

Using WRB to produce map legends

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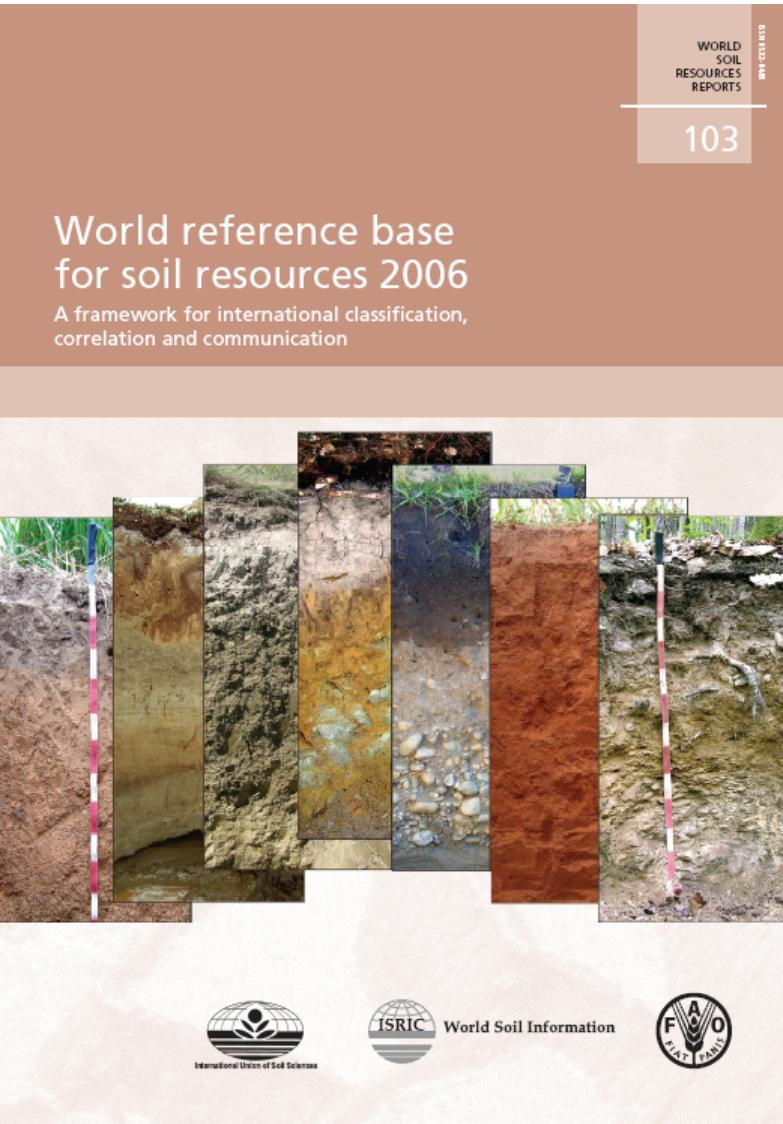
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IUSS Working Group WRB (2006):
World Reference Base for Soil Resources 2006.
Edited by Erika Micheli, Peter Schad and Otto Spaargaren.
FAO World Soil Resources Reports 103, Rome.
[ftp://ftp.fao.org/agl/agll/docs/wsrr103e.pdf](http://ftp.fao.org/agl/agll/docs/wsrr103e.pdf)

WRB: electronic Update, 2007

http://www.fao.org/agl/agll/wrb/doc/wrb2007_corr.pdf

http://www.wzw.tum.de/bk/pdfs/uebungen/WRB_update07.pdf

Classification of individual soils: example Luvisol

lists of qualifiers (qualifiers which apply in this example: red):

Prefix qualifiers	Suffix qualifiers
Lamellic	Anthric
Cutanic	Fragic
Albic	Manganiferic
Escalic	Ferric
Technic	Abruptic
Leptic	Ruptic
Vertic	Humic
Gleyic	Sodic
Vitric	Epidystric
Andic	Hypereutric
Nitic	Turbic
Stagnic	Gelic
Calcic	Oxyaquic
Haplic	Greyic
	Profondic
	Hyperochric
	Nudiargic
	Densic
	Skeletal
	Arenic
	Siltic
	Clayic
	Rhodic
	Chromic
	Transportic
	Novic

