Enviromental assesment of climate-change driven risks in landscape – decision support tool

by:

Juraj Balkovič, Rastislav Skalský

Soil Science and Conservation Research Institute, Bratislava

Erwin Schmid

Institute for Sustanaible Economic Development, University of Natural Resources and Applied Life Sciences, Vienna

Outlines of presentation

1. Introduce and define the problems of dynamic landscape modelling as it is applied within the frame of INSEA project

2. Example of input data, and outputs from modeling (case study - INSEA project)

Basic outlines of problems

Demands of decision sphere for **environmental indicators** with some level of quality:
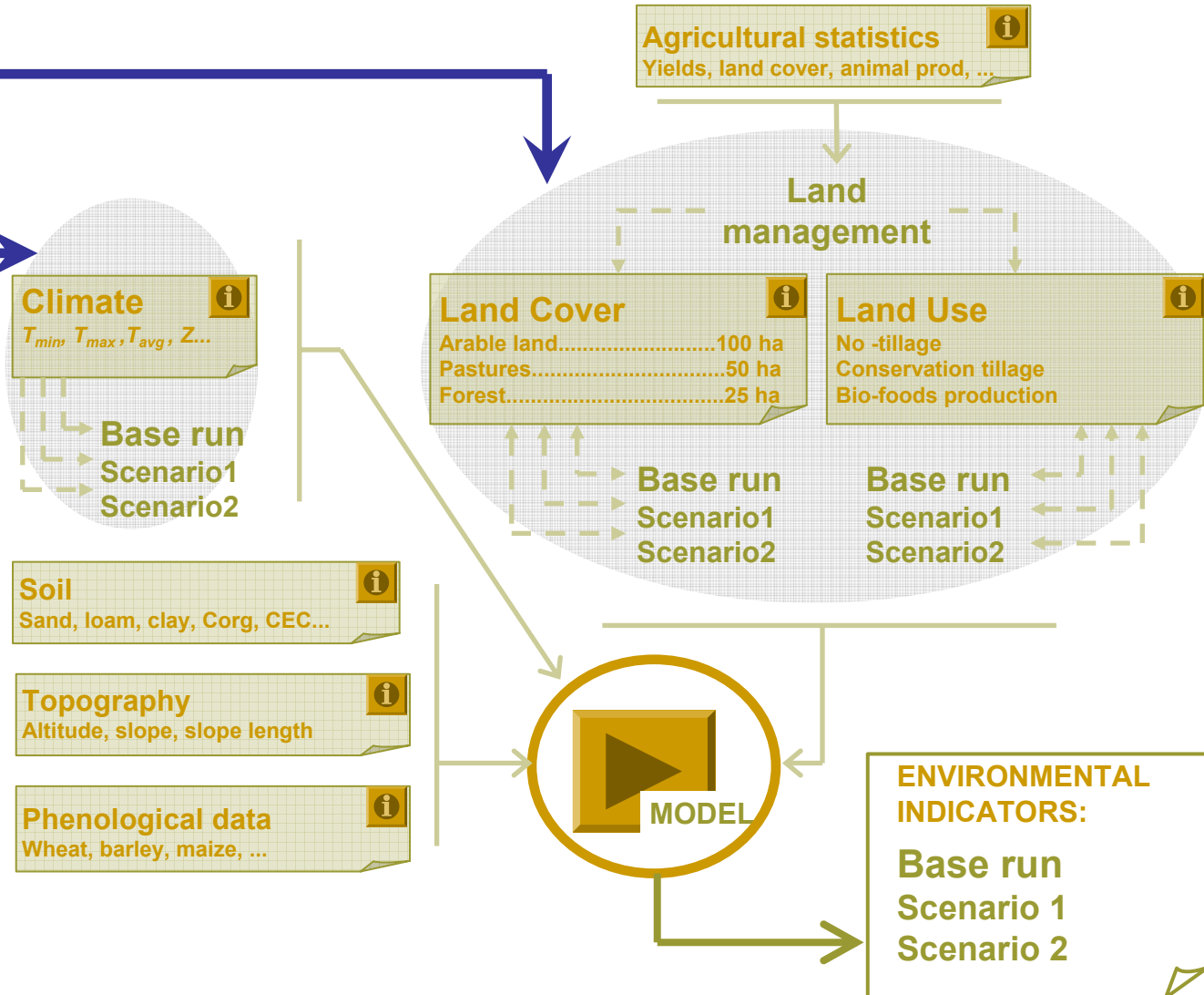
- **geographically explicit** indicators (i.e spatially related, spatially represented, easy to visualize)

