

## THE DIGITAL SOIL MAP OF THE WORLD

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Version 3.6, completed January 2003

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### **Background**

The present version (3.6) of the digitized Soil Map of the World has been cleaned of errors both in the database and in the lines constituting the digitized map itself.

The original map sheets covering the Americas are in bipolar oblique conformal projection. The other sheets, covering Europe, Africa, Asia and Australasia, are based on the Miller obliterated stereographic projection; a system consisting of three conformal projections centred on each continent, joined together in a continuous fashion by so-called "fill-in" projections. This allows a complete angular continuity between all sheets. The soil map was prepared using the topographic map series of the American Geographical Society of New York as a base at a nominal scale of 1:5 000 000. The base map comprises sixteen sheets; for the purpose of the Soil Map of the World the information has been redistributed over eighteen sheets in order to obtain sheets of equal size. A nineteenth sheet contains the legend. The digital database is in the Geographic projection.

All maps were intersected with a template containing water related features (coastlines, lakes, islands, glaciers and double-lined rivers). This layer was superimposed on the soil map (the information is represented in the FAOSOIL item as: inland WATER, and GLaciers).

The Soil Map of the World except for Africa was intersected with the Country Boundaries map from the World Data Bank II (with country boundaries updated to January 1994 at 1:3 000 000 scale), obtained from the US Government. For Africa, the country boundaries are derived from the FAO Country Boundaries on the original FAO/UNESCO Soil Map of the World. Country boundaries in both cases were checked and adjusted in certain places on the basis of FAO and UN conventions.

## Description

The FAO-UNESCO Soil Map of the World was published between 1974 and 1978 at 1:5 000 000 scale. The fields (columns) of the shapefile's table are described below.

## Fields

SNUM: a sequential code, unique for each soil Mapping Unit, which links the first level of soil information to the expansion data file. This number ranges from 1 to 6,999, some numbers in the sequence have not been used.

FAOSOIL: Is a unit structured as explained in **Table 1**.

**Table 1**

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Bk23-2/3ab:	soil mapping unit symbol;
Bk:	dominant soil, covering 40 % of the mapping unit;
Bk23:	refers to the soil components described on the back of the map (associated soils: K and E each covering 20 % of the mapping unit; and inclusions: Jc and Zo each covering 10 % of the mapping unit);
2/3:	<b>texture classes</b> of the dominant soil;
ab:	<b>slope classes</b> of the dominant soil.

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- Independent miscellaneous land unit symbols:  
D/SS = Dunes or shifting sand  
SALT = Salt flats  
ROCK = Rock debris or desert detritus; or
- other natural features:  
WATER = Inland water (lakes, wide rivers)  
GLACIER  
OCEAN
- NO DATA indicates polygons for which no soil information is available.

The soil associations are indicated on the original maps by the symbol of the dominant soil unit, followed by a number which refers to the descriptive legend on the back of the map, where the full composition of the association is given. Associations in which Lithosols are dominant are marked by the Lithosol symbol I combined with one or two associated soil units or inclusions; where there are no associated soils (or these are not known), the symbol I alone is used.

The soil composition and the texture and slope classes distribution of this mapping unit are listed in **tables 2, 3 and 4**.

**Table 2:** Composition of mapping unit: dominant, associated and included soil units.

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Soil Unit	% of mapping unit	
Dominant	Bk	40
Associated	K	20
Associated	E	20
Inclusion	Jc	10
Inclusion	Zo	10

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**Table 3:** Composition of mapping unit considering soil units, texture and slope

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Soil Unit	Texture & Slope	% of mapping unit
Bk	2a	10 %
Bk	2b	10 %
Bk	3a	10 %
Bk	3b	10 %
K	2a	10 %
K	2b	10 %
E	2b	20 %
Jc	2a	10 %
Zo	2a	10 %

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**Table 4:** Slope and texture classes of mapping unit

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Slope and Texture Classes		% of mapping unit
<hr/>		
Texture/slope class 2a		40
Texture/slope class 2b		40
Texture/slope class 3a		10
Texture/slope class 3b		10
<hr/>		
Texture	2	80
Texture	3	20
<hr/>		
Slope	a	50
Slope	b	50

