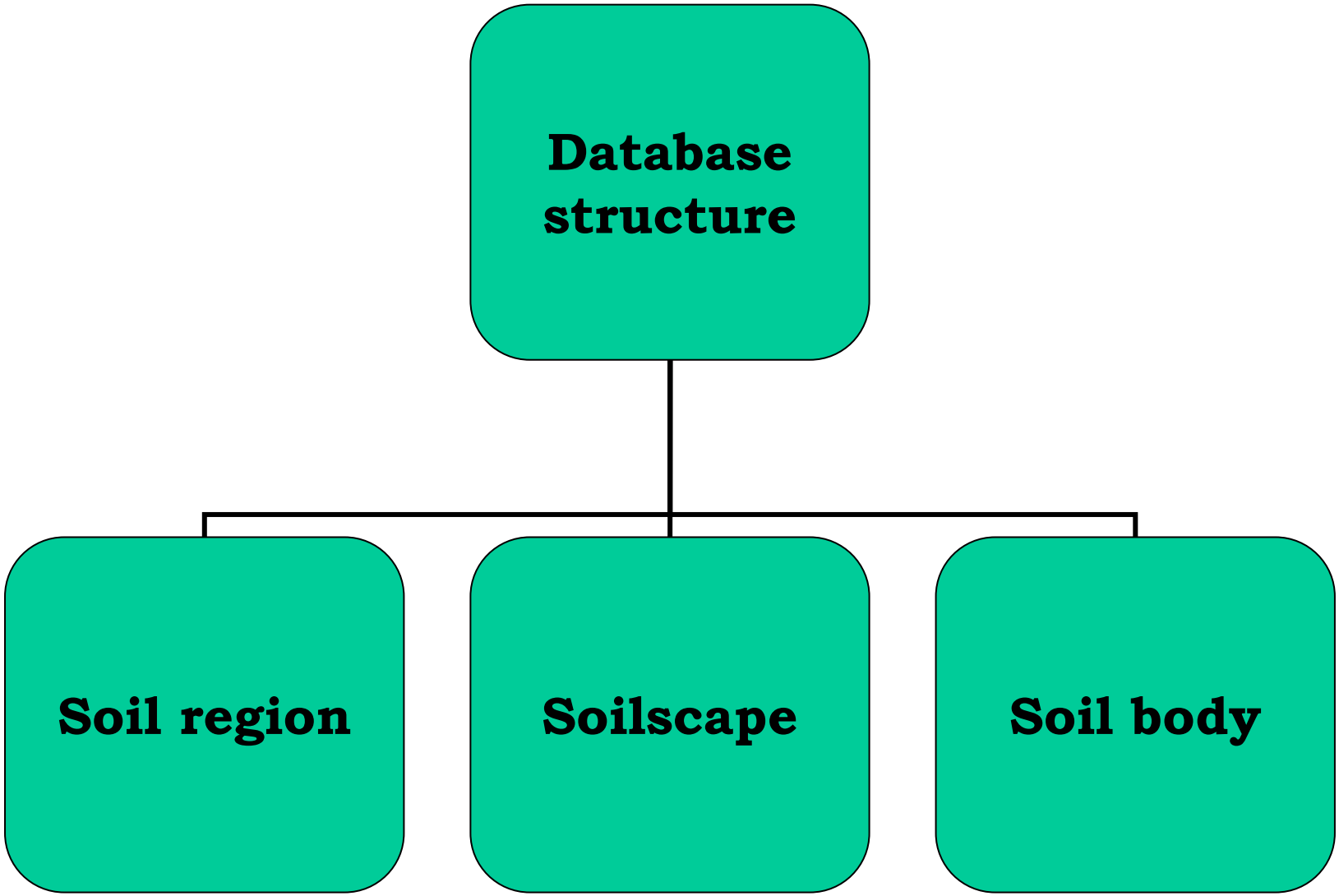
ESBN Workshop Zagreb 28-30 September 2006

Soil Information System (SIS) on Danube river basin

- **Flood Risk Assessment Project**
- **Georeferenced Soil Database of Europe**

Materials used for database construction

- The Georeferenced Soil Database for Europe, Manual of Procedures (EC?JRC, ESB, 2003).
- LISFLOOD, a distributed water-balance, flood simulation and flood inundation model, Version 1.0 (Ad de Roo et.at., EC/JRC, 2002).
- The procedures and experiences developed in the pilot project creating the digital soil database for the Odra basin at the scale 1:250.000 (Warsaw, 2001)