- in attributes **exact and dynamic** indicators (i.e numbers/values changing in time)

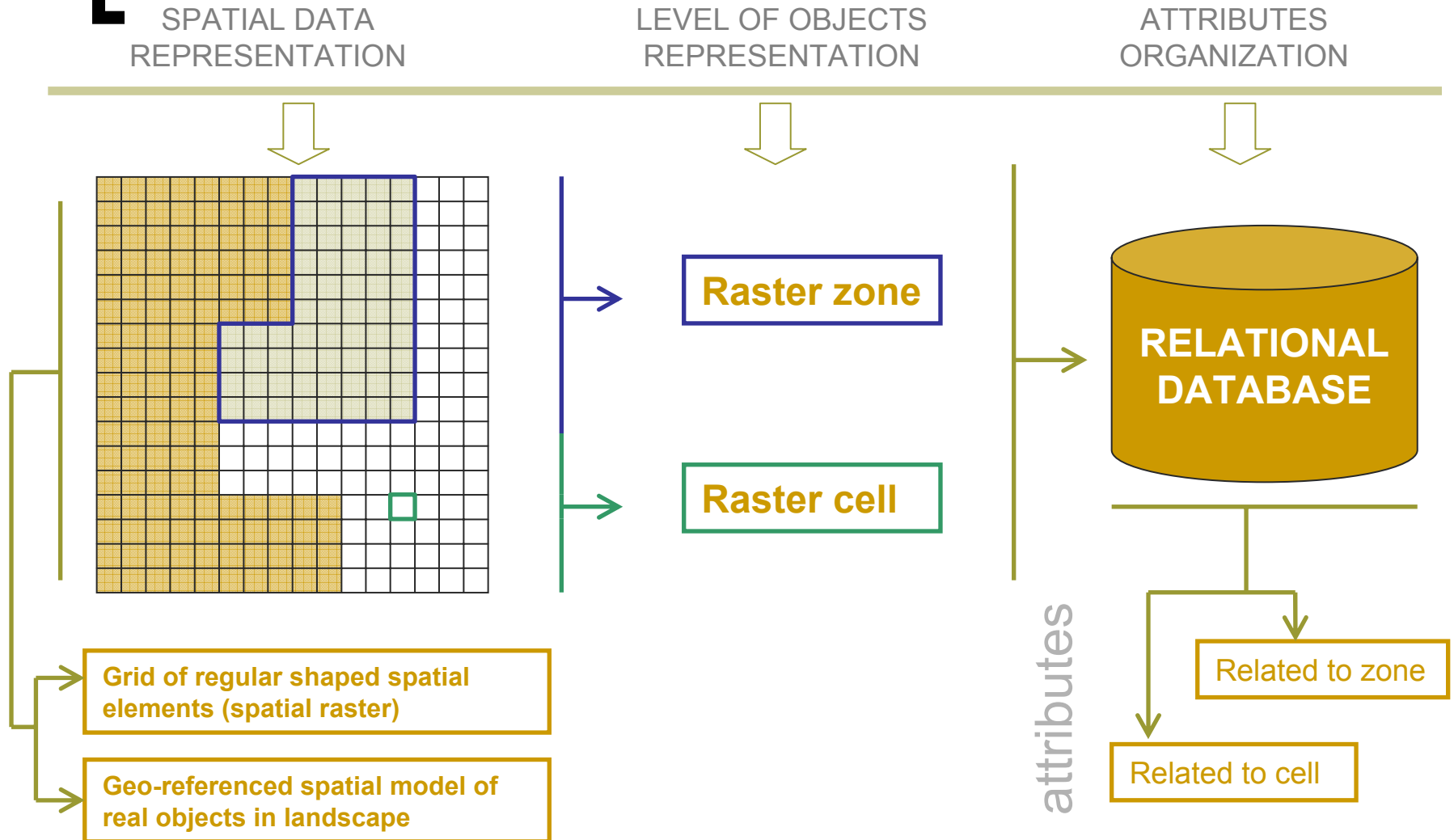