



eSoTer Project  
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SoTerML: Soil and Terrain Markup Language

# Annexe C: Matching SOTER database to SoTerML Attribute Patterns

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The following table shows how to implement SoTerML codes corresponding to each soil attributes in legacy databases, particularly those documented in SOTER database.

Table in SOTER	Attribute	Case applied in SoTerML (*)	How to implement the attribute in SoTerML (**)
<b>TERRAIN</b>			
	1 ISO country code*	4b	<SoTerUnit>...<attribute> <name>ISOCountryCode</name>...
	2 SOTER unit_ID *	1	<SoTerUnit><SoTerUnitID> <gco:CharacterString>...</gco:CharacterString> </SoTerUnitID>
	3 year of data collection	4a	<SoTerUnit>...<attribute> <name>yearOfDataCollection">...
	4 map_ID	1	<SoTerUnit>...<SourceMap mapID> <gco:CharacterString>...</gco:CharacterString> </SourceMapID>...
	5 minimum elevation	4a	<SoTerUnit>...<attribute> <name>minimumElevation</name>...
	6 maximum elevation	4a	<SoTerUnit>...<attribute> <name>maximumElevation</name>...
	7 median elevation	4a	<SoTerUnit>...<attribute>< name>medianElevation</name>...
	8 median slope	4a	<SoTerUnit>...<attribute> <name>medianSlop</name>...
	9 relief intensity	4a	<SoTerUnit>...<attribute> <name>releifeIntensity</name>...
	10 potential drainage density	4a	<SoTerUnit>...<attribute> <name>potentialDrainageDensity</name>...
	11 major landform	4b	<SoTerUnit>...<attribute> <name>majorLandform</name>...
	12 slope class	4b	<SoTerUnit>...<attribute> <name>slopeClass</name>...
	13 hypsometry	4b	<SoTerUnit>...<attribute> <name>hypsometry</name>...
	14 dominant parent material	4b	<SoTerUnit>...<dominantParentMaterial>...<attribute> <name>parentMaterial</name>...
	15 permanent water surface	4a	<SoTerUnit>...<attribute> <name>permanentWaterSurface</name>...
<b>TERRAIN COMPONENT</b>			
	16 SOTER unit_ID	2	-
	17 terrain component number	1	<terrainComponent> ...<terrainComponentNumber>

		<gco:Integer>...</gco:Integer>
18 proportions SOTER unit	3	<terrainComponent>... <proportion>...</proportion> ...
19 terrain component data_ID	2	-
<b>TERRAIN COMPONENT DATA</b>		
20 terrain component data_ID	2	-
21 dominant slope	4a	<terrainComponent>... ...<attribute><name>dominantSlope</name>...
22 length of slope	4a	<terrainComponent>... ...<attribute><name>lengthOfSlope</name>...
23 form of slope	4a	<terrainComponent>... ...<attribute><name>formOfSlope</name>...
24 texture of non-consolidated parent material	4b	<terrainComponent>... ...<attribute><name>textureOfNonCosolidatedParentMaterial</name>...
25 parent material	4b	<terrainComponent>... ...<parentMaterial>...<attribute><name>parentMaterial</name>...
26 depth to bedrock	4a	<terrainComponent>... ...<attribute><name>depthOfBedrock</name>...
27 surface drainage	4b	<terrainComponent>... ...<attribute><name>surfaceDrainage</name>...
28 depth to groundwater	4a	<terrainComponent>... ...<attribute><name>depthOfGroundWater</name>...
29 frequency of flooding	4a	<terrainComponent>... ...<attribute><name>frequencyOfFlooding</name>...
30 start of flooding	4c	<terrainComponent>... ...<attribute><name>startOfFlooding"> <attribute><name>startingMonth</name>...
31 duration of flooding	4a	<terrainComponent>... ...<attribute><name>durationOfFlooding</name>...
<b>SOIL COMPONENT</b>		
32 SOTER unit_ID	2	-
33 terrain component number	2	-
34 soil component number	1	<soilComponent> <soilComponentNumber> <gco:Integer>...</gco:Integer> </soilComponentNumber> ...
35 proportion of SOTER unit	3	<soilComponent> ...<proportion>...</proportion>

