e-SOTER

Regional pilot platform as EU contribution to a Global Soil Observing System

Enhanced SOTER database for a study area in the UK

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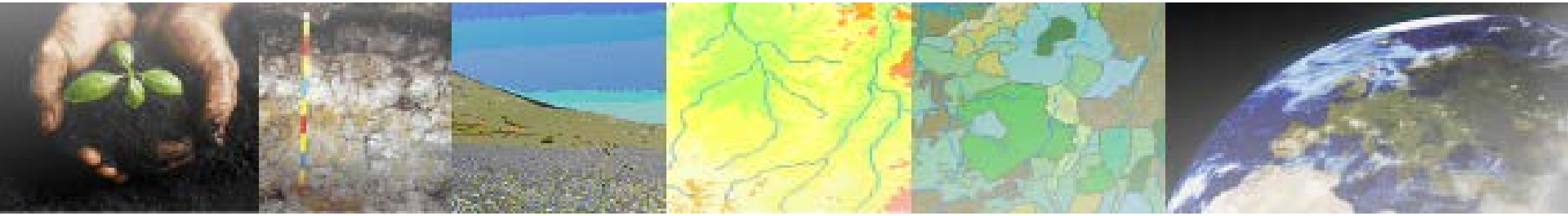
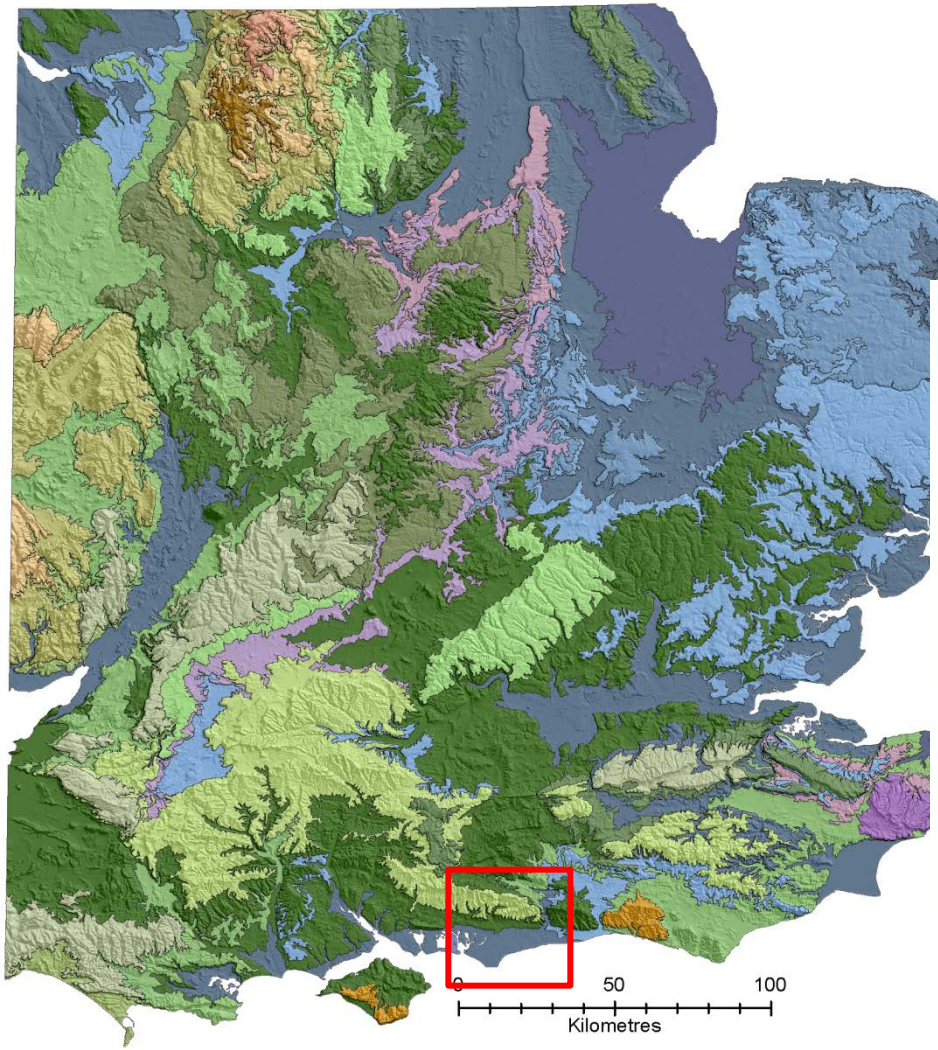


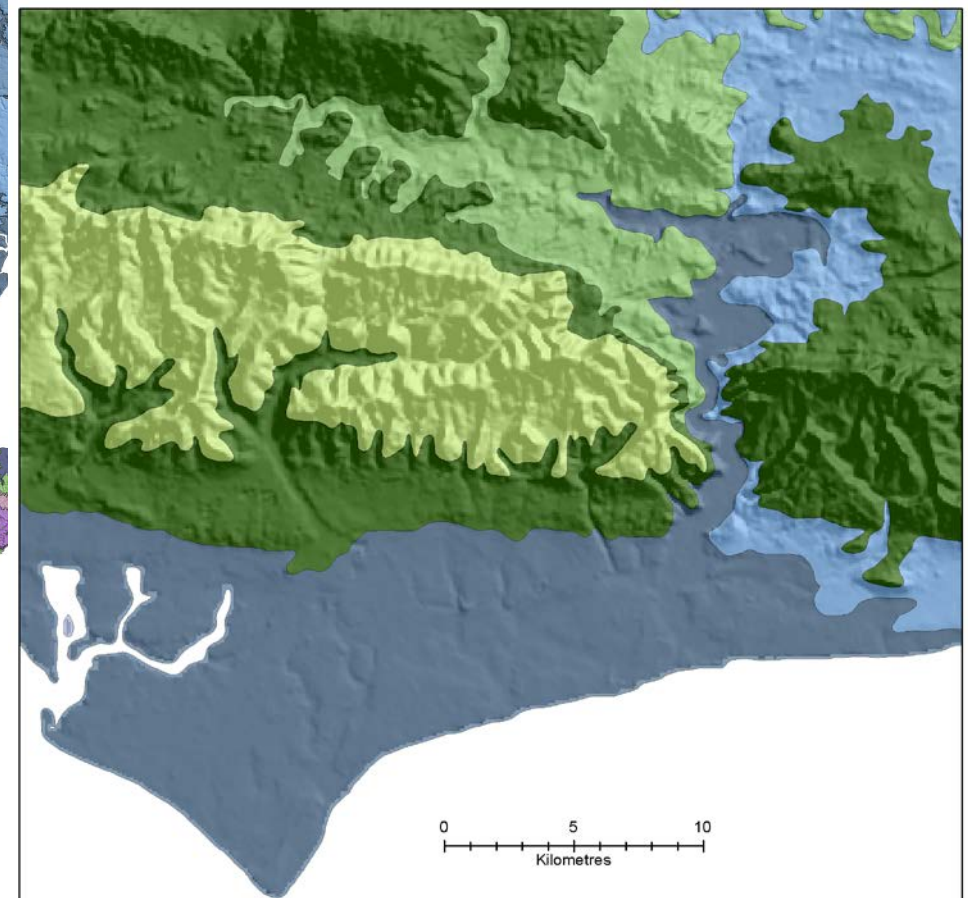
Introduction

- Recommended terrain approaches for UK window
- Physiographic units
- Enhanced SOTER databases