# Data-knowledge infrastructure: general
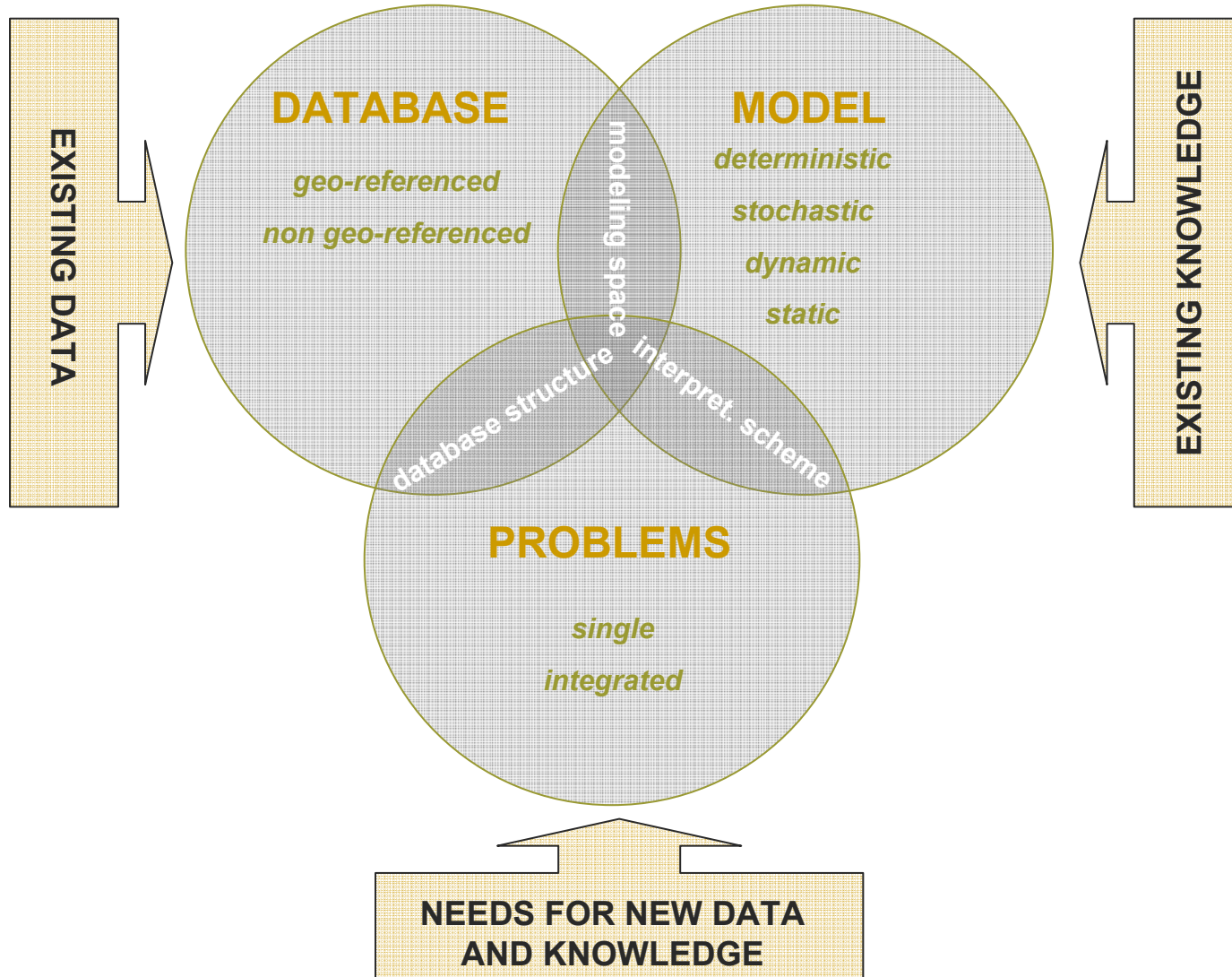
Data-knowledge infrastructure: problems