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**Texture classes** reflect the relative proportions of clay (fraction less than 0.002mm), silt (0.002 - 0.05mm) and sand (0.05 - 2mm) in the soil. Three textural classes are recognized: coarse (1): sands, loamy sands and sandy loams with less than 18 percent clay and more than 65 percent sand; medium (2): sandy loams, loams, sandy clay loams, silt loams, silt, silty clay loams and clay loams with less than 35 percent clay and less than 65 percent sand; the sand fraction may be as high as 82 percent if a minimum of 18 percent clay is present; and fine (3): clay, silty clays, sandy clays, clay loams, with more than 35 percent clay.

When information on the texture of the surface layers (upper 30 cm) of the dominant soil is available, the textural class figure (1, 2, 3) follows the association symbol, separated from it by a dash. Where two or three groups of textures occur that could not be separated on the map, two or three figures may be used, separated by a slash each is taken to apply to 50 or 33 percent respectively of the dominant soil unit..

The texture classes of component soils (associated soils and inclusions), and for dominant soils when not indicated in the mapping unit, were derived from the Composition Rules in **Table 5** (FAO, 1978):

**Table 5**

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Dominant soils of mapping units where texture is not described and all associated and included soils are considered as medium textured (2), except:

Qc, Ql, Qf, Qa, Po, Pf, Ph, Pp, Pg, Fx, which are classified as coarse textured (1); and,  
Vp, Vc, Zt, Bc, Bv, Lv, Fr, which are classified as fine textured (3).

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**Slope classes** indicate the slope that dominates in the area of soil association. The slope class follows the texture notation in the FAOSOIL unit, unless information on texture is not available, in which case it directly follows the association soil. Three slope classes are distinguished: (a) level to gently undulating, with generally less than 8 percent slope, (b) rolling to hilly with slopes between 8 and 30 percent and (c) steeply dissected to mountainous, with more than 30 percent slope. Where two or three slope classes are indicated, each is taken to apply to 50 or 33 percent respectively of the dominant soil unit. The slopes of component soils (associations and inclusions) and dominant soils when not indicated in the mapping unit, were derived from the Composition Rules in **Table 6** (FAO, 1978, with five soil units updated):

**Table 6**

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Slope Class a: J, G, O, W, Z, S, V, Qa, Ap, Lp, Fp, Bg  
Slope Classes a/b: P, Y, X, K, C, H, M, L, D, F, Q  
Slope Class b: R, E, B, A, N  
Slope Classes b/c: T, U, I

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When only major soil units are designated in the mapping units (e.g. A), it is assumed that the whole mapping unit consists of the first individual soil unit listed under the major soil unit (e.g. for A, it is Ao).

DOMSOI: lists the dominant soil unit code or the independent miscellaneous land unit code:

Af - Zt = Soil unit  
DS = Dunes or shifting sands  
ST = Salt flats  
RK = Rock debris or desert detritus  
WR = Inland water or ocean  
GL = Glacier  
ND = No data

Soil units from the legend of the soil map of the world (1974) comprises 106 soil are grouped in twenty-six major soil groupings. An alphabetical list of soil unit symbols and their names is given below. (For Classification Key consult: <http://www.fao.org/ag/agl/agll/key2soil.stm>)