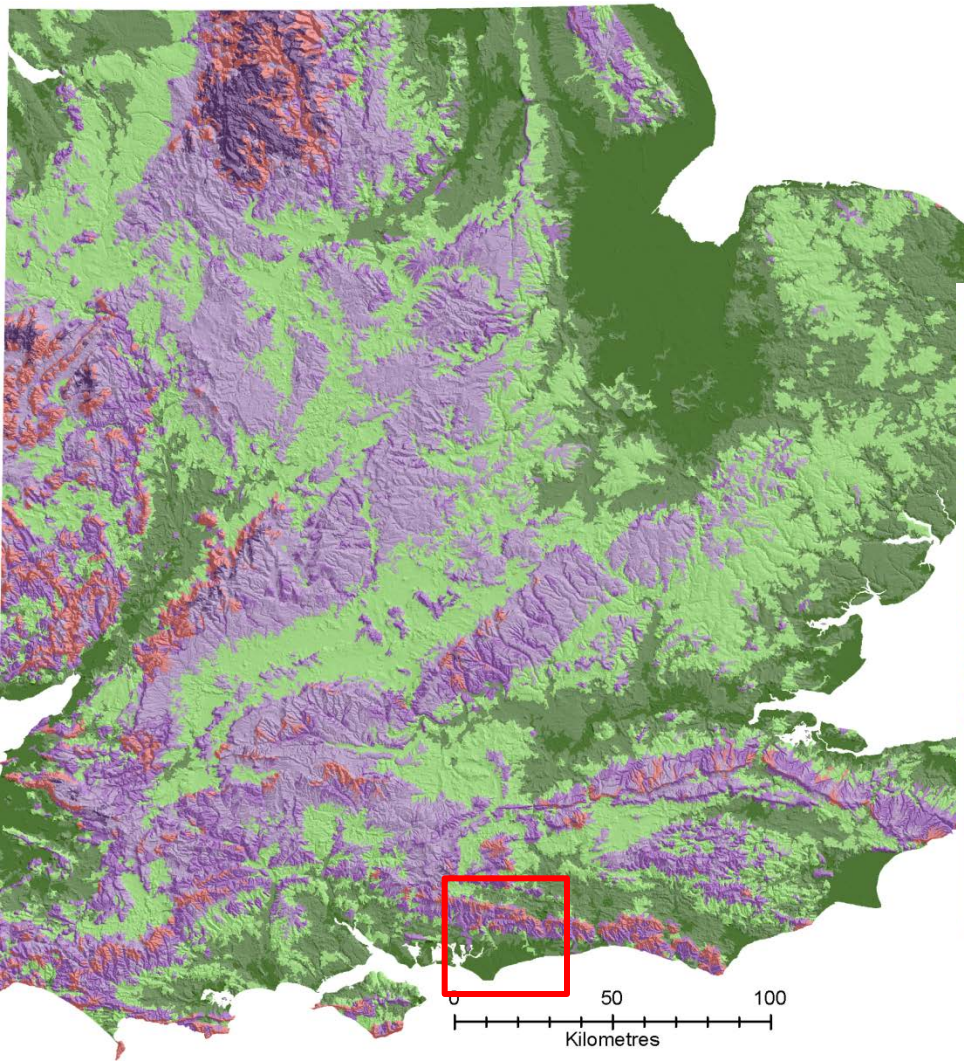
Terrain component #1

- Based on homogenous objects (Dragut et al., 2010)
- Low-high distinction on level1
- Clustering objects level 2 independently within low and