-> Stagnic Albic Cutanic Luvisol (Ferric, Greyic, Clayic)

WRB: Classifying soils versus making maps

classification of individual soils:

- all applying qualifiers have to be used
- there is no hierarchy of the qualifiers

map legends:

- the number of used qualifiers depends on the scale
- at least some of the qualifiers have to be in a hierarchical order

Guidelines for constructing small-scale map legends using the WRB

January 2010

scales of 1 : 250 000 and smaller

<http://www.fao.org/nr/land/soils/soil/wrb-documents/en/>

qualifiers arranged in a different manner:

main map unit qualifiers:

ranked

optional map unit qualifiers:

not ranked (alphabetical)

no changes in the definitions of qualifiers

no qualifiers abolished

no qualifiers newly introduced

-> besides the sequences: all according to WRB 2007

Map unit qualifiers: example Luvisol

main	optional
Leptic/Skeletal	Abruptic
Gleyic	Andic
Stagnic	Anthric
Albic	Arenic
Vertic	Clayic
Calcic	Cutanic
Manganiferic/Ferric	Densic
Rhodic/Chromic	Epidystric
Haplic	Escalic
	Fragic
	Gelic
	Greyic
	Humic
	Hypereutric
	Hyperochric
	Lamellic
	Nitic
	Novic
	Nudiargic
	Oxyaquic
	Profondic
	Ruptic
	Siltic
	Sodic
	Technic
	Transportic
	Turbic
	Vitric

Map unit qualifiers: example Luvisol

main	optional	
Leptic/Skeletal	Abruptic	Hyperochric
Gleyic	Andic	Lamellic
Stagnic	Anthric	Nitic
Albic	Arenic	Novic
Vertic	Clayic	Nudiargic
Calcic	Cutanic	Oxyaquic
Manganiferic/Ferric	Densic	Profondic
Rhodic/Chromic	Epidystric	Ruptic
Haplic	Escalic	Siltic
	Fragic	Sodic
	Gelic	Technic
	Greyic	Transportic
	Humic	Turbic
	Hypereutric	Vitric

red: prefix qualifiers for classification of individual soils

blue: suffix qualifiers for classification of individual soils

Scale levels (recommendation)

First scale level: Reference Soil Group (RSG) only:

1 : 5 000 000 and smaller

Second scale level: RSG with 1 main map unit qualifier

1 : 5 000 000

Third scale level: RSG with 2 main map unit qualifiers

1 : 5 000 000 to 1 : 1 000 000

Fourth scale level: RSG with 3 main map unit qualifiers

1 : 1 000 000 to 1 : 250 000

Map units

- before the name of the RSG, the recommended number of **main map unit qualifiers** is placed if there is more than one: a qualifier further up in the list stands closer to the name of the RSG
- behind the name of the RSG, **additional map unit qualifiers** may be placed in brackets and separated by commas
these may be
 - additional *main map unit qualifiers* further down in the list
 - *optional map unit qualifiers*additional main map unit qualifiers are placed first and out of them a qualifier further up in the list stands first
the sequence of the optional map unit qualifiers
is according to the preference of the soil scientist who makes the map
- if less qualifiers apply than described above, the smaller number is used
- redundant qualifiers are not used
- if two or more main map unit qualifiers are listed separated by a slash (/), only the dominant one is used
- the use of specifiers is encouraged:
Epi-: the qualifier applies only from 0 to 50 cm
Endo-: the qualifier applies from 50 to 100 cm (and not above 50 cm)

Dominant soils, co-dominant soils and associated soils

dominant soils: > 50 % of the soil cover

co-dominant soils: 25 – 50 % of the soil cover

associated soils: 5 – 25 % of the soil cover

map units:

- dominant soil only
- dominant soil and a co-dominant soil and/or one or more associated soils
- up to three co-dominant soils (and associated soils)

co-dominant soils and associated soils:

may have less qualifiers than indicated for the respective scale level

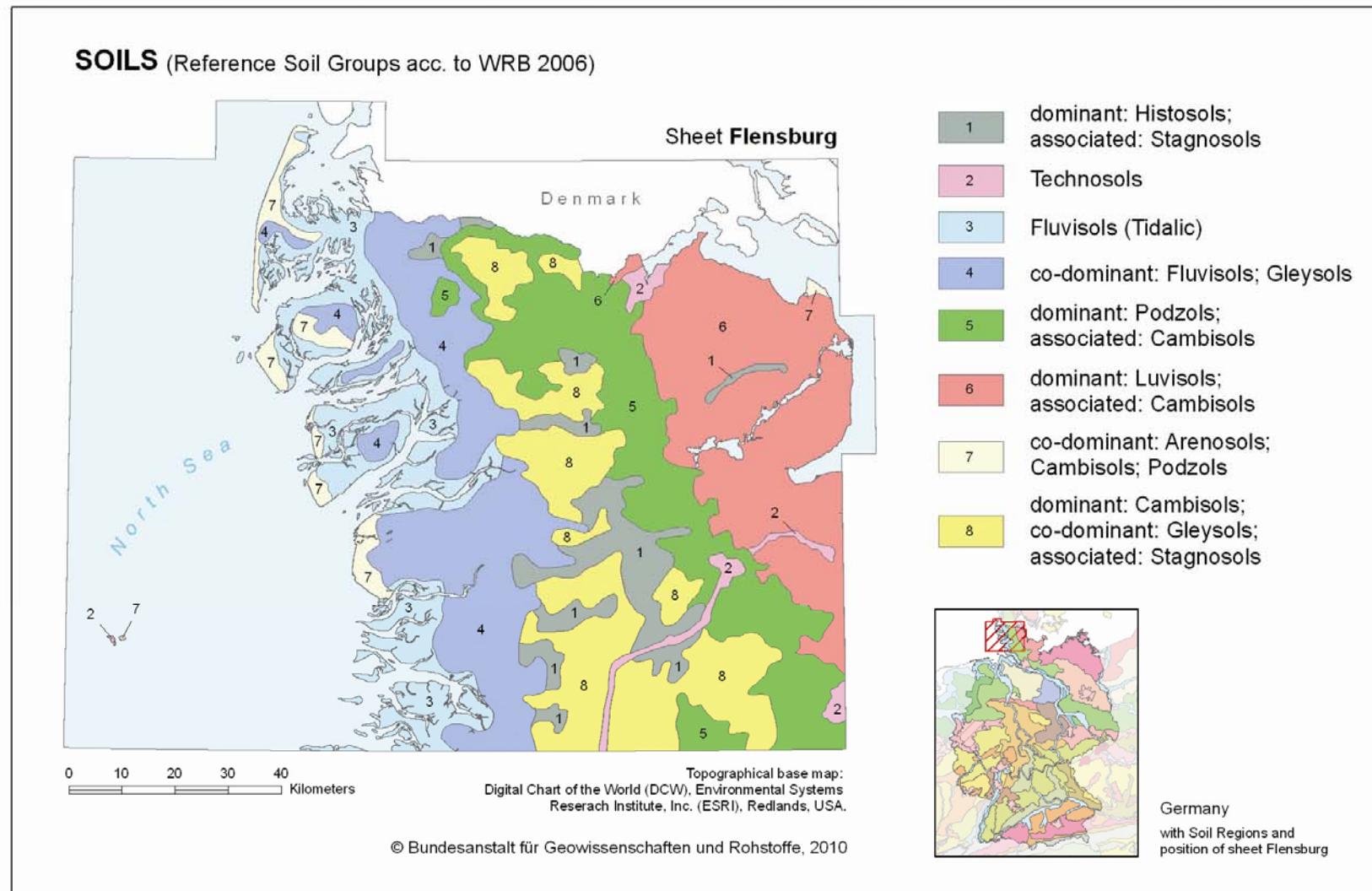
Map units: example Luvisol

classification of individual soil: Stagnic Albic Cutanic Luvisol (Ferric, Greyic, Clayic)

main	optional		
Leptic/Skeletal	Abruptic	Gelic	Oxyaquic
Gleyic	Andic	Greyic	Profondic
Stagnic	Anthric	Humic	Ruptic
Albic	Arenic	Hypereutric	Siltic
Vertic	Clayic	Hyperochric	Sodic
Calcic	Cutanic	Lamellic	Technic
Manganiferric/ Ferric	Densic	Nitic	Transportic
Rhodic/Chromic	Epidystric	Novic	Turbic
Haplic	Escalic	Nudiargic	Vitric
	Fragic		

	map unit	additional qualifiers (examples)
first scale level:	Luvisol	
second scale level:	Stagnic Luvisol	(Albic)
third scale level:	Albic Stagnic Luvisol	(Ferric, Greyic)
fourth scale level:	Ferric Albic Stagnic Luvisol	(Greyic, Clayic)