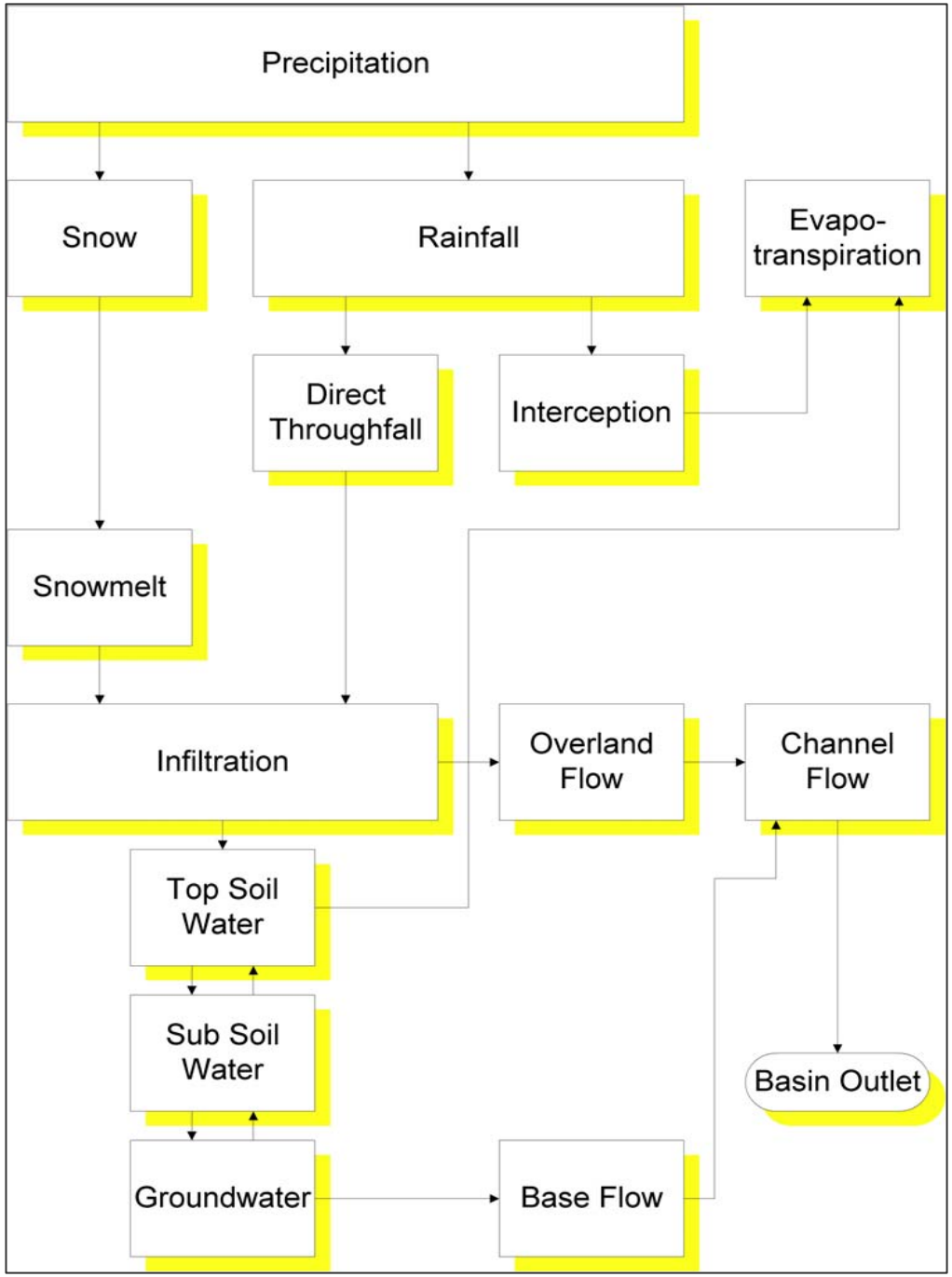

Database structure
Soil region
Soilscape
Soil body

Flood **Risk** Assessment Project

1. Develop and test in real time a pre-operational pan-European Flood Alert System (EFAS) based on LISFLOOD with 1-10 day lead-time, focusing on the Elbe and Danube river basins.
2. Evaluation of flood defence and mitigation plans for the Elbe and Danube catchments through scenario modelling of engineering, land-use change including urban expansion and climate change effects on flood risk in view of regional sustainability and environmental preventive measures.
3. Development of a framework on Sustainable Urban Development and Integrated Management of extreme events, including concepts and methods for integrated territorial management at EU, river basin and regional level.
4. Scientific and technical support towards a European approach related to other weather driven natural hazards.
5. Contribute to the ERA and Enlargement through networking and