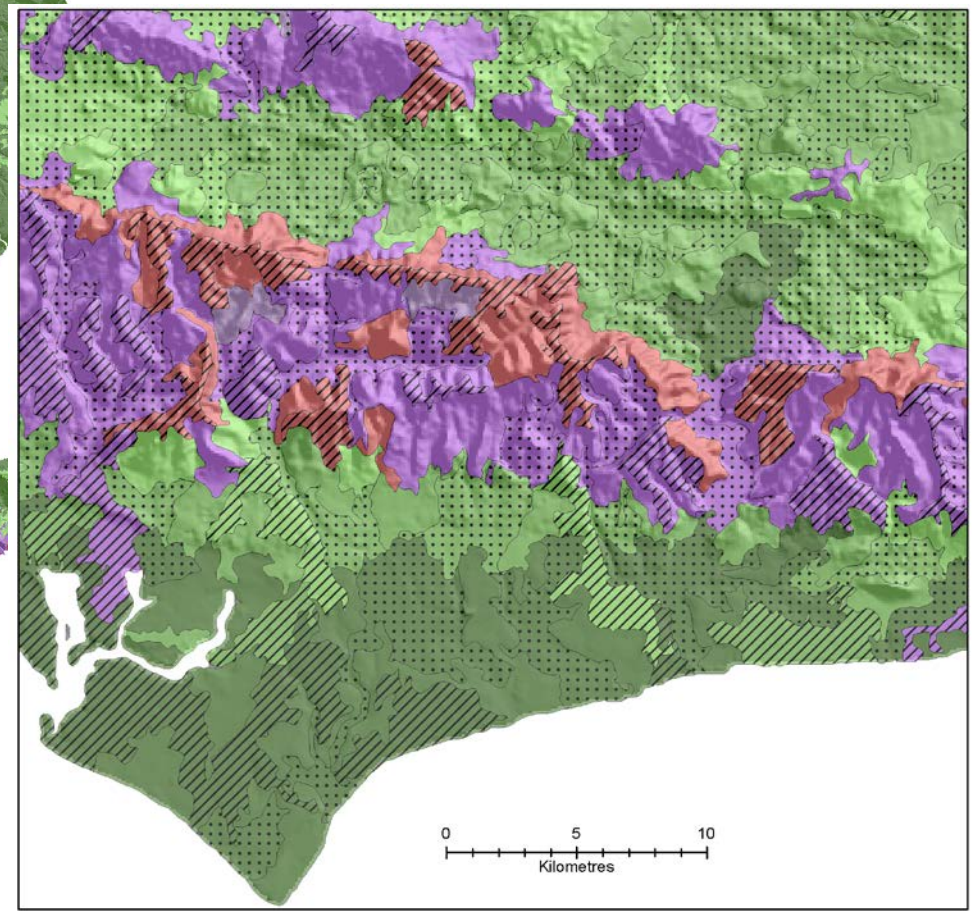




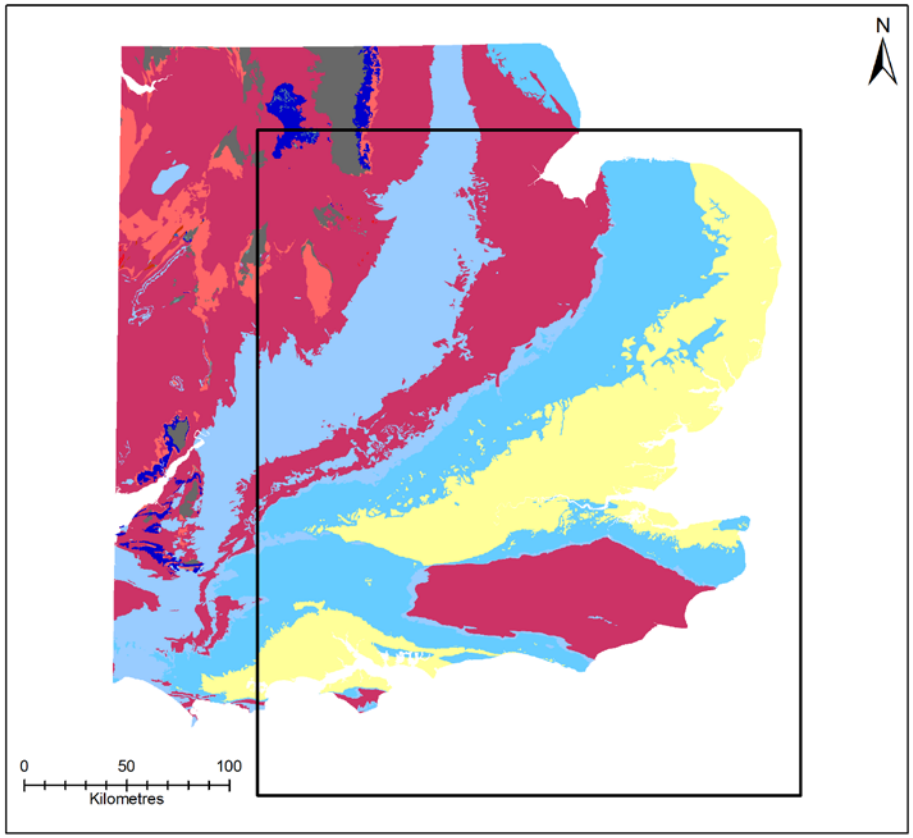
Terrain component #2



- Based on intersection of physical entities (MacMillan, 2003):
  - Peak sheds



Parent Material component



Legend

- UK window

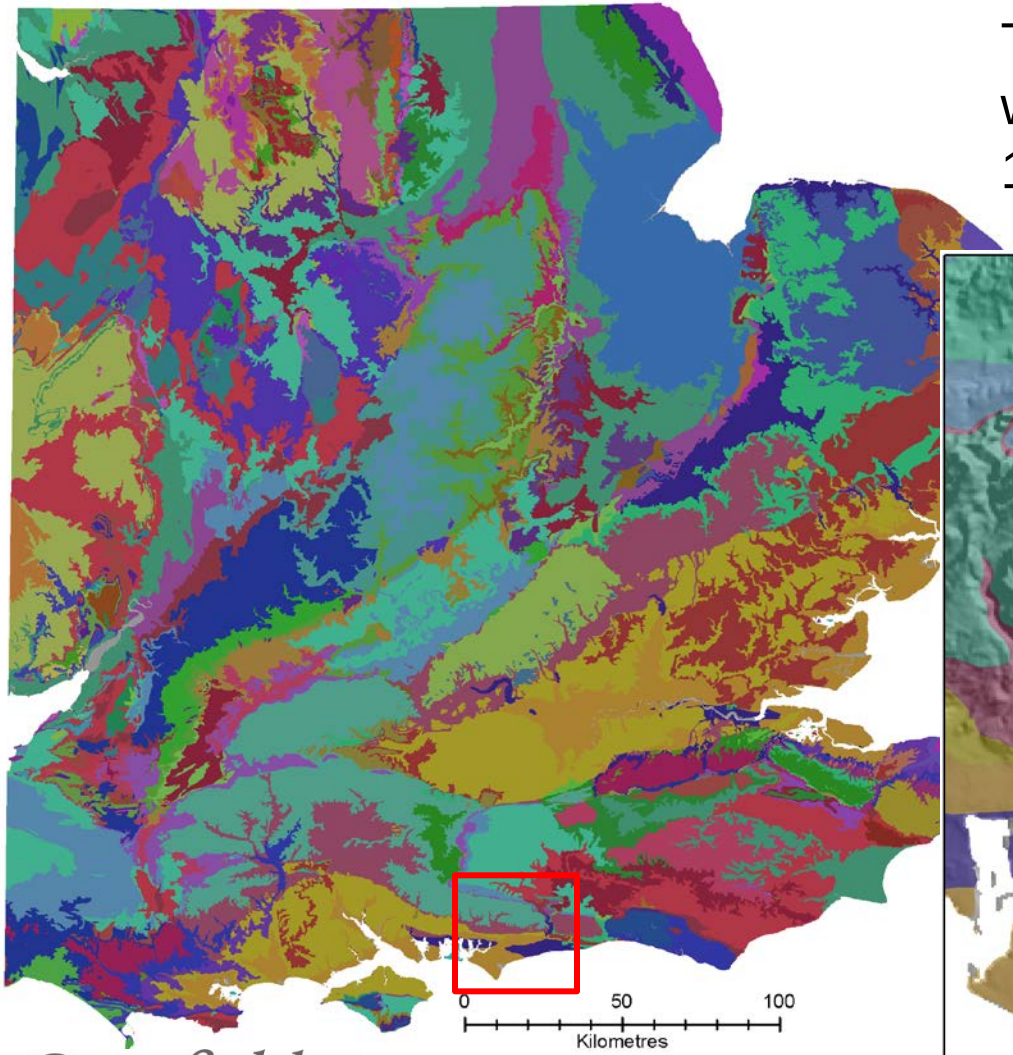
Parent material

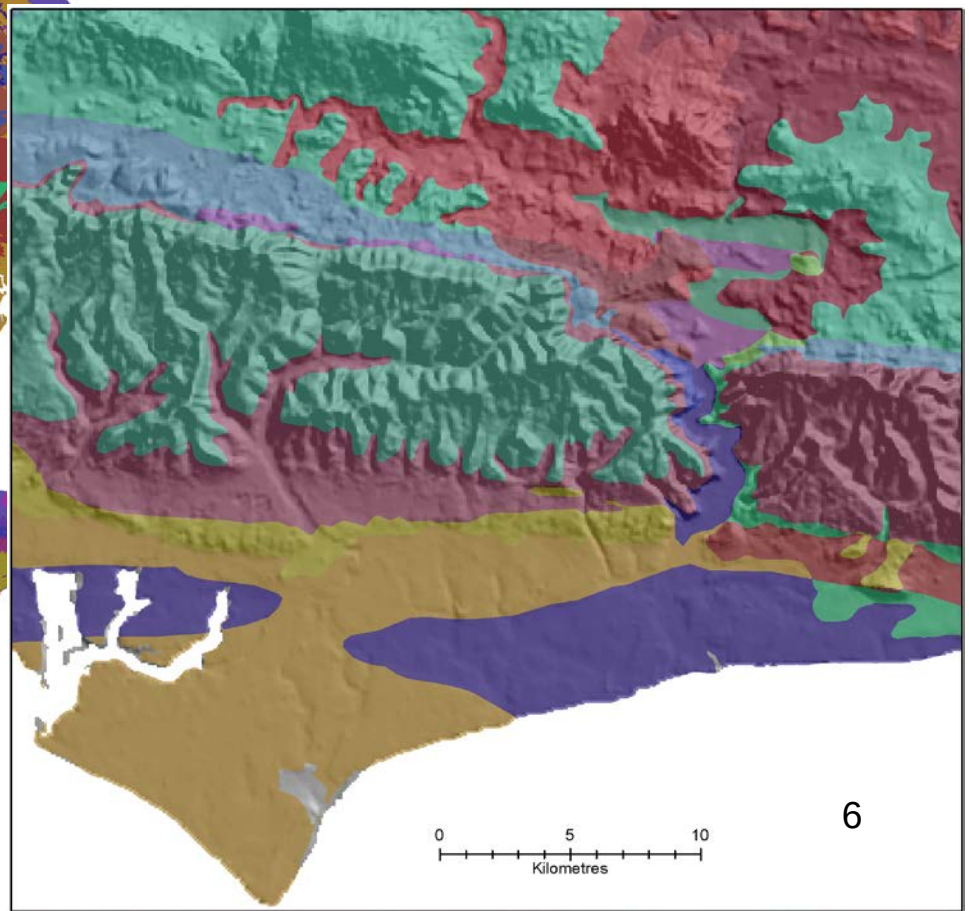
- acid siliceous igneous rock
- acid siliceous sedimentary rock
- basic siliceous igneous rock
- calcareous rock sedimentary sequence