36 WRB legend	4a	...<soilComponent>...<attribute><name>WRBLegend</name>...
37 phase	4a	<soilComponent> ...<attribute><name>phase</name>...
38 Revised legend (FAO'88)	4a	<soilComponent> ...<attribute><name>revisedLegend</name>...
39 textural class of the topsoil	4b	<soilComponent> ...<attribute><name>texturalClassOfTheTopsoil</name>...
40 profile_ID	2	-
41 position in terrain component	4b	<soilComponent> ...<attribute><name>positionInTerrainComponent</name>...
42 surface rockiness	4b	<soilComponent> <attribute><name>surfaceRockiness</name>...
43 surface stoniness	4b	<soilComponent> <attribute><name>surfaceStoniness</name>...
44 types of erosion/deposition	4b	<soilComponent> <attribute><name>typeOfErosionDeposition</name>...
45 area affected	4b	<soilComponent> <attribute><name>areaAffected</name>...
46 degree of erosion	4b	<soilComponent> <attribute><name>degreeOfErosion</name>...
47 sensitivity to capping	4b	<soilComponent> <attribute><name>sensitivityToCapping</name>...
48 rootable depth	4b	<soilComponent> <attribute><name>rootableDepth</name>...

#### ADDITIONAL SOIL PROFILES

49 ISO country code	2	-
50 SOTER unit_ID	2	-
51 terrain component number	2	-
52 soil component number	2	-
53 profile_ID	2	-

#### SOIL PROFILES

54 profile_ID	1	<profile>...<profileID> <gco:Integer>...</gco:Integer> </profileID>...
55 profile database_ID	2	-
56 profile description status	4b	<profile>... <attribute><name>profileDescriptionStatus</name>...
57 sampling date	4a	<profile>... <attribute><name>samplingDate</name>...
58 lab_ID	2	-
59 latitude	3	<profile>...
60 longitude	3	<point>

		<pre>&lt;gml:srsName&gt;...&lt;/gml:srsName&gt; &lt;gml:pos&gt;... ..&lt;/gml:pos&gt; &lt;/point&gt;...</pre>
61 profile location status	4b	<pre>&lt;profile&gt;... &lt;attribute&gt;&lt;name&gt;profileLocationStatus&lt;/name&gt;...</pre>
62 elevation	3	Implemented as the third dimension of <gml:pos> in item 61 above.
63 land use at profile location	4b	<pre>&lt;profile&gt;...&lt;attribute&gt; &lt;name&gt;landuseAtProfileLocation&lt;/name&gt;...</pre>
64 vegetation at profile location	4b	<pre>&lt;profile&gt;... &lt;attribute&gt;&lt;name&gt;vegetationAtProfileLocation&lt;/name&gt;...</pre>
65 parent material of profile	4b	<pre>&lt;profile&gt;... &lt;parentMaterial&gt; &lt;attribute&gt;&lt;name&gt;samplingDate&lt;/name&gt;...</pre>
66 drainage	4b	<pre>&lt;profile&gt;... &lt;attribute&gt;&lt;name&gt;drainage&lt;/name&gt;...</pre>
67 RSG qualifiers WRB'06	3	<pre>&lt;profile&gt;...&lt;soilClassification&gt; &lt;WRB2006&gt; &lt;rsg&gt;...&lt;/rsg&gt; &lt;qualifier&gt; &lt;position&gt;prefix suffix&lt;/position&gt; &lt;specifier&gt;...&lt;/specifier&gt; &lt;name&gt;...&lt;/name&gt;</pre>
68 specifiers	3	<pre>&lt;profile&gt;...&lt;soilClassification&gt; &lt;FAORevisedLegend1998&gt; &lt;soilUnit&gt;...&lt;/soilUnit&gt;</pre>
69 Revised legend (FAO'88)	3	Not Implemented
70 national classification	3	Not implemented
71 Soil Taxonomy	3	Not implemented
72 ST version	1	Not implemented
<b>HORIZON</b>		
73 profile_ID	2	-
74 horizon number	2	-
75 diagnostic horizon	4b	<pre>&lt;horizon&gt;... &lt;attribute&gt;&lt;name&gt;samplingDate&lt;/name&gt;...</pre>
76 diagnostic property	4b	<pre>&lt;horizon&gt;... &lt;attribute&gt;&lt;name&gt;diagnosticProperty&lt;/name&gt;...</pre>
77 diagnostic material	4b	<pre>&lt;horizon&gt;... &lt;attribute&gt;&lt;name&gt;diagnosticMaterial&lt;/name&gt;...</pre>
78 horizon designation (master horizon + subordinate characteristics)	4c	<pre>&lt;horizon&gt;... &lt;attribute&gt;&lt;name&gt;horizonDesignation&lt;/name&gt; &lt;attribute&gt;&lt;name&gt;masterHorizon&lt;/name&gt; ...&lt;/attribute&gt; &lt;attribute&gt;&lt;name&gt;subordinateCharacteristics&lt;/name&gt; ...&lt;/attribute&gt;</pre>