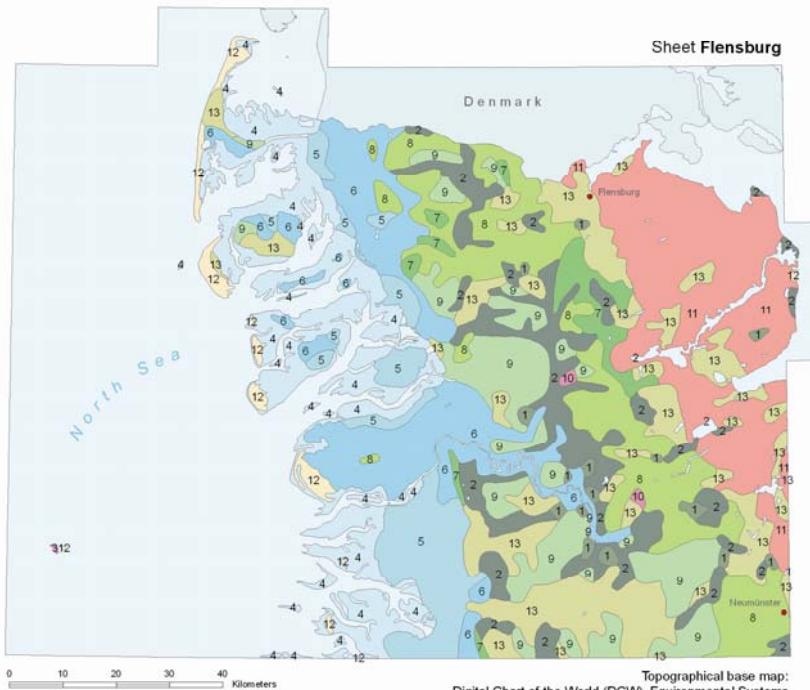
First scale level: RSG



sheet Flensburg (draft), German Federal Institute for Geosciences and Natural Resources
recommended scale : 1 : 5 000 000 and smaller

Third scale level: RSG plus 2 main qualifiers

SOILS (Reference Soil Groups with max. 2 Qualifiers)



dominant: Dystric Hemic Histosols (Rheic);
associated: Dystric Fibric Histosols (Rheic);
Dystric Gleysols (Arenic, Greyic); Gleyic Albic Podzols

co-dominant: Dystric Fibric Histosols (Ombric);
co-dominant: Dystric Hemic Histosols (Ombric);
associated: Gleyic Albic Podzols (Ortsteinic)

Eutric Technosols (Calcaric)

Salic Tidalic Fluvisols

co-dominant: Eutric Calcic Gleysols;
associated: Eutric Gleysols (Silic); Eutric Fluvisol (Calcic);
Eutric Plaggic Anthrosols; Dystric Cambisols; Eutric Planosols

dominant: Eutric Gleysols;
associated: Dystric Gleysols (Arenic)

co-dominant: Albic Podzols;
associated: Gleyic Albic Podzols; Haplic Podzols;
Entic Podzols; Dystric Brunic Arenosols

dominant: Albic Podzols (Rupic);
co-dominant: Haplic Podzols;
associated: Dystric Planosols (Albic, Epiarenic, Rupic);
Stagnic Albic Podzols

co-dominant: Albic Podzols (Bathygleyic);
associated: Dystric Planosols; Stagnic Albic Podzols; Eutric
Plaggic Anthrosols; Dystric Gleysols; Dystric Stagnic Cambisols;
Dystric Albic Arenosols (Greyic)

co-dominant: Dystric Planosol (Epiarenic, Endogleyic);
Dystric Umbric Gleysols (Greyic);
associated: Gleyic Podzols

dominant: Stagnic Luvisols (Cutanic);
associated: Haplic Luvisols (Cutanic); Calcic Luvisols (Cutanic);
Eutric Stagnosols; Calcic Planosols

dominant: Dystric Protic Arenosol;
co-dominant: Dystric Gleysol (Arenic);
associated: Eutric Calcic Gleysol

co-dominant: Dystric Stagnic Cambisols;
co-dominant: Haplic Podzols;
associated: Dystric Brunic Arenosols; Haplic Luvisols (Cutanic, Rupic)