Impact assessment of land cover/use alternatives in changing climate conditions

Agricultural statistics
Yields, land cover, animal prod, ...

Land management

Climate
T_{min}, T_{max}, T_{avg}, Z...

Base run
Scenario1
Scenario2

Land Cover
Arable land...........................100 ha
Pastures.................................50 ha
Forest....................................25 ha

Land Use
No -tillage
Conservation tillage
Bio-foods production

Base run
Scenario1
Scenario2

Base run
Scenario1
Scenario2

Soil
Sand, loam, clay, Corg, CEC...

Topography
Altitude, slope, slope length

Phenological data
Wheat, barley, maize, ...

MODEL

ENVIRONMENTAL INDICATORS:

Base run
Scenario 1
Scenario 2

Data-knowledge infrastructure: database

SPATIAL DATA REPRESENTATION	LEVEL OF OBJECTS REPRESENTATION	ATTRIBUTES ORGANIZATION

Raster zone

Raster cell

RELATIONAL DATABASE

Grid of regular shaped spatial elements (spatial raster)

Geo-referenced spatial model of real objects in landscape

attributes

Related to zone

Related to cell

Data-knowledge infrastructure: model

EPIC – Environmental Policy Integrated Climate model (www.brc.tamus.edu/epic)

- bio-physical, deterministic, dynamic model used for modeling of wide range of environmental indicators

- operates in time steps (1 day) for long-term time periods

- compiled in FORTRAN programming language

- specific format and file structure is needed for data inputs
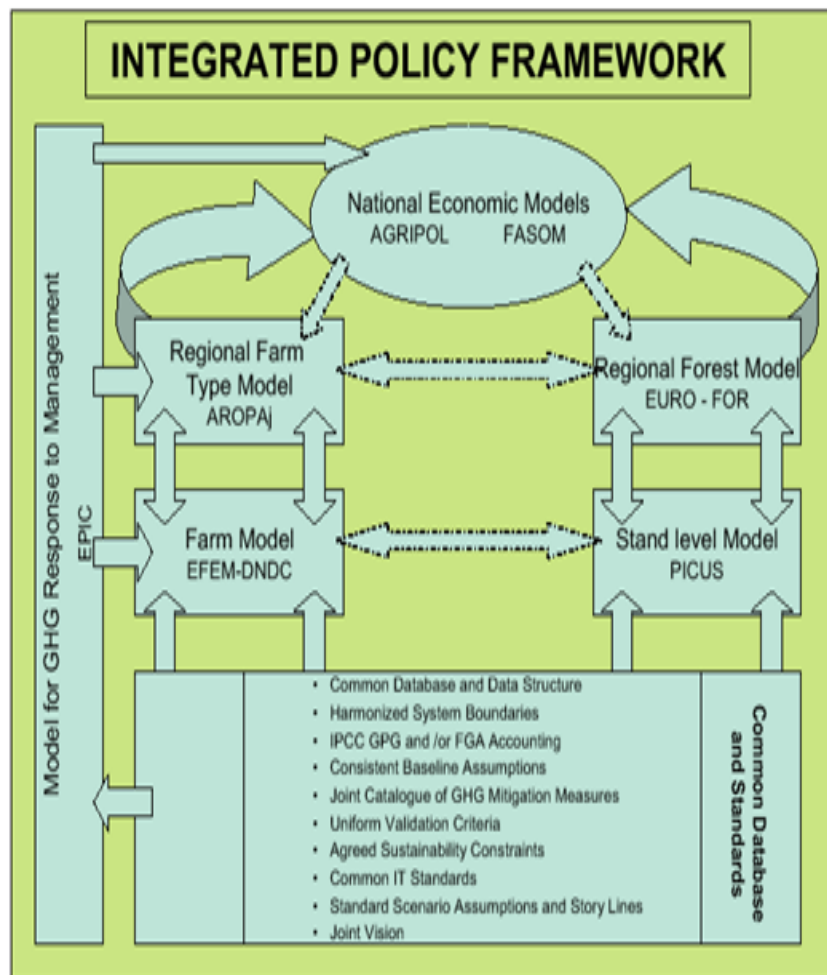
- UTIL program utility available for input/output files and model runs management
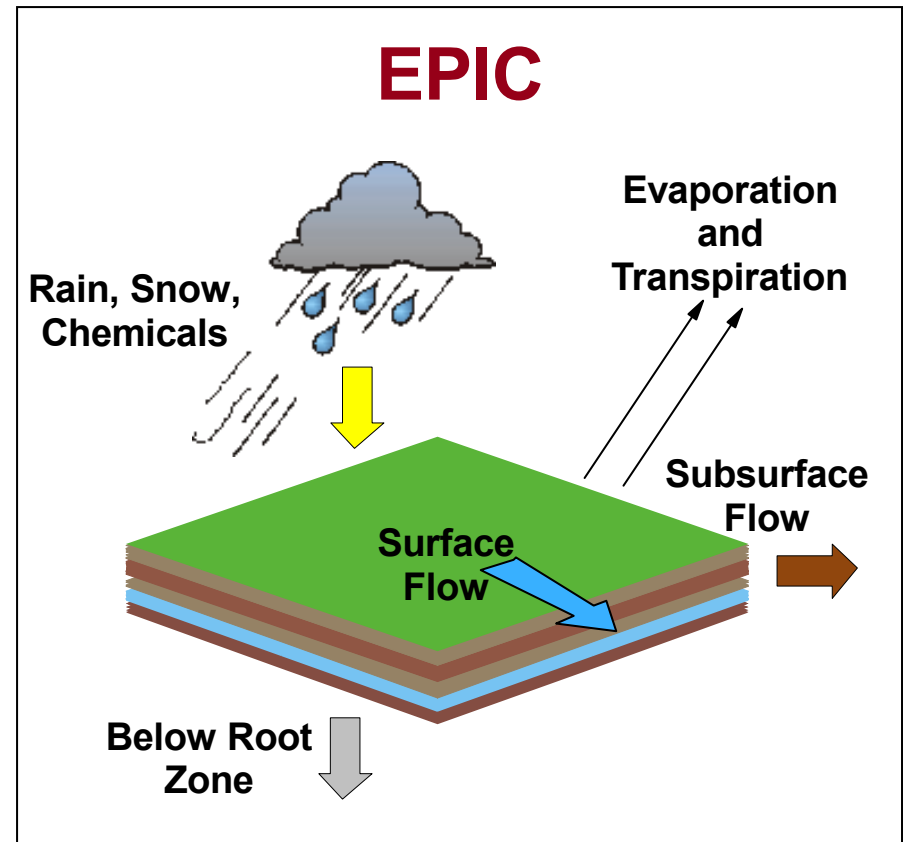
Data-knowledge infrastructure: operation