LISFLOOD model – evaluation of flood risk in different time interval

LISFLOOD model



„Cascade“ structure of LISFLOOD model

LISFLOOD-WB: a water balance model (daily time step)
LISFLOOD-FS: a flood simulation model (hourly time step)
LISFLOOD-FP: a floodplain inundation model (second time step)

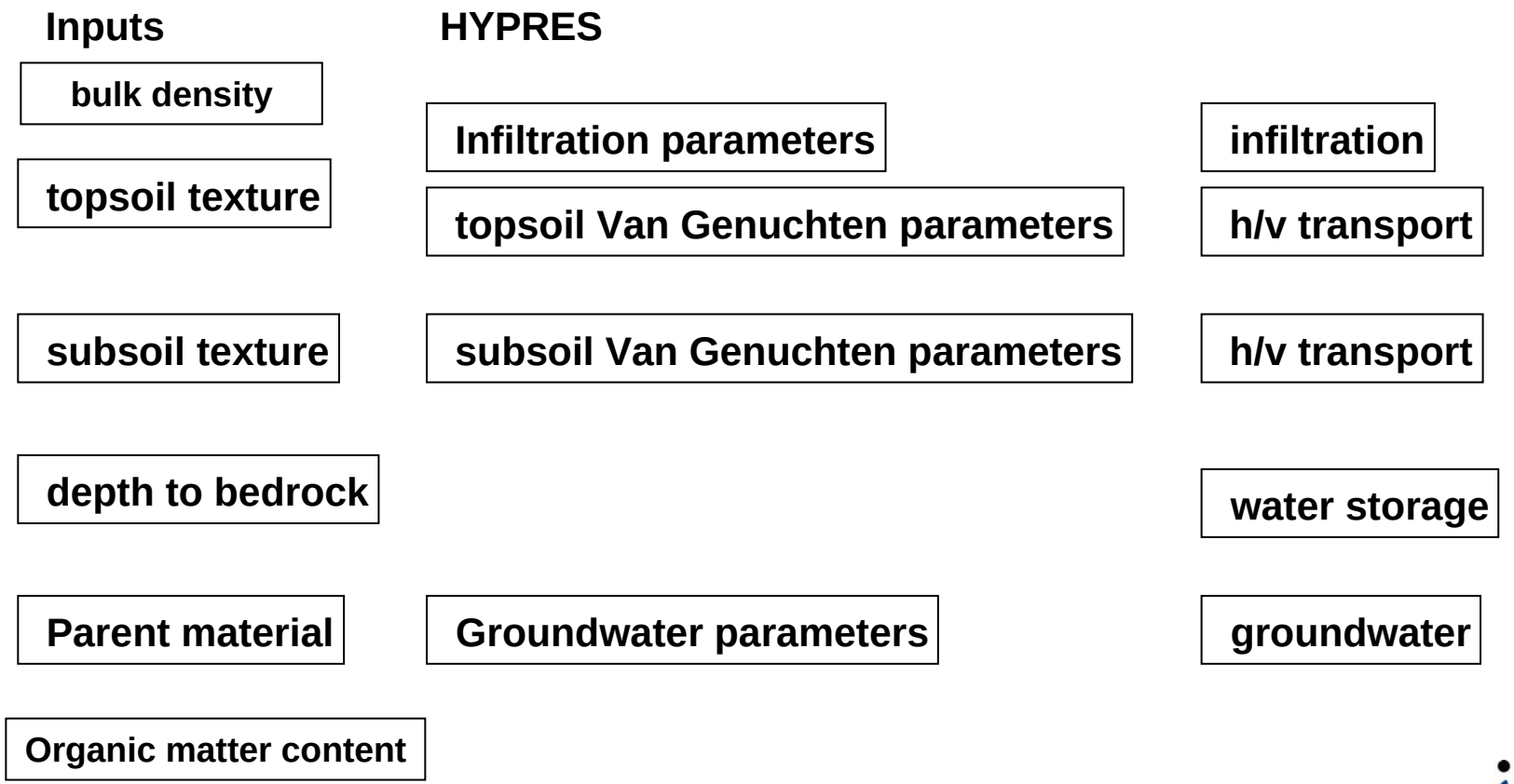
Input data:

- CORINE land cover;
- Soil database parameters (soil texture and depth);
- Flow rates (the river channel network);
- Meteorological data (precipitation, temperature, wind, humidity)
- Geological Data
- Digital Elevation Model

Output data:

- Annual results abd daily discharge (Water balance module);
- Daily-weekly Results and hourly Discharge (Flood simulation module);
- Hourly- daily results, Flood extent (Floodplain inundation Module)