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sheet Flensburg (draft), German Federal Institute for Geosciences and Natural Resources
recommended scale : 1 : 1 000 000 to 1 : 5 000 000

Third scale level: RSG plus 2 main qualifiers

1

dominant: Dystric Hemic Histosols (Rheic);
associated: Dystric Fibric Histosols (Rheic);
Dystric Gleysols (Arenic, Greyic); Gleyic Albic Podzols

2

co-dominant: Dystric Fibric Histosols (Ombric);
co-dominant: Dystric Hemic Histosols (Ombric);
associated: Gleyic Albic Podzols (Ortsteinic)

3

Eutric Technosols (Calcaric)

4

Salic Tidalic Fluvisols

5

co-dominant: Eutric Calcic Gleysols;
associated: Eutric Gleysols (Siltic); Eutric Fluvisol (Calcic);
Eutric Plaggic Anthrosols; Dystric Cambisols; Eutric Planosols

6

dominant: Eutric Gleysols;
associated: Dystric Gleysols (Arenic)

9

co-dominant: Albic Podzols (Bathygleyic);
associated: Dystric Planosols; Stagnic Albic Podzols; Eutric
Plaggic Anthrosols; Dystric Gleysols; Dystric Stagnic Cambisols;
Dystric Albic Arenosols (Greyic)

10

co-dominant: Dystric Planosol (Epiarenic, Endogleyic);
Dystric Umbric Gleysols (Greyic);
associated: Gleyic Podzols

11

dominant: Stagnic Luvisols (Cutanic);
associated: Haplic Luvisols (Cutanic); Calcic Luvisols (Cutanic);
Eutric Stagnosols; Calcic Planosols

12

dominant: Dystric Protic Arenosol;
co-dominant: Dystric Gleysol (Arenic);
associated: Eutric Calcic Gleysol