1-th run: Climate scenario 1, Landuse Scenario 1, Management scenario 1
N-th run: Climate scenario i, Landuse Scenario j, Management scenario k
...

Case study: INSEA project


INTEGRATED POLICY FRAMEWORK
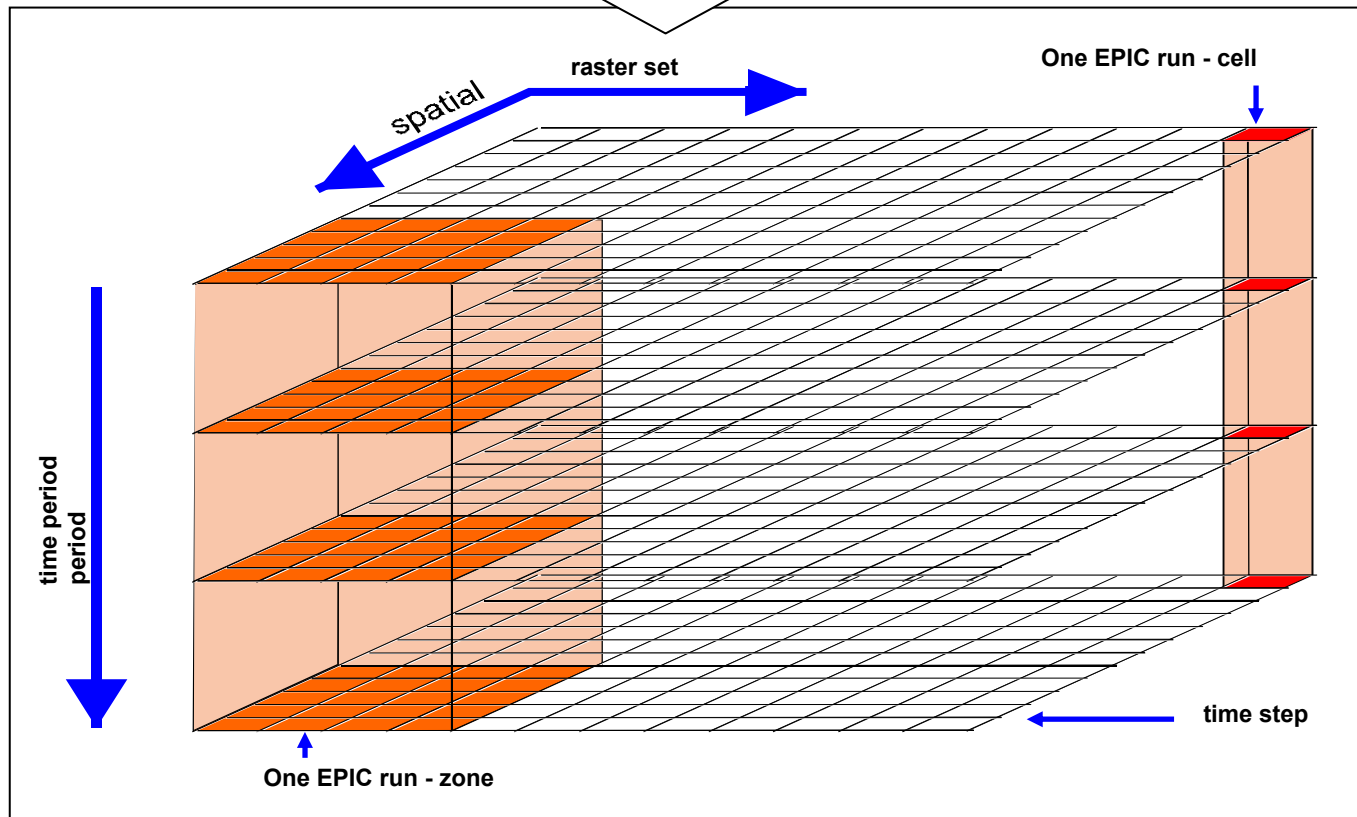
Nowadays, a **data-knowledge infrastructure prototype** as a tool for producing reliable environmental data is being tested within the frame of the European