Use of Soil data in LISFLOOD model



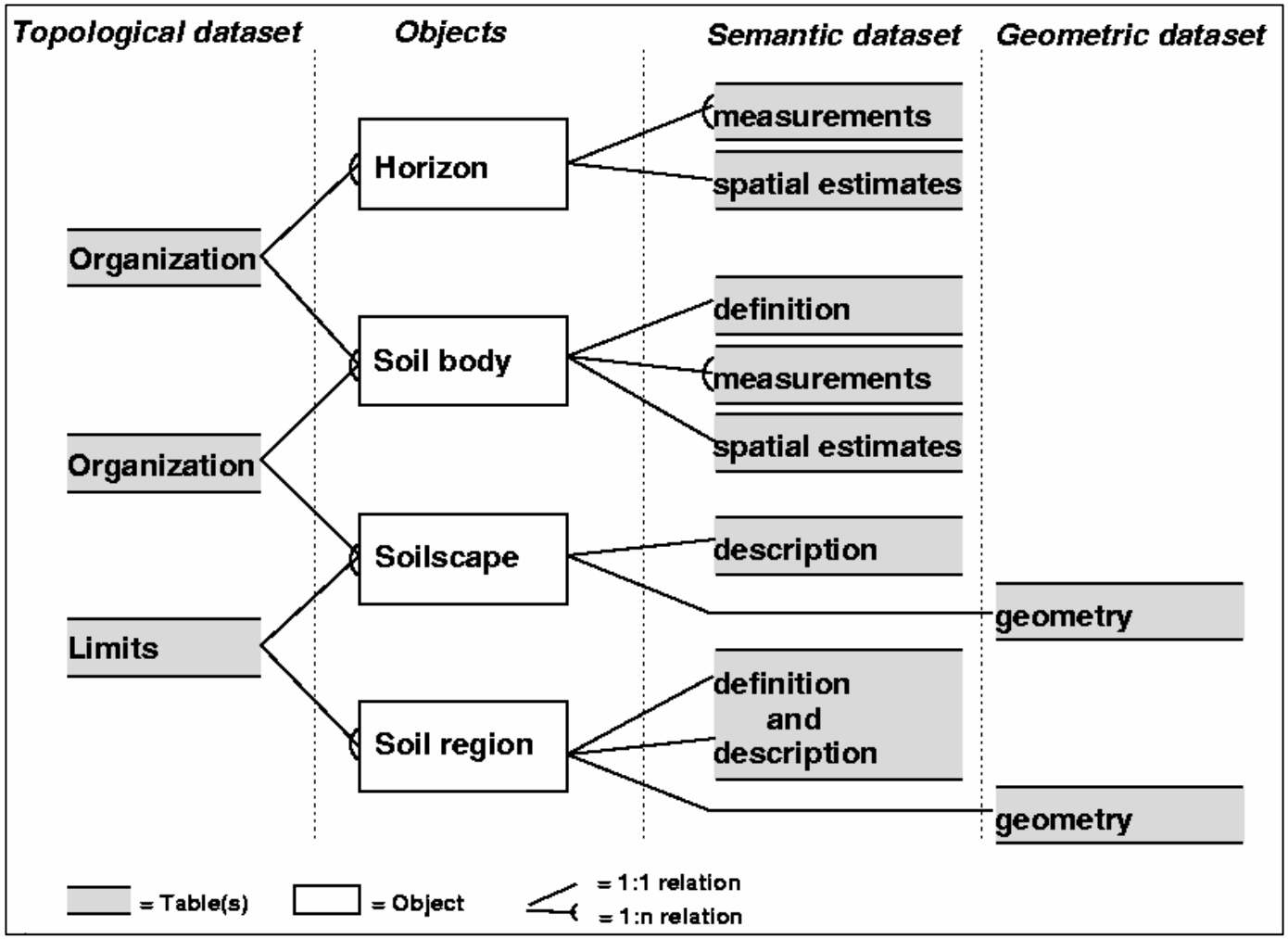
Georeferenced Soil Database of Europe (1:250,000)

Structure and **contents** of database are defined according to Manual of Procedures, Vers. 1.1 from 2003 (ESB, IES/JRC), EUR 18092 EN.

The purposes of the present Manual are:

- To define the structure and contents of the database.
- To describe the methods of georeferencing the data.
- To outline suggested procedures for regional mapping and sampling programmes.
- To prescribe a format of data storage.
- To ensure inter-regional and inter-country harmonization of data acquisition, processing and interpretation.
- To pave the way for the creation of a user-friendly soil database which will cater for present and future demands for specific soils information.

General Structure of the Database



Information of Soil Regions Level

Soil regions

For soils on soil region information level are typical similar soil forming conditions. They are the largest units of soil description and typical associations of dominant soils occurring in areas limited by typical climate and/or typical parent material. Each soil region is characterized by following attributes:

- Parent material
- Dominant parent material
- Climatic data
- Altitudes and major landforms.