79 upper horizon boundary	4a	<horizon>...<attribute> <name>upperHorizonBoundary</name>...
80 lower horizon boundary	4a	<horizon>...<attribute> <name>lowerHorizonBoundary</name>...
81 distinctness of transition	4b	<horizon>...<attribute> <name>distinctnessOfTransition</name>...
82 moist colour Munsell	4c	<horizon>... <attribute><name>moistColour</name> <attribute><name>hue</name>...</attribute> <attribute><name>value</name>...</attribute> <attribute><name>chroma</name>...</attribute>
83 dry colour Munsell	4c	<horizon>... <attribute><name>dryColour</name> <attribute><name>hue</name>...</attribute> <attribute><name>value</name>...</attribute> <attribute><name>chroma</name>...</attribute>
84 colour of mottles Munsell	4c	<horizon>... <attribute><name>colourOfMottles</name> <attribute><name>hueM</name>...</attribute> <attribute><name>value</name>...</attribute> <attribute><name>chroma</name>...</attribute>
85 abundance of mottles	4b	<horizon>...<attribute> <name>abundanceOfMottles</name>...
86 size of mottles	4b	<horizon>...<attribute> <name>sizeOfMottles</name>...
87 grade of structure	4b	<horizon>...<attribute> <name>gradeOfStructure</name>...
88 size of structure elements	4b	<horizon>...<attribute> <name>sizeOfStructureElements</name>...
89 type of structure	4b	<horizon>...<attribute> <name>typeOfStructure</name>...
90 nature of mineral concretions	4b	<horizon>...<attribute> <name>natureOfMineralConcretions</name>...
91 abundance of mineral concretions	4b	<horizon>...<attribute> <name> abundanceOfMineralConcretions</name>...
92 size of mineral concretions	4b	<horizon>...<attribute> <name> sizeOfMineralConcretions</name>...
93 abundance of coarse fragments	4b	<horizon>...<attribute> <name> abundanceOfCoarseFragments</name>...
94 size of coarse fragments	4b	<horizon>...<attribute> <name> sizeOfCoarseFragments</name>...
95 very coarse sand	4a	<horizon>...<attribute> <name> veryCoarseSand</name>...
96 coarse sand	4a	<horizon>...<attribute> <name> coarseSand</name>...
97 medium sand	4a	<horizon>...<attribute>