- calcareous sedimentary rock (semiconsolidated)
- carbonatic metamorphic rock
- iron and organic bearing rock sequence
- pure carbonatic sedimentary rock
- siliceous igneous rock
- siliceous sediment
- siliceous sedimentary rock

DiGMapGB - 625
Geology map at the scale 1:625 000
British Geological Survey
with applied SOTER parent material classification

Physiographic unit #1

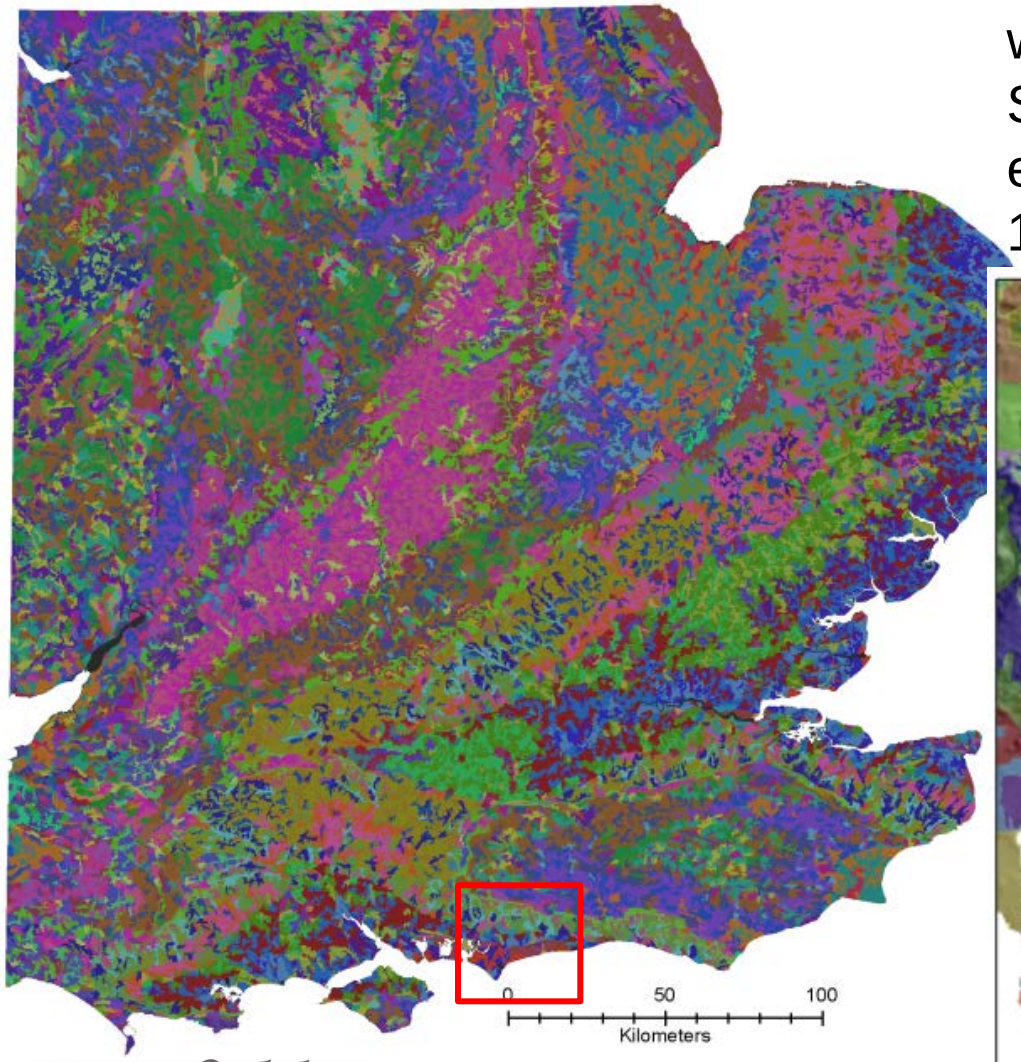
Terrain component intersected with parent material.
142 mapping units