Information on Soil Scape level

Soilscape

Information on soilscape level represents that part of soil cover, which groups soil bodies having former or present functional relationships, and can be represented at scale 1:250 000. Main diagnostic criterion for delimitation of soil units according to morphological attributes is relief. The most important role play morphological attributes as: slope, slope length, altitude, curvature, etc. Information on soilscape level is the basis for geometric part of the database.

Information on Soil body level

Soil body

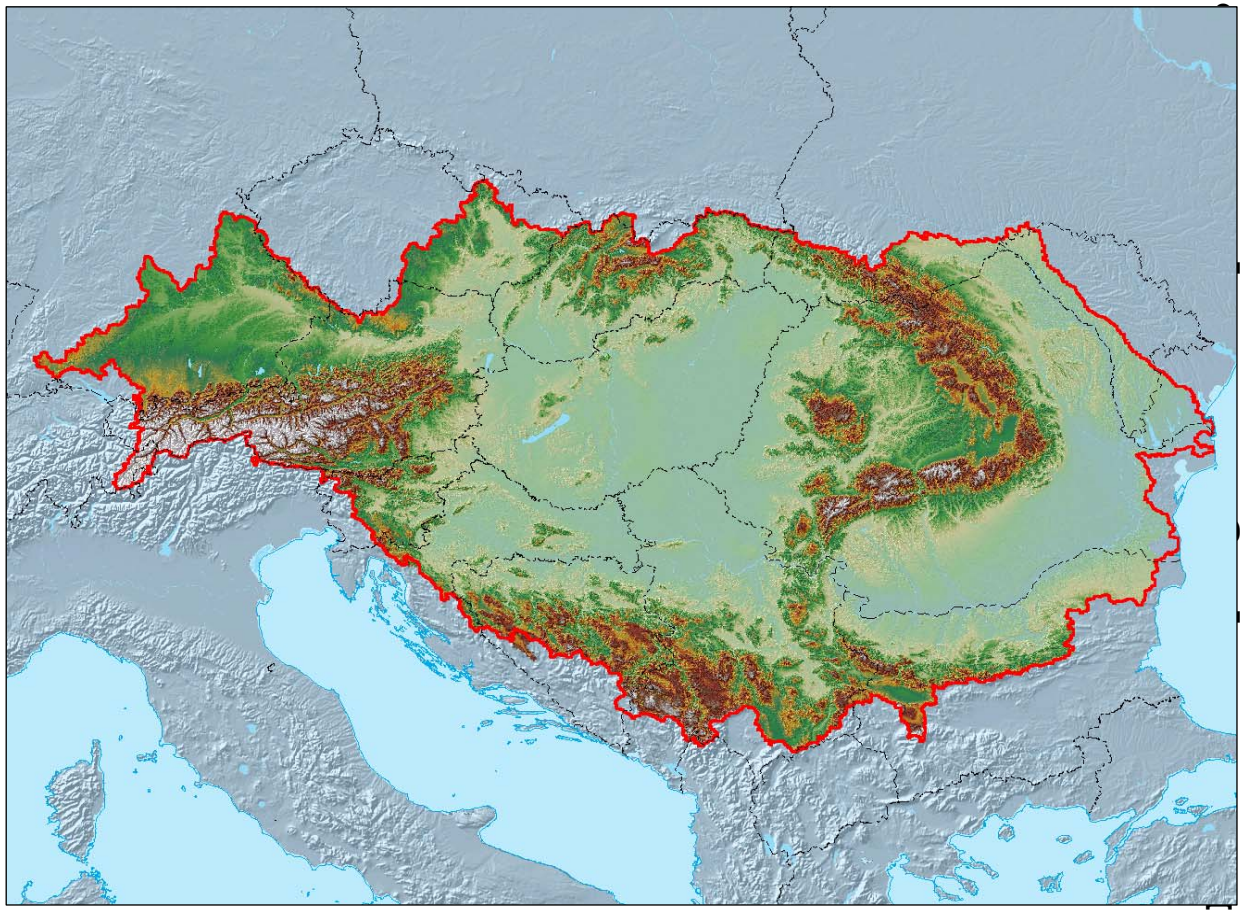
It is a portion of the soil cover of with diagnostic characteristics resulting from similar processes of soil genesis. Soil body description comprises also morphological and analytical attributes of the main horizons.

Database to this time consist mainly of soil data from river basins: Elbe, Odra and Meuse. National soil survey of Italy is also part of this database. In this time the Danube basin data are collected according to the Manual of procedures (Vers. 1.1).