13

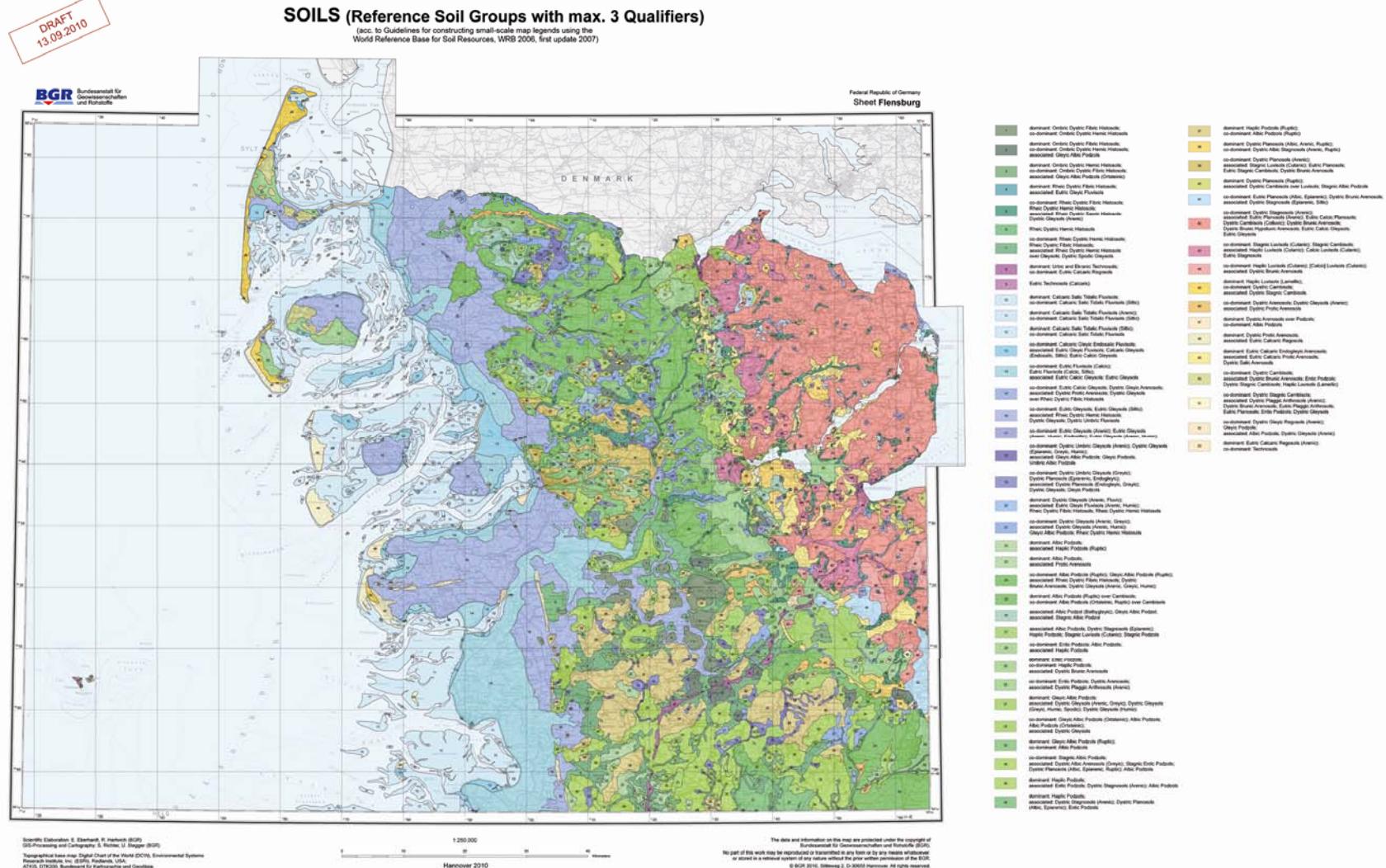
co-dominant: Dystric Stagnic Cambisols;
co-dominant: Haplic Podzols;
associated: Dystric Brunic Arenosols; Haplic Luvisols (Cutanic, Ruptic)

Fourth scale level: RSG plus 3 main qualifiers

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13-



sheet Flensburg (draft), German Federal Institute for Geosciences and Natural Resources
recommended scale : 1 : 250 000 to 1 : 000 000

Fourth scale level: RSG plus 3 main qualifiers

1 dominant: Ombric Dystric Fibric Histosols;
co-dominant: Ombric Dystric Hemic Histosols

2 dominant: Ombric Dystric Fibric Histosols;
co-dominant: Ombric Dystric Hemic Histosols;
associated: Gleyic Albic Podzols

3 dominant: Ombric Dystric Hemic Histosols;
co-dominant: Ombric Dystric Fibric Histosols;
associated: Gleyic Albic Podzols (Ortsteinic)

4 dominant: Rheic Dystric Fibric Histosols;
associated: Eutric Gleyic Fluvisols

5 co-dominant: Rheic Dystric Fibric Histosols;
Rheic Dystric Hemic Histosols;
associated: Rheic Dystric Sapric Histosols;
Dystric Gleysols (Arenic)

6 Rheic Dystric Hemic Histosols

7 co-dominant: Rheic Dystric Hemic Histosols;
Rheic Dystric Fibric Histosols;
associated: Rheic Dystric Hemic Histosols
over Gleysols; Dystric Spodic Gleysols

10 dominant: Calcaric Salic Tidalic Fluvisols;
co-dominant: Calcaric Salic Tidalic Fluvisols (Siltic)

11 dominant: Calcaric Salic Tidalic Fluvisols (Arenic);
co-dominant: Calcaric Salic Tidalic Fluvisols (Siltic)

12 dominant: Calcaric Salic Tidalic Fluvisols (Siltic);
co-dominant: Calcaric Salic Tidalic Fluvisols

13 co-dominant: Calcaric Gleyic Endosalic Fluvisols;
associated: Eutric Gleyic Fluvisols; Calcaric Gleysols
(Endosalic, Siltic); Eutric Calcic Gleysols