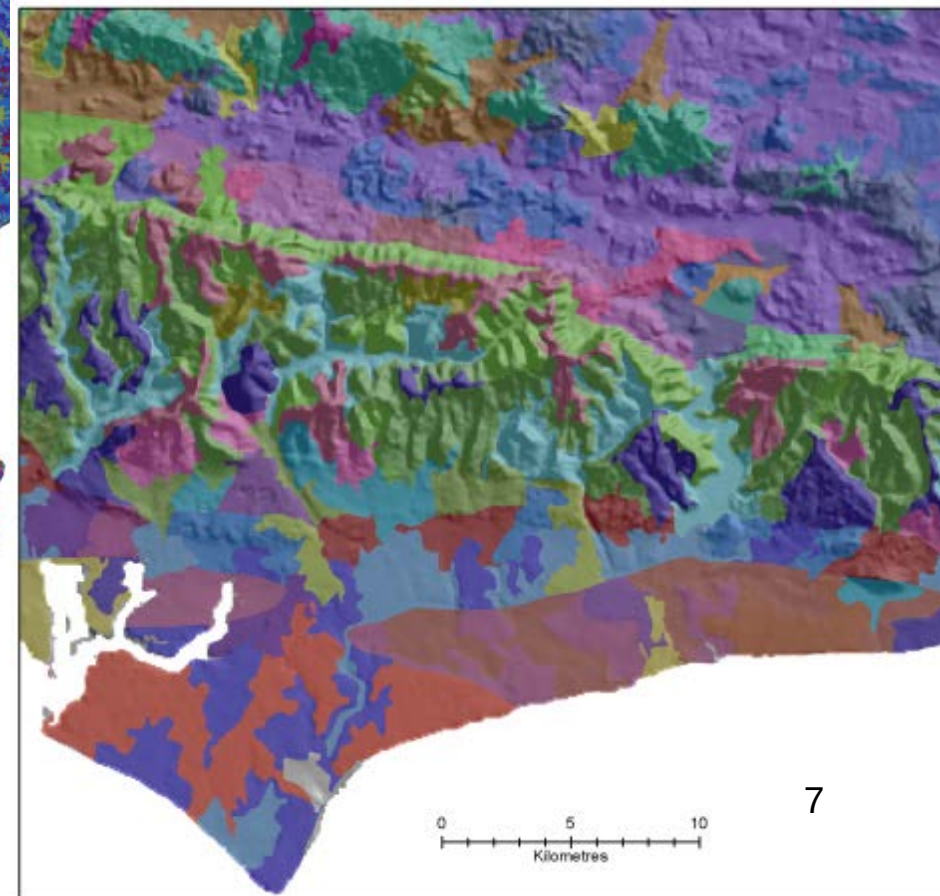




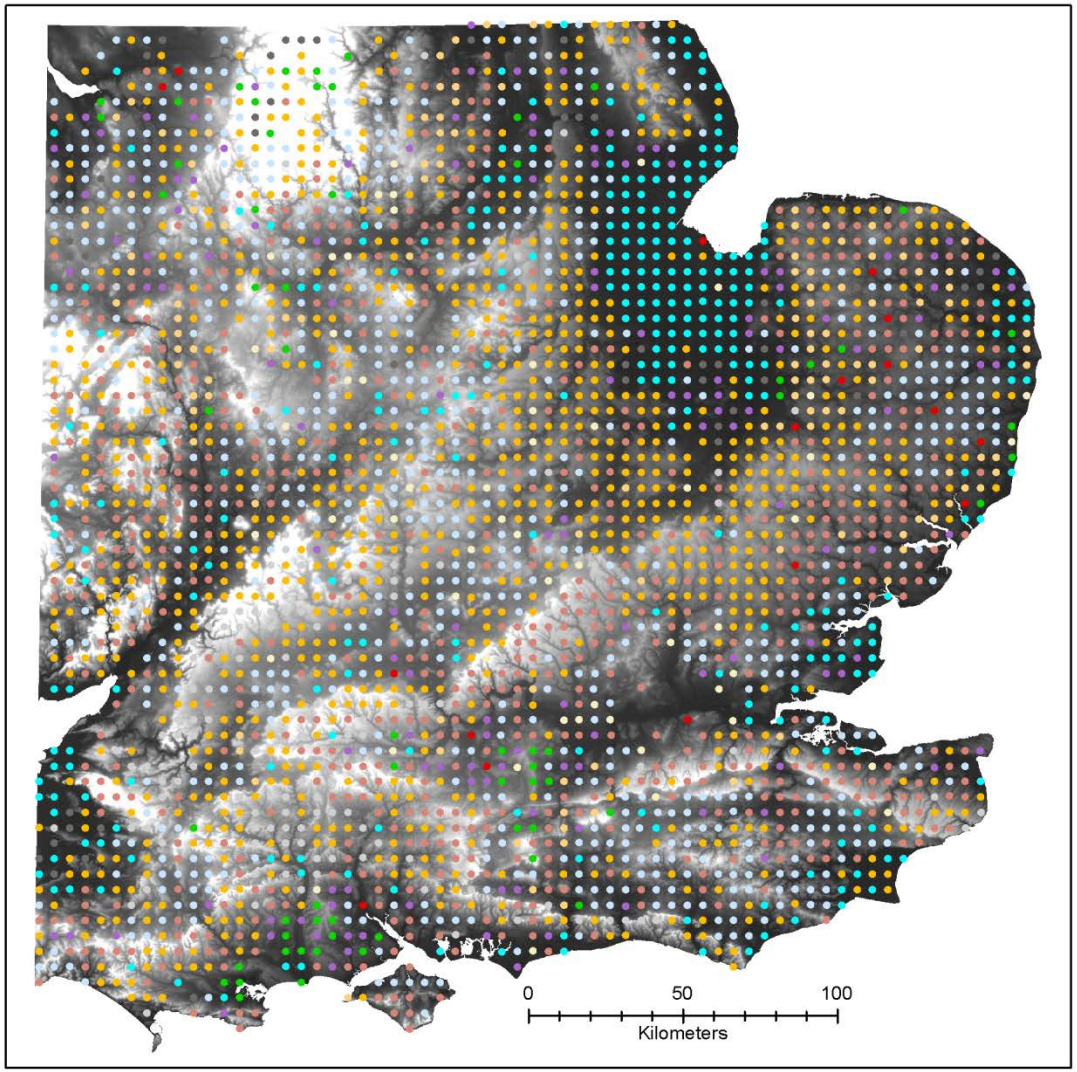
Physiographic unit #2

Terrain component intersected with parent material.
Sliver polygons <156.25 ha eliminated into neighbours.
142 mapping units