		<name> mediumSand</name>...
98 fine sand	4a	<horizon>...<attribute> <name> fineSand</name>...
99 very fine sand	4a	<horizon>...<attribute> <name> veryFineSand</name>...
100 total sand	4a	<horizon>...<attribute> <name> totalSand</name>...
101 silt	4a	<horizon>...<attribute> <name> silt</name>...
102 clay	4a	<horizon>...<attribute> <name> clay</name>...
103 particle size class	4b	<horizon>...<attribute> <name> particleSizeClass</name>...
104 bulk density	4a	<horizon>...<attribute> <name> bulkDensity</name>...
105 soil moisture various tensions	4c	<horizon>...<attribute> <name>moisturePerTension</name> <attribute><name>tension</name> <attribute><name>moisture</name> ...</attribute> <value>...</value> </attribute> [repeat as necessary]
106 electrical conductivity	4a	<horizon>...<attribute> <name>EC</name>...
107 pH H2O	4a	<horizon>...<attribute> <name> pHH2O</name>...
108 pH KCl	4a	<horizon>...<attribute> <name> pHKCl</name>...
109 pH-CaCl2	4a	<horizon>...<attribute> <name> pHCaCl2</name>...
110 EC of saturation extract	4a	<horizon>...<attribute> <name> ECE</name>...
111 soluble Na+	4a	<horizon>...<attribute> <name> solubleNa</name>...
112 soluble Ca++	4a	<horizon>...<attribute> <name> solubleCa</name>...
113 soluble Mg++	4a	<horizon>...<attribute> <name> solubleMg</name>...
114 soluble K+	4a	<horizon>...<attribute> <name> solubleK</name>...
115 soluble Cl-	4a	<horizon>...<attribute> <name> solubleCl</name>...
116 soluble SO4--	4a	<horizon>...<attribute> <name> solubleSO4</name>...
117 soluble HCO3-	4a	<horizon>...<attribute>

		<name> solubleHCO3</name>...
118 soluble CO3--	4a	<horizon>...<attribute> <name> solubleCO3</name>...
119 exchangeable Ca++	4a	<horizon>...<attribute> <name> exchangeableCa</name>...
120 exchangeable Mg++	4a	<horizon>...<attribute> <name> exchangeableMg</name>...
121 exchangeable Na+	4a	<horizon>...<attribute> <name> exchangeableNa</name>...
122 exchangeable K+	4a	<horizon>...<attribute> <name> exchangeableK</name>...
123 exchangeable Al+++	4a	<horizon>...<attribute> <name> exchangeableAl</name>...
124 exchangeable acidity	4a	<horizon>...<attribute> <name> exchangeableAcidity</name>...
125 CEC soil	4a	<horizon>...<attribute> <name> exchangeableCECSoil</name>...
126 total carbonate equivalent	4a	<horizon>...<attribute> <name> totalCarbonateEquivalent</name>...
127 gypsum content	4a	<horizon>...<attribute> <name> gypsumContent</name>...
128 total carbon	4a	<horizon>...<attribute> <name> totalCarbon</name>...
129 organic carbon	4a	<horizon>...<attribute> <name> organicCarbon</name>...
130 total nitrogen	4a	<horizon>...<attribute> <name> totalNitrogen</name>...
131 P-available	4a	<horizon>...<attribute> <name> PAvailable</name>...
132 P-total	4a	<horizon>...<attribute> <name> PTotal</name>...
133 Phosphate retention	4a	<horizon>...<attribute> <name> phosphateRetension</name>...
134 Fe, dithionite extractable	4a	<horizon>...<attribute> <name> FeDithioniteExtractable</name>...
135 Al, oxalate extractable	4a	<horizon>...<attribute> <name> AlOxalateExtractable</name>...
136 Fe, oxalate extractable	4a	<horizon>...<attribute> <name> FeOxalateExtractable</name>...
137 clay mineralogy	4b	<horizon>...<attribute> <name> clayMinerology</name>...

**\* Case applied in SoTerML:**

- 1- The attributes is needed in SoTerML as derived directly from the SOTER database

- 2- The attributes is required for a relational database design, but are not necessarily required for the SoTerML structure.
- 3- The attributes can be automatically associated to or inherited from GeoSciML, or from Soil Classification classes, if the right classes are chosen for association/generalization in SoTerML data model.
- 4- The attributes is designed to be implemented using the *Attribute mechanism* in SoTerML. These attributes are themselves divided to three groups:
  - a. Numeric or literal: These attributes can accept a number or a literal string.
  - b. Enumerated: The values of these attributes must be one of a set of predefined values, like vegetation having a set of permitted values.
  - c. Sub-attributes: Some of the attributes are a container for some other sub-attributes of one of the two above groups, forming a recursive reference to other attributes.

\*\* "gco" namespace is referenced to <http://www.isotc211.org/2005/gco>