community 6th FP project **INSEA**
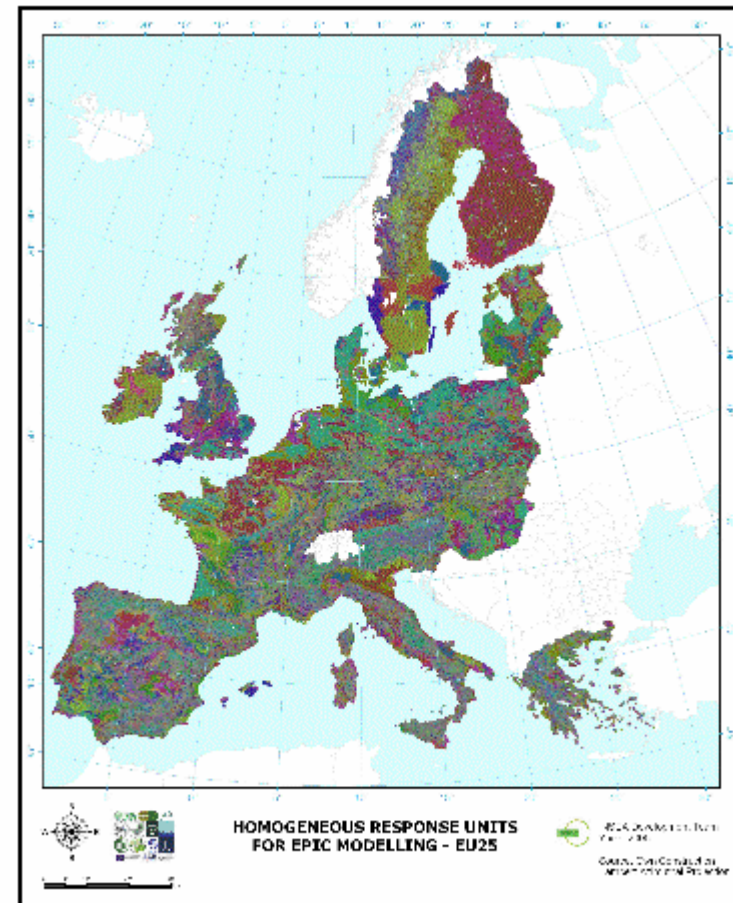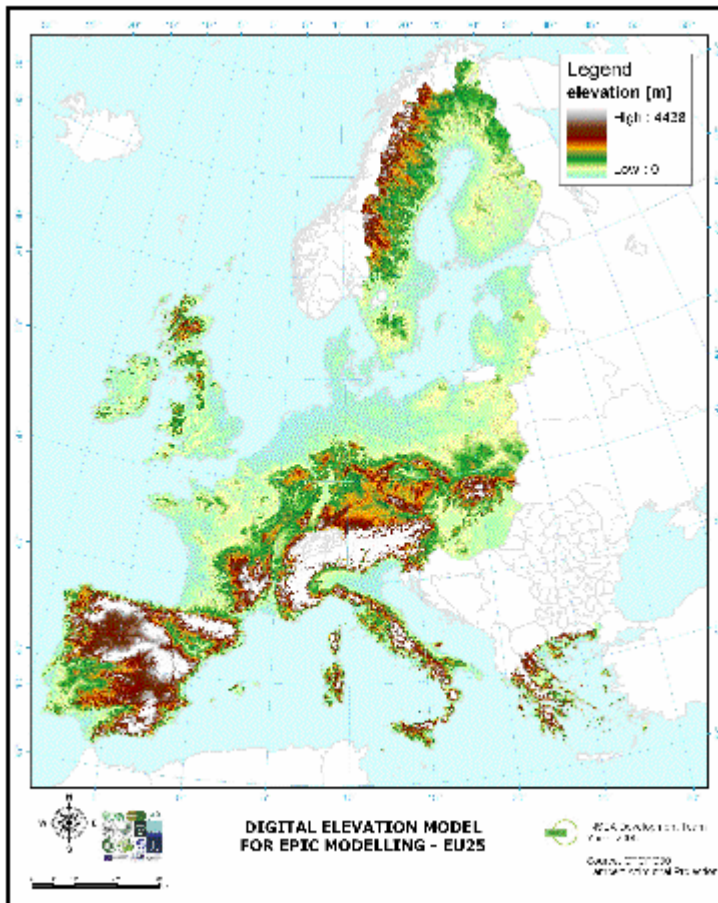
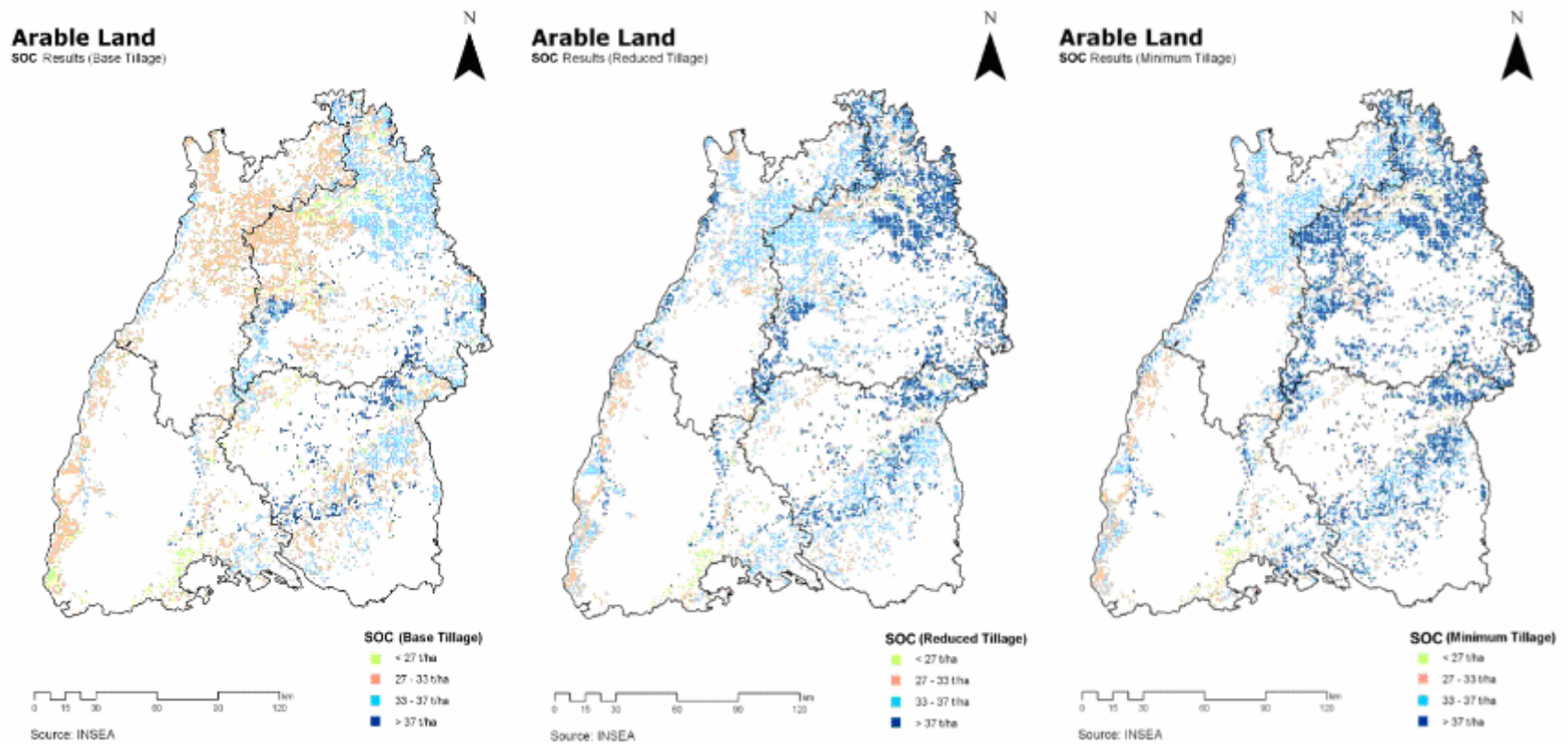(*www.iiasa.ac.at/Research/FOR/INSEA*)