Soil component



NSI point data

- Soil series correlated into WRB
- Regular grid 5x5km
- 3082 data points

Legend

NSI data points

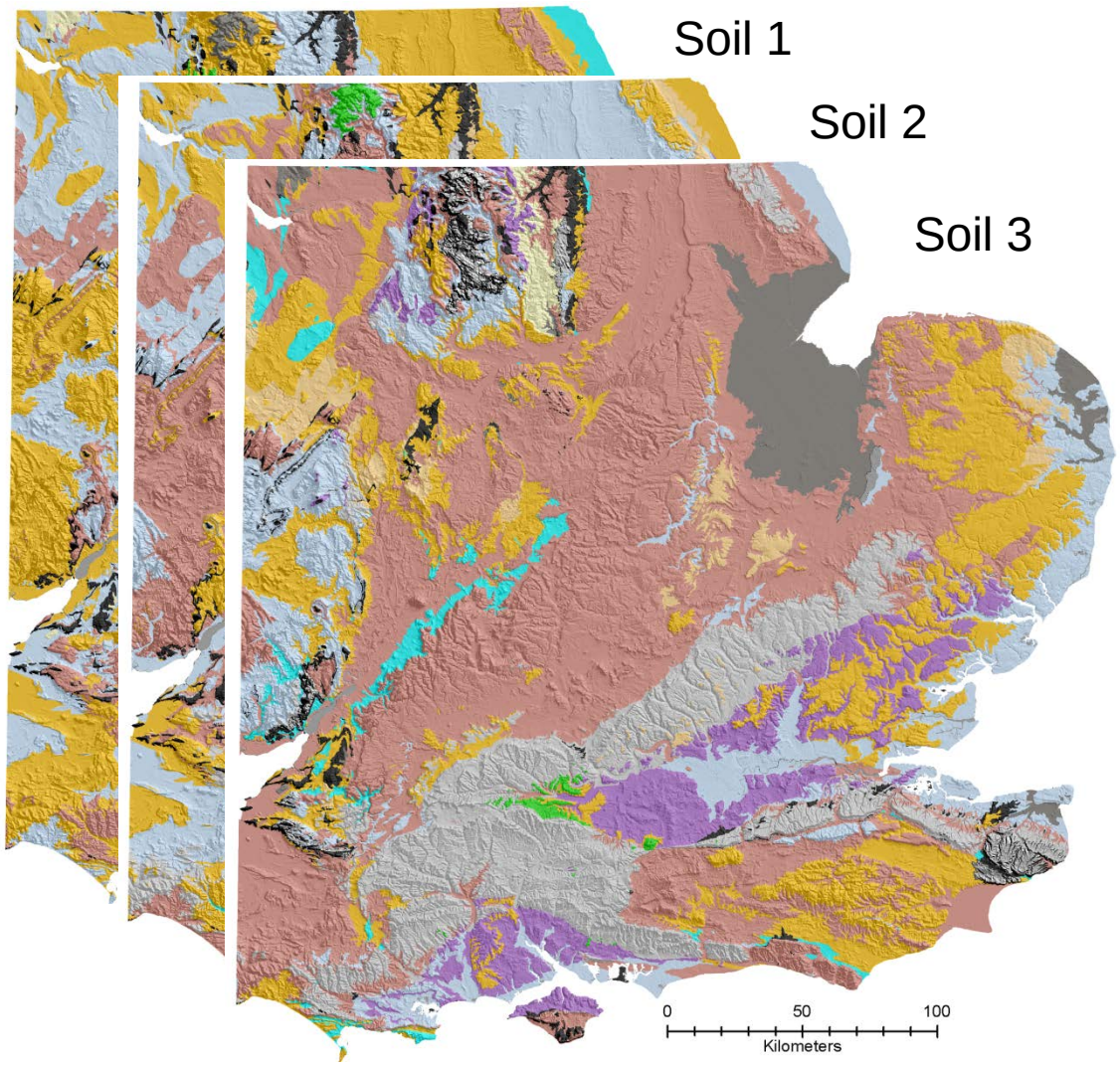
WRB

- Anthrosol
- Arenosol
- Cambisol
- Fluvisol
- Gleysol
- Histosol
- Leptosol
- Luvisol
- Podzol
- Regosol
- Stagnosol