Danube Basin

Figures

Area: 817,000 km²
Length: 2,857 km
Alt. of source: 1,078 m
Population: ± 80 mil.



Sources: Water Pollution Control - A Guide to the Use of Water Quality Management Principles. © 1997 WHO/UNEP

DANUBE BASIN DATABASE MEETING

Explanatory meeting for contributors of data,
JRC/Ispra/Soil&Waste Unit
22–23 January, 2004

Representatives from: Austria, Czech Republic, Hungary, Slovakia, JRC

Point data:

- **Soil body definition table;**
- **Soil body measuring table;**
- **Horizon measurement table.**

≈ 1 200 points/country

Structure of Danube basin soil database

Soil body definition table

Identifier	Type	Mandatory	Example	Description
soil_body (key)	char 10	yes	33.2.SB81	Code soil body (SB821) within soil region (33.2)
sb_wrb	char 10	yes	stn-vr -LV	WRB-classification [1]
sb_mat	char 3	yes	900	Parent material [2]
sb_obst	char 1	yes	1	Depth to obstacle for roots [3]

Structure of Danube basin soil database

Soil body measurement table

Identifier	Type	Mandatory	Example	Description
soil_body (key)	char 10	yes	33.2.SB821	code soil body (SB821) within soil region (33.2)
sbsm_X	num 5	yes	12.10	X-coordinate representative soil profile (eastern latitude)
sbsm_Y	num 4	yes	35.20	Y-coordinate representative soil profile (longitude)
sbsm_alt	num 4	yes	812	Surface altitude (meter a.s.l.)
sbsm_depw	num 3	yes	20	average depth to water table (dm)

Structure of Danube basin soil database

Soil horizon measurement table

Identifier	Type	Mandatory	Example	Description [1]
soil_body (key)	char 10	yes	33.2.SB821	code soil body
body_hor (key)	char 3	yes	1ap	code soil horizon
sbhm_top	num 3	yes	0	starting depth horizon (cm)
sbhm_bot	num 3	yes	20	ending depth horizon (cm)
sbhm_clay	num 2	yes	20	clay content (%)
sbhm_clayQ1	char 10	yes	NLD01_1988	country, lab and year of analysis
sbhm_clayQ2	char 1	yes	m	quality estimate of analysis
sbhm_silt	num 2	yes	40	silt content (%)
sbhm_siltQ1	char 10	yes	NLD01_1988	country, lab and year of analysis
sbhm_siltQ2	char 1	yes	m	quality estimate of analysis
sbhm_sand	num 2	yes	40	sand content (%)
sbhm_sandQ1	char 10	yes	NLD01_1988	country, lab and year of analysis
sbhm_sandQ2	char 1	yes	m	quality estimate of analysis
sbhm_stgr	char 2	yes	vv	stone/gravel abundance and size
sbhm_stgrQ1	char 10	yes	NLD01_1988	country, lab and year of analysis
sbhm_stgrQ2	char 1	yes	m	quality estimate of analysis
sbhm_om	num 4.1	yes	8.1	organic matter content (%)
sbhm_omQ1	char 10	yes	NLD01_1988	country, lab and year of analysis
sbhm_omQ2	char 1	yes	m	quality estimate of analysis

Identifiers of Soil body measurement table

Profile_sm_X

X – coordinate of described soil profile information (eastern longitude). Units are degrees.centidegrees.

Profile_sm_Y

Y – coordinate of described soil profile (northern latitude). Units are degrees.centidegrees.

Profile_sm_alt

Surface altitude in meters above sea level, potentially below sea level. In case below sea level minus – sign characterizes this fact.

Profile_sm_depw

The annual average water table depth in decimeters. Unknown depths or absence of a water table is indicated by a minus sign: a - sign preceding any number between 1 and 99 indicates a depth deeper than the number (example: -35 indicates a water table depth deeper than 3.5 meter); -99 indicates absence of a water table.