A : ACRISOLS	Gx: Gelic Gleysols	Po: Orthic Podzols
Ao: Orthic Acrisols		Pl: Leptic Podzols
Af: Ferric Acrisols	H : PHAEOZEMS	Pf: Ferric Podzols
Ah: Humic Acrisols	Hh: Haplic Phaeozems	Ph: Humic Podzols
Ap: Plinthic Acrisols	Hc: Calcaric Phaeozems	Pp: Placic Podzols
Ag: Gleyic Acrisols	Hi: Luvic Phaeozems	Pg: Gleyic Podzols
	Hg: Gleyic Phaeozems	
B : CAMBISOLS	I : LITHOSOLS	Q : ARENOSOLS
Be: Eutric Cambisols		Qc: Cambic Arenosols
Bd: Dystric Cambisols	J : FLUVISOLS	Ql: Luvic Arenosols
Bh: Humic Cambisols	Je: Eutric Fluvisols	Qf: Ferralic Arenosols
Bg: Gleyic Cambisols	Jc: Calcaric Fluvisols	Qa: Albic Arenosols
Bx: Gelic Cambisols	Jd: Dystric Fluvisols	
Bk: Calcic Cambisols	Jt: Thionic Fluvisols	R : REGOSOLS
Bc: Chromic Cambisols		Re: Eutric Gleysols
Bv: Vertic Cambisols	K : KASTANOZEMS	Rc: Calcaric Regosols
Bf: Ferralic Cambisols	Kh: Haplic Kastanozems	Rd: Dystric Regosols
	Kk: Calcic Kastanozems	Rx: Gelic Regosols
C : CHERNOZEMS	Kl: Luvic Kastanozems	
Ch: Haplic Chernozems	L : LUVISOLS	S : SOLONETZ
Ck: Calcic Chernozems	Lo: Orthic Luvisols	So: Orthic Solonetz
Cl: Luvic Chernozems	Lc: Chromic Luvisols	Sm: Mollic Solonetz
Cg: Glossic Chernozems	Lk: Calcic Luvisols	Sg: Gleyic Solonetz
	Lv: Vertic Luvisols	
D : PODZOLUVISOLS	Lf: Ferric Luvisols	T : ANDOSOLS
De: Eutric Podzoluvisols	La: Albic Luvisols	To: Ochric Andosols
Dd: Dystric Podzoluvisols	Lp: Plinthic Luvisols	Tm: Mollic Andosols
Dg: Gleyic Podzoluvisols	Lg: Gleyic Luvisols	Th: Humic Andosols
		Tv: Vitric Andosols
E : RENDZINAS	M : GREYZEMS	U : RANKERS
	Mo: Orthic Greyzems	V : VERTISOLS
F : FERRALSOLS	Mg: Gleyic Greyzems	Vp: Pellic Vertisols
Fo: Orthic Ferralsols		Vc: Chromic Vertisols
Fx: Xanthic Ferralsols	N : NITOSOLS	
Fr: Rhodic Ferralsols	Ne: Eutric Nitosols	W : PLANOSOLS
Fh: Humic Ferralsols	Nd: Dystric Nitosols	We: Eutric Planosols
Fa: Acric Ferralsols	Nh: Humic Nitosols	Wd: Dystric Planosols
Fp: Plinthic Ferralsols		Wm: Mollic Planosols
	O : HISTOSOLS	Wh: Humic Planosols
G : GLEYSOLS	Oe: Eutric Histosols	Ws: Solodic Planosols
Ge: Eutric Gleysols	Od: Dystric Histosols	Wx: Gelic Planosols
Gc: Calcaric Gleysols	Ox: Gelic Histosols	
Gd: Dystric Gleysols		X : XEROSOLS
Gm: Mollic Gleysols	P : PODZOLS	Kh: Haplic Xerosols
Gh: Humic Gleysols		
Gp: Plinthic Gleysols		

Xk: Calcic Xerosols  
Xy: Gypsic Xerosols  
Xl: Luvic Xerosols

**Y : YERMOSOLS**

Yh: Haplic Yermosols  
Yk: Calcic Yermosols  
Yy: Gypsic Yermosols  
Yl: Luvic Yermosols  
Yt: Takyric Yermosols

**Z : SOLONCHAKS**

Zo: Orthic Solonchaks  
Zm: Mollic Solonchaks  
Zt: Takyric Solonchaks  
Zg: Gleyic Solonchaks

PHASE1 and PHASE2: Phases are subdivisions of soil units based on characteristics which are significant to the use or the management of land but which are not diagnostic for the separation of soil units themselves. Phases are used, for example, where indurated layers or hard rock occur at shallow depth.

They are shown as overprints on the original maps. When a phase is present in the mapping unit symbol, it is taken to apply to the dominant soil in the mapping unit, all associated soils and inclusions being considered unaffected.