Methodology

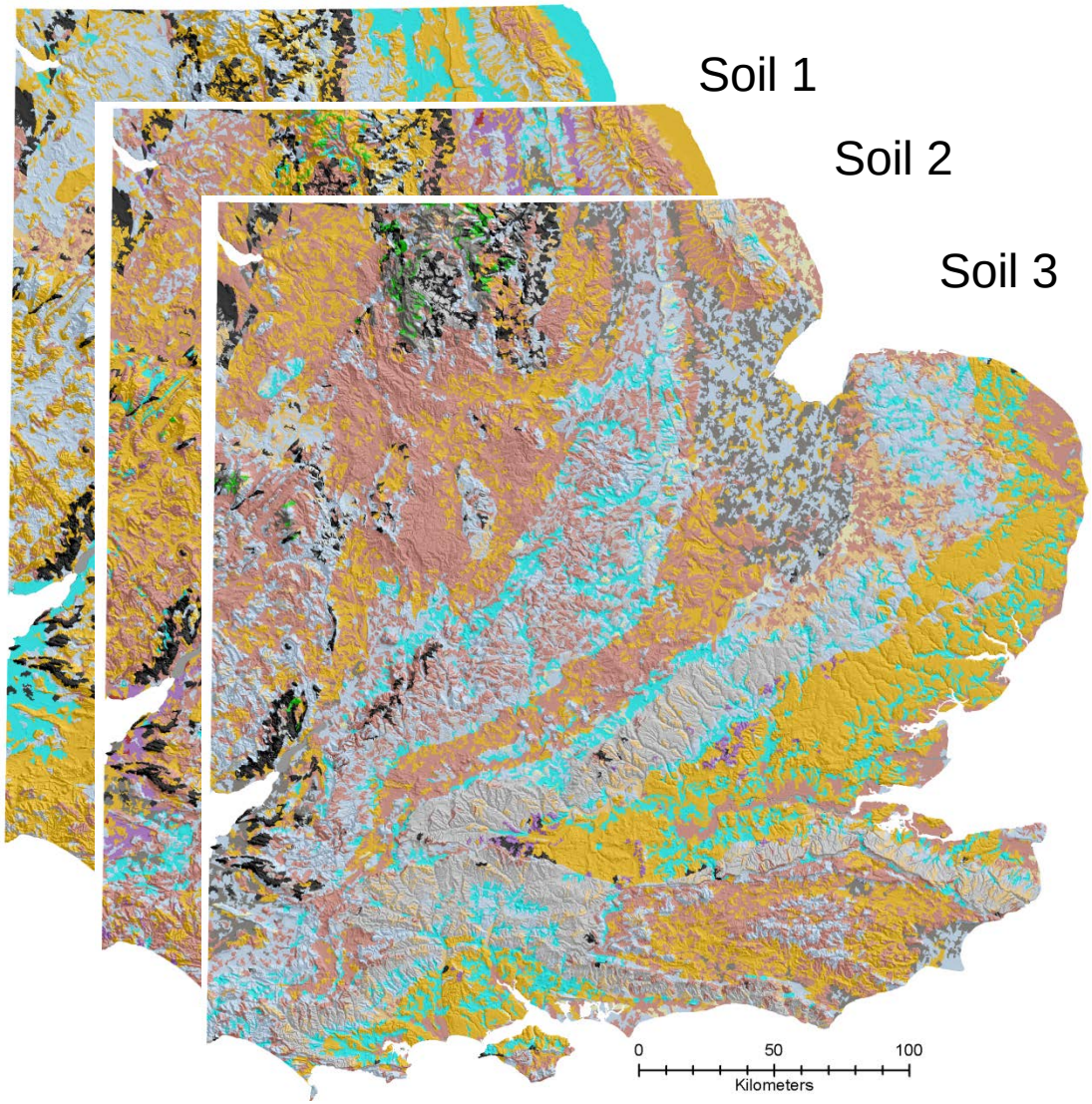
- Assignment of a Physiographic Unit to each soil data point
- Creation of contingency table with PUs as row and soil types as column labels
- Calculation of percentage contents of soil types within each PU
- Exclusion of PUs with less than 3 soil observations (set as NoData)
- Listing the soils in descending order according to % contents in each PU. In case of same % alphabetical order is used.
- For simplicity, % contents is classified into ranges:
  0-5%, 5-20%, 20-40%, 40-70%, 70-100%
- Soils falling into a particular range are listed.

Enhanced SOTER database #1



- Delineation based on homogenous objects (Dragut et al., 2010)
- Small mapping scale 1:1M or less

Enhanced SOTER database #2



- Delineation based on physical entities (MacMillan, 2001)
- Medium mapping scale 1:250k

Structure

IDnum – unique row identifier
tp_hamm – landform type
cls_hamm – landform class
scs_hamm – landform subclass
pm4 – parent material
pmscshamm – parent material intersected with landform subclass
soil_1 – WRB soil with the first highest % contents
range_1 – % range of contents of each soil found within the mapping unit
prcnt_1 – actual % contents of a particular soil

Table

SOIL 1

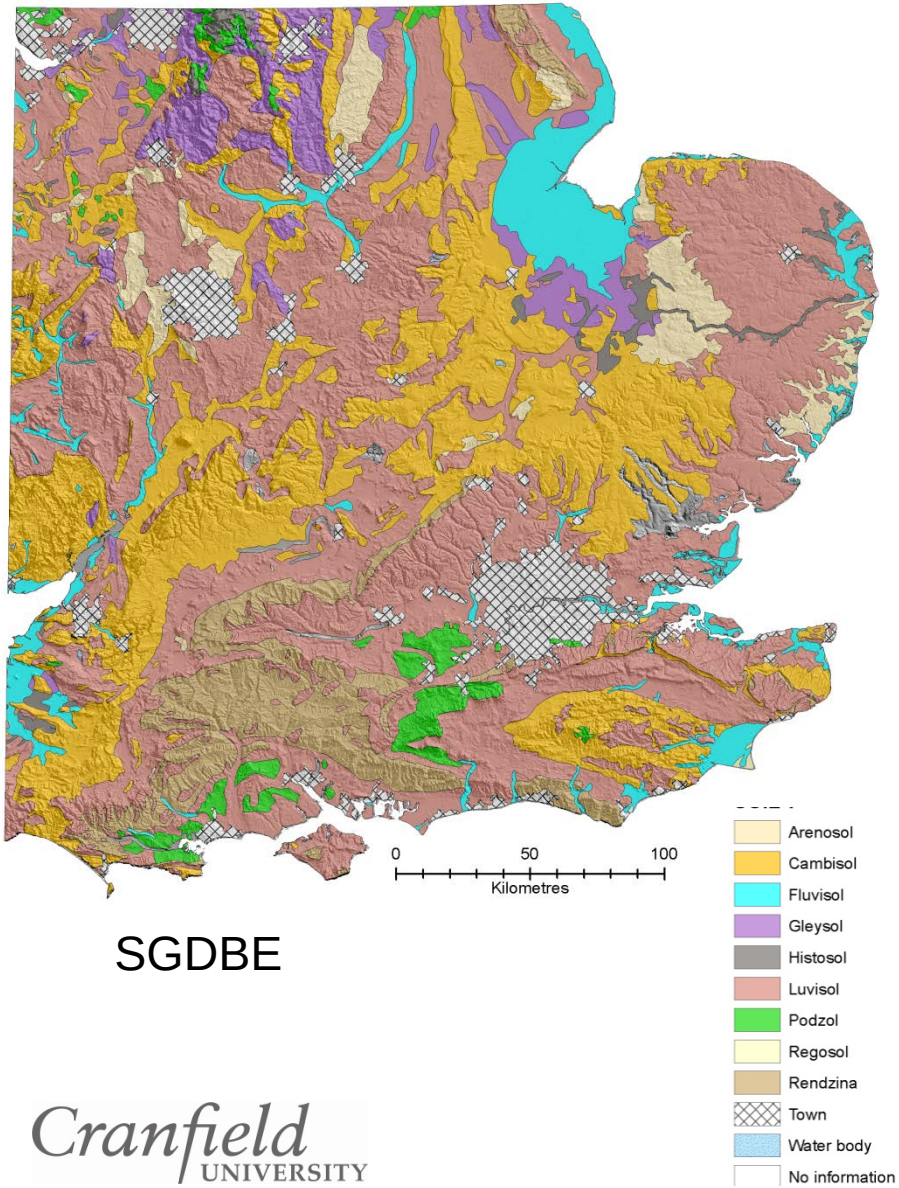
IDnum	FID	Shape *	tp_hamm	cls_hamm	scs_hamm	pm4	pmscsham	Soil_1	range1	Soil_2
3	3	Polygon	OPM	Open_high_hills	C4a	CCPS	C4aCCPS	Cambisol	70-100%	none
17	17	Polygon	OPM	Open_high_hills	C4b	SCXS	C4bSCXS	Cambisol	20-40%	Leptosol
18	18	Polygon	OPM	Open_high_hills	C4b	SCXS	C4bSCXS	Cambisol	20-40%	Leptosol
19										
20										
21										
28										