Soil Profiles

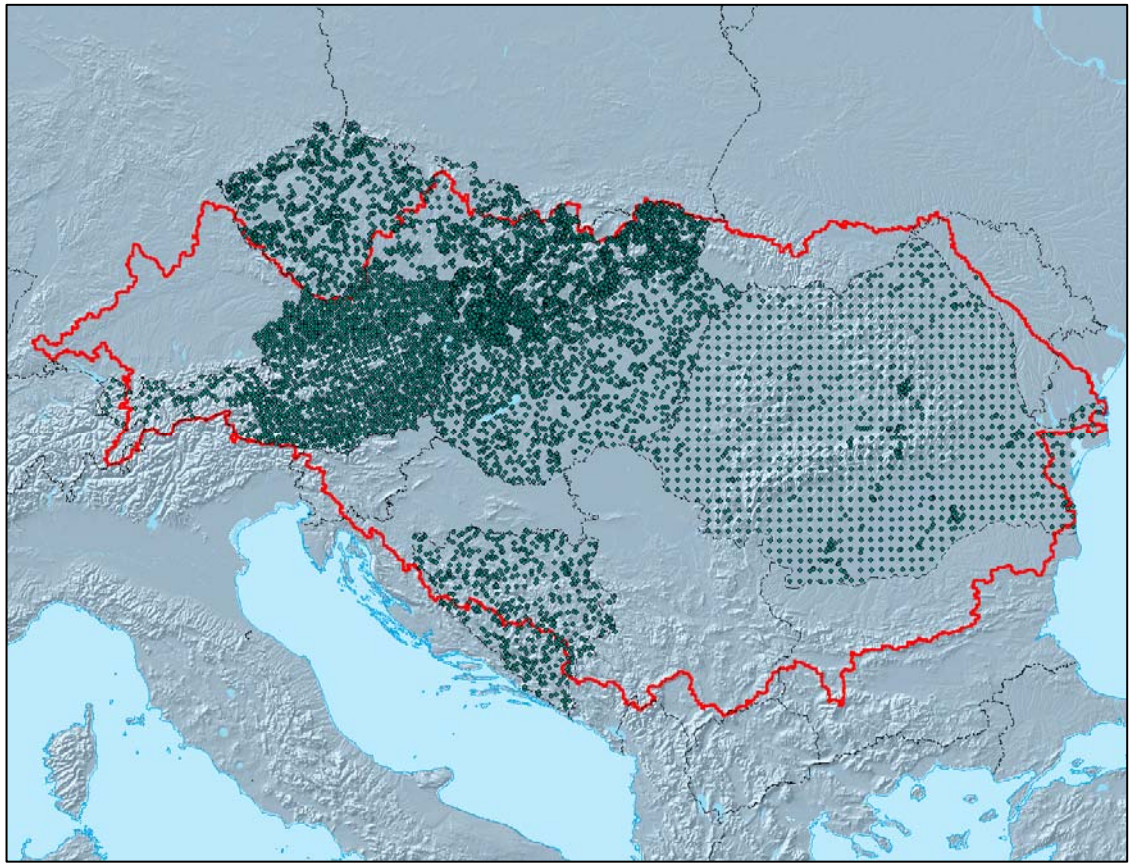
Soil profiles acquired From States within the Basin: 7,695 points

Projection used:

The ETRS89 Lambert Azimuthal Equal Area Coordinate Reference System (ETRS-LAEA) is a single projected

coordinate reference system for all of the Pan-European area. It is based on the ETRS89 geodetic datum and the