Phase Types:

- = No phase or no second phase
- 01 = Stony
- 02 = Lithic
- 03 = Petric
- 04 = Petrocalcic
- 05 = Petrogypsic
- 06 = Petroferric
- 07 = Phreatic
- 08 = Fragipan
- 09 = Duripan
- 10 = Saline
- 11 = Sodic
- 12 = Cerrado

MISCLU1 and MISCLU2: are the first and second dependent miscellaneous land unit type. Miscellaneous land units are areas of "non-soil" such as dunes or shifting sands, salt flats, and rock debris or desert detritus. These are also shown as overprints on the original maps.

- = no miscellaneous land units or no second miscellaneous land unit
- 1 = Dunes or shifting sands
- 3 = Salt flats
- 4 = Rock debris or desert detritus

PERMAFROST: indicates permafrost areas by type

- = Not a permafrost area
- 1 = Permafrost
- 2 = Discontinuous permafrost

CNTCODE: is a unique number for each country or area. **Annex I** gives a listing of country or area names and their corresponding numbers by continental region.

CNTNAME: is a two letter code, unique for each country or area. **Annex I** gives a listing of country or area names and the respective codes by continental region.

COUNTRY-NAME: is the Country or area name; **Annex I** gives a listing of country or area names by continental region.



SQKM: is the corrected extent of the polygon in square Kilometres based on an equal area calculation rounded to the next whole integer (those areas less than 1km<sup>2</sup> are shown as “0”). The map was converted to an equal-area projection for computation of the areas in this field.

## MAPPING UNITS

The legend of the original soil map of the World (FAO, 1974) comprises an estimated 4,930 different map units, which consist of soil units or associations of soil units. When a map unit is not homogeneous, it is composed of a dominant soil and component soils. The latter are: associated soils, covering at least 20 percent of the area; and inclusions, important soils which cover less than 20 percent of the area. The list of components for each mapping unit is found on the back of the maps. The proportions of dominant and component soils in each mapping unit listed in the expansion file were derived from the Composition Rules in **Table 7** (FAO, 1978).

**Table 7.** Composition rules for the proportions of dominant and component soils in each mapping unit

(No.: number of associated soils or inclusions)

Dominant Soil	Associated Soil(s)	Soil Inclusion(s)
% of Area	No. % of Area	No. % of Area
100	0 0	0 0
90	0 0	1 10
80	0 0	2 10 + 10
70	0 0	3 10 + 10 + 10
70	1 30	0 0
60	1 30	1 10
60	2 20 + 20	0 0
50	2 20 + 20	1 10
50	1 30	2 10 + 10
50	1 30	4 5 + 5 + 5 + 5
40	2 20 + 20	4 5 + 5 + 5 + 5
40	1 30	1 10
40	2 20 + 20	2 10 + 10
30	3 20 + 20 + 20	1 10
30	2 20 + 20	3 10 + 10 + 10
30	3 20 + 20 + 20	2 5 + 5
25	3 20 + 20 + 20	3 5 + 5 + 5
24	3 20 + 20 + 20	4 4 + 4 + 4 + 4

## Annex I

### NUMERIC AREA CODE (1), TWO-LETTER CODE, AND FULL COUNTRY NAME

#### Africa

4	AG	ALGERIA
7	AO	ANGOLA
20	BC	BOTSWANA
29	BY	BURUNDI
32	CM	CAMEROUN
35	CV	CAPE VERDE
37	CT	CENTRAL AFRICAN REPUBLIC
39	CD	CHAD
45	CN	COMOROS
46	CF	CONGO
53	BN	BENIN
59	EG	EGYPT
61	EK	EQUATORIAL GUINEA
511	ER	ERITREA
62	ET	ETHIOPIA
72	DJ	DJIBOUTI
74	GB	GABON
75	GA	GAMBIA
81	GH	GHANA
90	GV	GUINEA
107	IV	IVORY COAST
114	KE	KENYA
122	LT	LESOTHO
123	LI	LIBERIA
124	LY	LIBYA
129	MA	MADAGASCAR
130	MI	MALAWI
133	ML	MALI
136	MR	MAURITANIA
137	MP	MAURITIUS
143	MO	MOROCCO
144	MZ	MOZAMBIQUE
147	WA	NAMIBIA
158	NG	NIGER
159	NI	NIGERIA
175	PU	GUINEA BISSAU
181	ZI	ZIMBABWE
182	RE	REUNION
184	RW	RWANDA
193	TP	SAO TOME AND PRINCIPE
195	SG	SENEGAL
197	SL	SIERRA LEONE
201	SO	SOMALIA
202	SF	SOUTH AFRICA
203	SP	CANARIES

206	SU	SUDAN
209	WZ	SWAZILAND
215	TZ	TANZANIA

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(1) For more information on the Numeric Area Code, refer to the end of Annex III.