Table

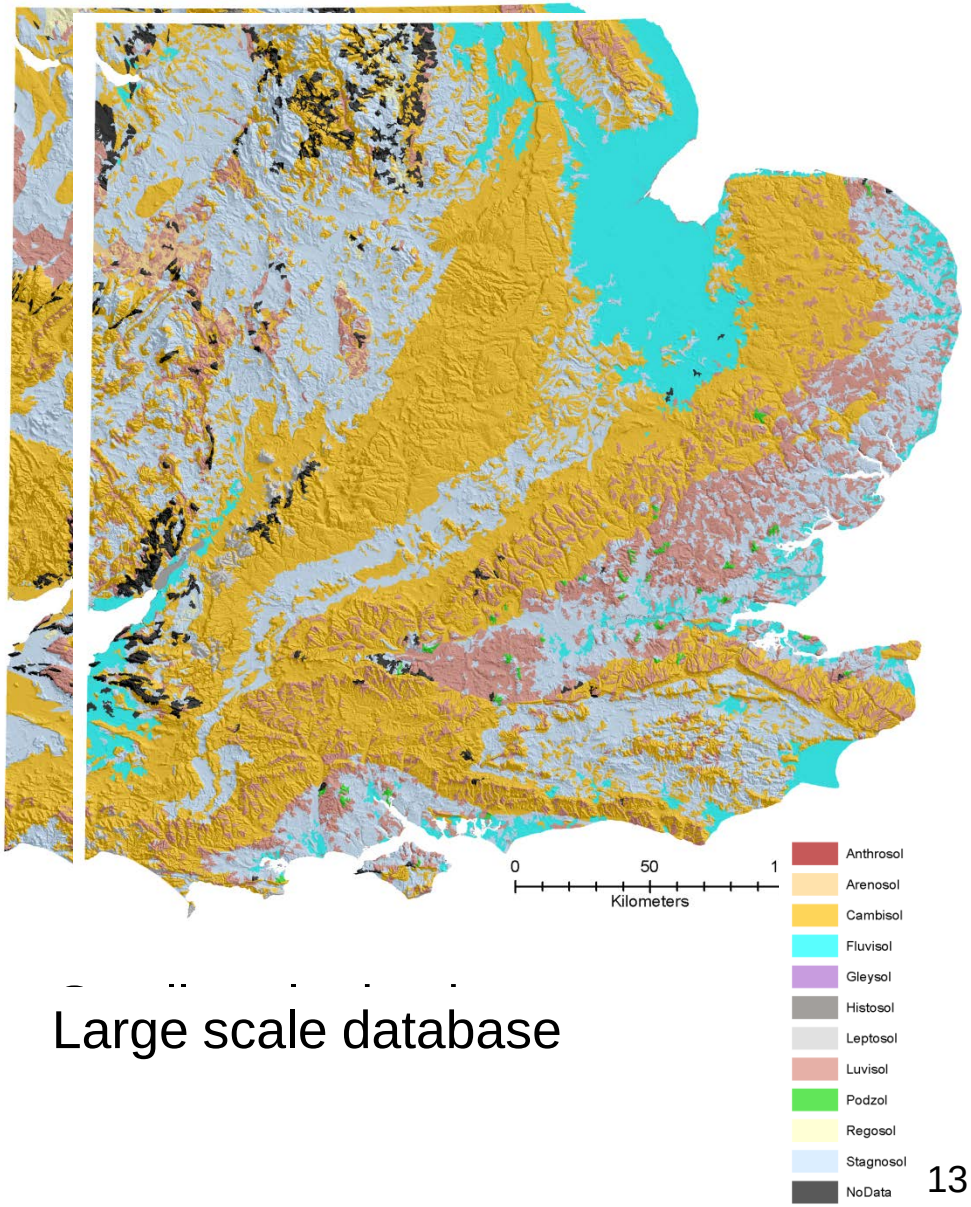
SOIL 1

Soil_10	range10	Soil_11	range11	prcn_1	prcn_2	prcn_3	prcn_4	prcn_5	prcn_6	prcn_7	prcn_8	prcn_9	prcn_10	prcn_11
none		none		100	0	0	0	0	0	0	0	0	0	0
none		none		40	40	20	0	0	0	0	0	0	0	0
none		none		40	40	20	0	0	0	0	0	0	0	0
none		none		40	40	20	0	0	0	0	0	0	0	0
none		none		40	40	20	0	0	0	0	0	0	0	0
none		none		40	40	20	0	0	0	0	0	0	0	0
none		none		75	25	0	0	0	0	0	0	0	0	0

Comparison to SGDBE v4 beta



SGDBE



Large scale database

Discussion

- Terrain component
  - Inclusion of object based approaches add the physical dimension to the database
  - Variability of soils depicted in second and further soil components.
- Parent material
  - Coarse resolution
  - Helps to identify major landforms
- Soil data
  - Conversion of soil series to tier 1 WRB soil type coarsened the possible resolution of the database
- Method
  - Robustness of the database largely dependant on availability of soil observations

Summary

Both presented approaches add value to the SOTER database

Inclusion of terrain component based on physical entities appropriate for 1:250 000 scale mapping

Terrain component based on homogenous objects appropriate for small scale maps (1:1 – 1:5 M)

The accuracy of the database in terms of provision of soil information affected by the accuracy of parent material data and soil observations.

References:

- Dragut, L., Tiede, D. and Levick, S., 2010. ESP: a tool to estimate scale parameters for multiresolution image segmentation of remotely sensed data, International Journal of Geographical Information Science
- MacMillan, R. A. 2003. LandMapR© Software Toolkit- C++ Version: Users manual. LandMapper Environmental Solutions Inc., Edmonton, AB. 110 pp.

Thank you!