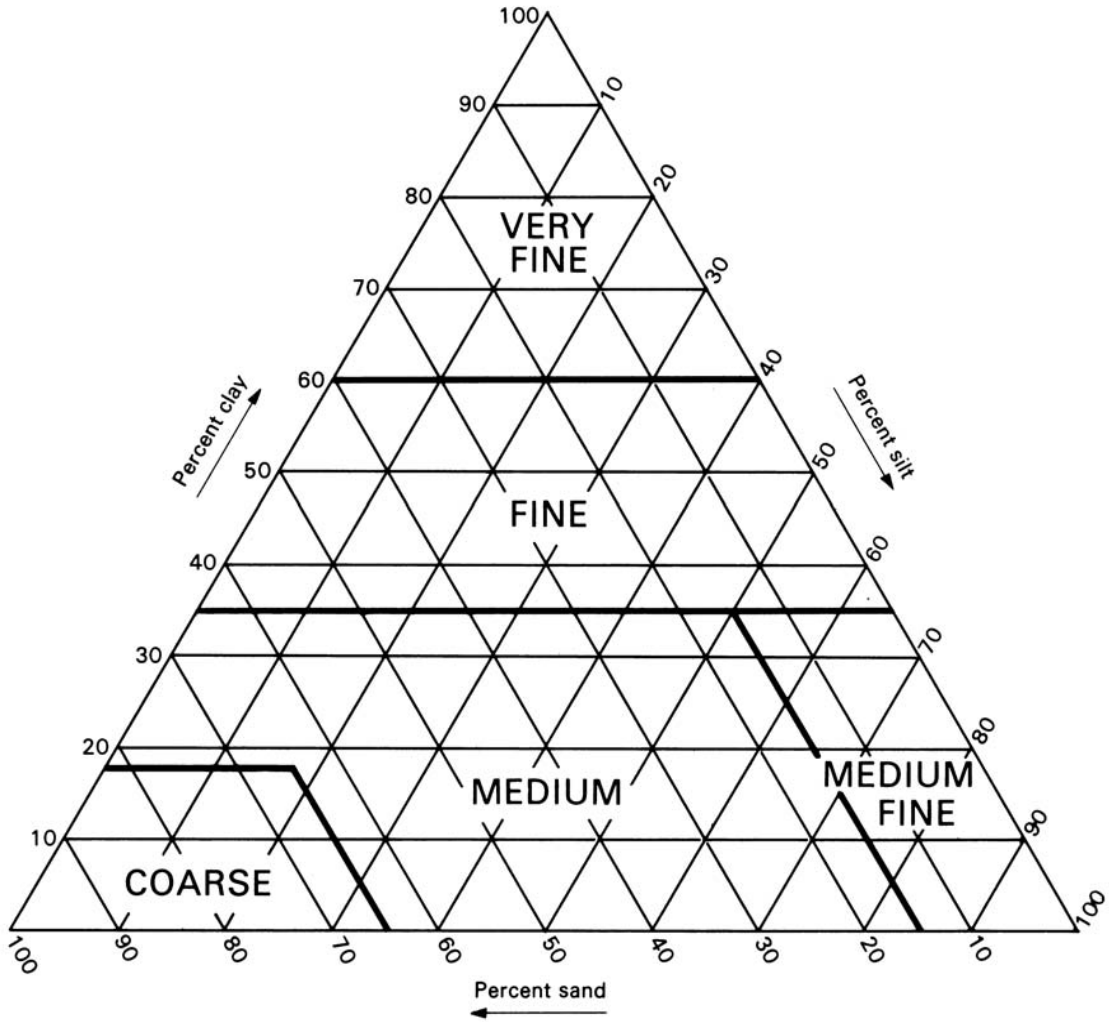
GRS80 ellipsoid.



Soil textural classes

Class	Description	
0	No texture	Peat soils
1	Coarse	18% > clay and ≥ 65% sand
2	Medium	18% ≤ clay < 35% and ≥ 15% sand, or
3	Medium fine	18% ≤ clay and 15% ≤ sand <65%
4	Fine	<35% clay and <15% sand 35% ≤ clay < 60%
5	Very fine	≥ 60% clay

Where: sand=fraction between 50 and 2000 µmeter;
silt=fraction between 2 and 50 µmeter;
clay= fraction smaller than 2 µmeter



Texture classes (after CEC, 1985)

Parent material

Level		Criteria for subdivision
Major Class		Most recent rock formation process (sedimentation, diagenesis, intrusion, volcanism, metamorphism)
	Major Class	
Group	100	Energy level of deposition and facies
	200	Dominant process of (bio)chemical sedimentation
	300	Acidity level of igneous rocks and depositional mode of volcanic efflata
	400	Degree and type of metamorphism and acidity of associated minerals
	500	Type of alluvial deposition (marine, fluvial, lake, mass movement) and parent rock in case of weathering residuum
	600	Type of (peri)glacial deposition
	700	Texture of eolian sediment
	800	Type of deposition or accumulation of organic materials
	900	Origin of anthropogenic depositis
Type	100	Texture and mineralogy
	200	Consistency or mineralogy
	300	Mineralogy or degree of consolidation of efflata
	400	Mineralogy
	500	Age or energy level of deposition or mass movement or in situ character of weathering residuum
	600	Texture
	700	Texture and resulting physiography
	800	Nutrient status or degree diagenesis
	900	Texture
Subtype	100	Mineralogy or texture
	200	Consistency and morphological appearence
	300	Mineralogy or texture of efflata (material from volcanic eruptions)
	400	Mineralogical features or morphological appearence
	500	Texture and stoniness
	600	-
	700	-
	800	Degree of composting
	900	-

Root obstracle reasons

Codes for root obstracle reason:

T – toxic
L – lowox
R – rock
I - imper

The following classes of depth are distinguished in the soil profile:

Code	Description
1	Depth to obstacle for roots 0 - 10 cm
2	Depth to obstacle for roots 10 - 25 cm
3	Depth to obstacle for roots 25 - 50 cm
4	Depth to obstacle for roots 50 - 100 cm
5	Depth to obstacle for roots > 100 cm

Reason and depth to obstacle for roots = Code of root obstracle reason + Class of Depth
Example: R3

Contributors

Available

- Slovak Republic
- Austria
- Czech Republic
  Republic
- Romania
- Hungary
- Bosnja–
- Herzegovina
- Slovenia

Pending

- Bulgaria
- Croatia
- Germany

Missing

– Serbia
– Ukraine
– Moldovja