217	TO	TOGO
222	TS	TUNISIA
226	UG	UGANDA
233	UV	BURKINA FASO
250	CG	CONGO, DEM. R.
251	ZA	ZAMBIA
174	PO	MADEIRA

\*\* An area in the western part of Sahara

#### Central America

8	AC	ANTIGUA AND BARBUDA
12	BF	BAHAMAS
14	BB	BARBADOS
23	BH	BELIZE
239	VI	BR VIRGIN ISLANDS
36	CJ	CAYMAN IS
48	CS	COSTA RICA
49	CU	CUBA
55	DO	DOMINICA
56	DR	DOMINICAN REPUBLIC
60	ES	EL SALVADOR
86	GJ	GRENADA
87	GP	GUADELOUPE
89	GT	GUATEMALA
93	HA	HAITI
95	HO	HONDURAS
109	JM	JAMAICA
135	MB	MARTINIQUE
138	MX	MEXICO
142	MH	MONTSERRAT
151	NA	NETHERLANDS ANTILLES
157	NU	NICARAGUA
166	PM	PANAMA
177	RQ	PUERTO RICO
188	SC	ST KITTS AND NEVIS
189	ST	ST LUCIA
191	SV	ST VINCENT AND THE GRENADINES
220	TD	TRINIDAD AND TOBAGO
224	TK	TURKS AND CAICOS
240	VQ	US VIRGIN ISLANDS

#### South America

9	AR	ARGENTINA
19	BL	BOLIVIA
21	BR	BRAZIL
40	CI	CHILE
44	CO	COLOMBIA
58	EC	ECUADOR
65	FA	FALKLAND ISLANDS (MALVINAS)
69	FG	FRENCH GUIANA
91	GY	GUYANA
169	PA	PARAGUAY
170	PE	PERU
207	NS	SURINAME
234	UY	URUGUAY
236	VE	VENEZUELA

#### North America

33	CA	CANADA
85	GL	GREENLAND
231	US	UNITED STATES OF AMERICA

#### South East Asia

26	BX	BRUNEI
115	CB	CAMBODIA
176	EA	EAST TIMOR
66	FJ	FIJI
101	ID	INDONESIA
120	LA	LAOS
131	MY	MALAYSIA
28	BM	MYANMAR
153	NC	NEW CALEDONIA
168	PP	PAPUA NEW GUINEA
171	RP	PHILIPPINES
244	SS	SAMOA
200	SN	SINGAPORE
25	BP	SOLOMON ISLANDS
216	TH	THAILAND
219	TN	TONGA
155	NH	VANUATU
237	VM	VIETNAM

#### Australasia

10	AS	AUSTRALIA
156	NZ	NEW ZEALAND

#### Near East, Far East

2	AF	AFGHANISTAN
13	BA	BAHRAIN
16	BG	BANGLADESH
18	BT	BUTHAN
41	CH	CHINA
50	CY	CYPRUS
76	GZ	GAZA
96	HK	HONG KONG
100	IN	INDIA
102	IR	IRAN
103	IZ	IRAQ
105	IS	ISRAEL
110	JA	JAPAN
112	JO	JORDAN
116	KN	KOREA DE.PEOPLE'S REP.
117	KS	KOREA REPUBLIC OF
118	KU	KUWAIT
121	LE	LEBANON
141	MG	MONGOLIA
149	NP	NEPAL
221	MU	OMAN
165	PK	PAKISTAN
179	QA	QATAR
194	SA	SAUDI ARABIA
38	CE	SRI LANKA
212	SY	SYRIA
225	TC	UNITED ARAB EMIRATES
246	YE	YEMEN

D1: Discrepancy in borders between Jordan and Israel, corresponding to Jerusalem, West Bank and Noman's Land (989, 994 and 990 area codes).