Case study: input data for EPIC

LAND COVER FOR EPIC MODELLING – EU25

TOPSOIL ORGANIC CARBON FOR EPIC MODELLING – EU25
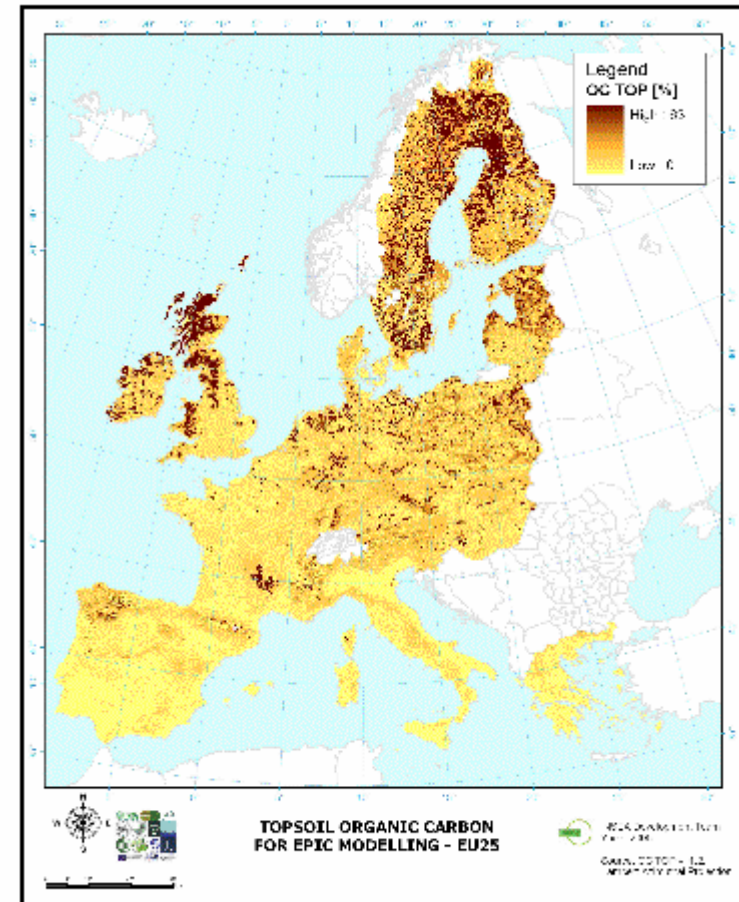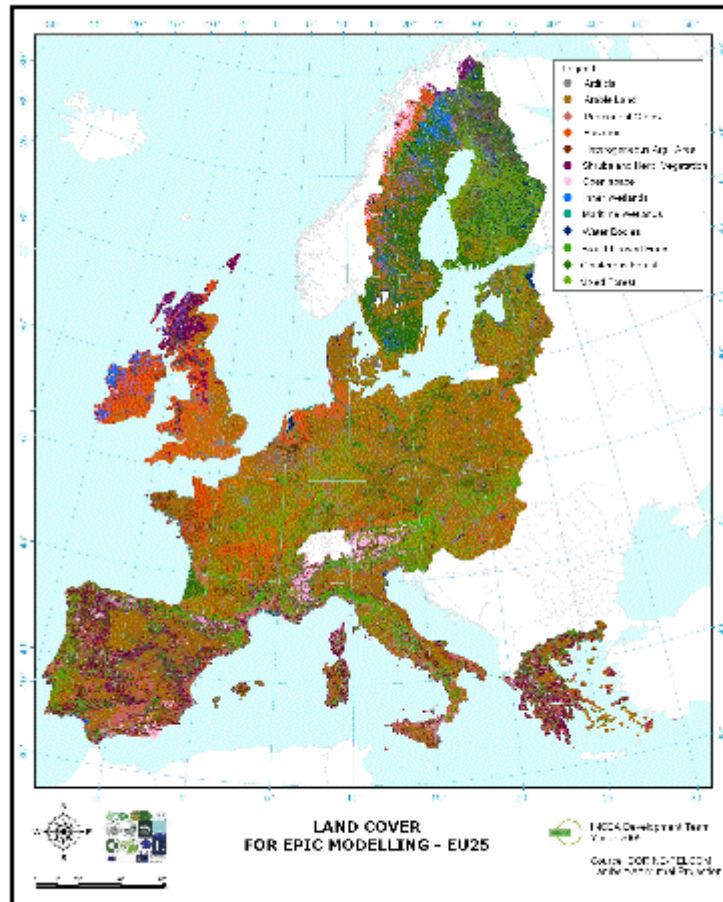
Case study: input data for EPIC

Case study: results of EPIC modelling

Thank You for Your attention....