14 co-dominant: Eutric Fluvisols (Calcic);
Eutric Fluvisols (Calcic, Siltic);
associated: Eutric Calcic Gleysols; Eutric Gleysols

Example Histosols

<i>Main map unit qualifiers</i>
Cryic
Thionic
Folic
Fibric/Hemic/Sapric
Technic
Hyperskeletal/Leptic
Vitric/Andic
Dystric/Eutric
Rheic/Ombric

Example Histosols: second scale level

Sheet Flensburg:

Fibric Histosols (Rheic)

Fibric Histosols (Ombric)

Hemic Histosols (Rheic)

Hemic Histosols (Ombric)

<i>Main map unit qualifiers</i>
Cryic
Thionic
Folic
Fibric/Hemic/Sapric
Technic
Hyperskeletal/Leptic
Vitric/Andic
Dystric/Eutric
Rheic/Ombric

added at the second scale level

Example Histosols: third scale level

Sheet Flensburg:

Dystric Fibric Histosols (**Rheic**)
Dystric Fibric Histosols (**Ombric**)
Dystric Hemic Histosols (**Rheic**)
Dystric Hemic Histosols (**Ombric**)

<i>Main map unit qualifiers</i>
Cryic
Thionic
Folic
Fibric/Hemic/Sapric
Technic
Hyperskeletal/Leptic
Vitric/Andic
Dystric/Eutric
Rheic/Ombric

added at the second scale level

added at the third scale level

Example Histosols: fourth scale level

Sheet Flensburg:

Rheic Dystric Fibric Histosols
Ombric Dystric Fibric Histosols
Rheic Dystric Hemic Histosols
Ombric Dystric Hemic Histosols
Rheic Dystric Sapric Histosols

<i>Main map unit qualifiers</i>
Cryic
Thionic
Folic
Fibric/Hemic/Sapric
Technic
Hyperskeletal/Leptic
Vitric/Andic
Dystric/Eutric
Rheic/Ombric

added at the second scale level

added at the third scale level

added at the fourth scale level

Example Fluvisols

<i>Main map unit qualifiers</i>
Subaqueic/Tidalic
Thionic
Skeletal
Salic
Gleyic
Stagnic
Folic/Histic
Mollic/Umblic
Calcaric
Dystric/Eutric

Example Fluvisols: second scale level

Sheet Flensburg:

Tidalic Fluvisols

Eutric Fluvisols

added in the second scale level

<i>Main map unit qualifiers</i>
Subaqueic/Tidalic
Thionic
Skeletal
Salic
Gleyic
Stagnic
Folic/Histic
Mollic/Umblic
Calcaric
Dystric/Eutric

Example Fluvisols: third scale level

Sheet Flensburg:

Salic Tidalic Fluvisols

Eutric Fluvisols (**Calcic**)

added in the second scale level

added in the third scale level

<i>Main map unit qualifiers</i>	<i>Optional map unit qualifiers</i>
Subaquatic/Tidalic	...
Thionic	Calcic
Skeletal	...
Salic	
Gleyic	
Stagnic	
Folic/Histic	
Mollic/Umbritic	
Calcaric	
Dystric/Eutric	

Example Fluvisols: fourth scale level

Sheet Flensburg:

Calcaric Salic **Tidalic** Fluvisols
Calcaric Salic **Tidalic** Fluvisols (**Arenic**)
Calcaric Salic **Tidalic** Fluvisols (**Siltic**)
Calcaric Gleyic Endosalic Fluvisols
Eutric Gleyic Fluvisols
Eutric Gleyic Fluvisols (**Arenic, Humic**)
Dystric Umbric Fluvisols
Eutric Fluvisols (**Calcic**)
Eutric Fluvisols (**Calcic, Siltic**)

<i>Main map unit qualifiers</i>	<i>Optional map unit qualifiers</i>
Subaquatic/ Tidalic	Arenic
Thionic	Calcic
Skeletal	Humic
Salic	Siltic
Gleyic	...
Stagnic	
Folic/Histic	
Mollic/ Umbric	
Calcaric	
Dystric/Eutric	

added in the second scale level

added in the third scale level

added in the fourth scale level



Thank you very much