D2: Discrepancy in borders between Syria and Israel, corresponding to Golan (987 area code).

D3: Neutral Zone (between Saudi Arabia and Iraq, 993 area code).

D4-D5: Parts of Kashmir under Pakistan and India administration respectively (992 and 999 area codes).

D6: Aksai Chin and small pockets of land further south along the China - India border (996 area code).

Data on Sikkim are included with India. Data for China include those for Taiwan province of China. Data on Cyprus in all instances refer to the whole island.

Europe and West of the Urals

3	AL	ALBANIA
6	AN	ANDORRA

308	AM	ARMENIA
11	AU	AUSTRIA
309	AZ	AZERBAIJAN
306	WH	BALARUS
15	BE	BELGIUM
320	YB	BOSNIA-HERZEGOVINA
27	BU	BULGARIA
318	YC	CROATIA
51	CZ	CZECH REPUBLIC
510	ZC	SLOVAK REPUBLIC
54	DA	DENMARK
300	EO	ESTONIA
64	FO	FAEROE ISLANDS
321	YR	FEDERAL REPUBLIC OF YUGOSLAVIA
67	FI	FINLAND
68	FR	FRANCE
307	GO	GEORGIA
78	GE	GERMANY
82	GI	GIBRALTAR
84	GR	GREECE
97	HU	HUNGARY
99	IC	ICELAND
104	ER	IRELAND
106	IT	ITALY
301	LV	LATVIA
125	LS	LIECHTENSTEIN
302	LN	LITHUANIA
991	LU	LUXEMBOURG
324	YD	MACEDONIA
134	MT	MALTA
304	MV	MOLDOVA
150	NL	NETHERLANDS
162	NO	NORWAY
173	PL	POLAND
174	PO	PORTUGAL
304	MV	REPUBLIC OF MOLDOVA
183	RO	ROMANIA
228	UR	RUSSIAN FEDERATION
317	YL	SLOVENIA
203	SP	SPAIN
210	SW	SWEDEN
211	SZ	SWITZERLAND
223	TU	TURKEY
305	UC	UKRAINA
229	UK	UNITED KINGDOM

Data for the area of former Yugoslavia reflect the UN 1992 situation.

Central and North East Asia

228	UR	RUSSIAN FEDERATION
312	KZ	KAZAKHSTAN
314	KG	KYRGYZSTAN
311	TM	TURKMENISTAN
313	TA	TAJIKISTAN
310	UZ	UZBEKISTAN

#### Information on Numeric Area Code

The two-letter code is ad hoc and does not conform to other conventions such as the ISO 2-letter code. The numeric code largely follows the FAO-ESS code, which is used for statistical databases provided by FAO and which will be used throughout WAICENT, FAO's World Agricultural Information Centre. Differences, which will be eliminated in so far as possible in further versions of the Digitized Soil Map of the World, are listed below:

Africa: Ethiopia - code 62 refers to the former Ethiopia PDR which included the area of Eritrea. The code for Ethiopia will be 238.

Eritrea - code 511, will be 178

An area in the western part of the Sahara - code \*\*, will be 205

Europe: Czech Republic - code 51 refers to the former Czechoslovakia. The code for the Czech republic will be 167.

Slovak Republic - code 510 will be : Slovakia 199

Europe and Central + North East Asia:

Russian Federation - code 228 refers to the former Soviet Union. The code for the Russian Federation will be 185.

All codes in the list larger than 299 will be changed in accordance with the FAO-ESS codes. These, and a comparison with ISO and UN codes, are given in Annex 4 of UNEP/ISSS/ISRIC/FAO 1993.

If new or additional numerical codes are needed (for example for a new country or area), or for any queries, please contact Statistics Division (ESS), User Services Food and Agriculture Organization of the United Nations Via delle Terme di Caracalla 00100 Rome, Italy FAX No: +39.06.57053152 or +39.06.57055155

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