FAO-CSIC
Multilingual Soil Profile Database
(SDBm Plus)

For using in soil monitoring and evaluation systems

CSIC/IRNAS, Sevilla
FAO/AGLL, Rome

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Project co-ordinators:

D. de la Rosa, F. Mayol (CSIC/IRNAS, Sevilla, Spain)
J. Antoine (FAO/AGLL, Rome, Italy)

Main contributors:

F. Moreno, F. Cabrera, E. Diaz-Pereira, R. Cordón, I. Girón, V. Castillo, B. Hafidi
(CSIC/IRNAS, Sevilla, Spain)
R. Brinkman (FAO/AGLL, Rome, Italy)
J. Sanchez, J.C. Colomer (CSIC/CIDE, Valencia, Spain)
C. Simota (RISSA, Bucharest, Romania)
R. Horn, H. Fleige, N. Prange (KU, Kiel, Germany)

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Abstract

SDBm Plus: FAO-CSIC Multilingual Soil Profile Database is a derivative from the SDBm database (FAO-ISRIC-CSIC, World Soil Resources Reports 81, 1995) which has been developed by CSIC/IRNAS with the collaboration of FAO/AGLL through a joint project (Letter of Agreement PR 15621, 7.12.1999), during 1999 and 2000. The initial version of SDBm was the SDB database (FAO-ISRIC, World Soil Resources Reports 64, 1989). As its predecessors, **SDBm Plus** is an 'open' system which can be modified in the future.

SDBm Plus has been totally re-designed and re-written as a WINDOWS application. It is a user-friendly software designed to harmonise, store and use large amounts of geo-referenced soil profile data, elaborated in the field and the laboratory, in an efficient and systematic way. The soil profile database can be utilised regardless of scale, at regional, national or local level, in soil monitoring and evaluation (M&E). The main characteristics of this database are the following: **i**) software development for WINDOWS platforms; **ii**) multilingual function and automatic translation from English, as source language, to other target languages (so far Spanish, French and German); **iii**) detailed soil profile characterisation following the conventional procedures of soil survey, making use of 'assist menus' in the selected language which greatly facilitates data storage; **iv**) possibility of monitoring the temporal variability of analytical, physical and hydraulic soil properties; **v**) metabase facility to describe the methods used in the laboratory analysis; and **vi**) interface facility to automatize the linkage of soil data to computerised information systems.

The following soil data sets can be stored in the **SDBm Plus** database:

☐ **General information**. Characteristics of the site as well as the information related to the identification of the soil profile.

☐ **Horizon description**. Morphological data described by horizon which is stored along with the general information in a coded format following the **Guidelines for Soil Profile Descriptions** (FAO-ISRIC, 1990).

☐ **Standard analyses**. Conventional soil profile analytical results.

☐ **Soluble salts/Heavy metals**. Soluble salts and most trace elements present in the soil and considered as major soil contaminants.

☐ **Physical analyses**. General soil physical analytical results.

☐ **Water retention/Hydraulic conductivity**. Up to 25 determinations per soil sample of water content and hydraulic conductivity by different suctions.

☐ **Photographs**. Site, profile and other soil photographs.

☐ **Metadata**. Analytical methods and procedures used.

The **SDBm Plus** database includes the following set of conventional and special main functions:

- **File**. Input and edit screens which are provided with pop-up menus for entering data using selection bar. Import and export options are also included to access other SDB databases.

- **Codes**. Through a flexible coding system, the database translates morphological soil variables from English into the other alternative languages. The set of coded variables is also available in Spanish, French and German.

- **Content**. Current list of soil profile datasets already stored in the database. Each selected dataset may be viewed or printed. The printouts are identical to the conventional soil profile description. Analytical results can be graphed on the screen as XY presentations.

- **Search**. Fast and detailed selection facilities connected to the view, print and graphic, and evaluation options.

- **Customise**. De/activation data fields option allows for the specific restructuring of input data screens, thus offering the possibility of adjusting the database to specific national or local conditions.

- **Language**. The database can be used in English and other languages, as well as an automatic translation system. The set of labels and the coding system are already available in English, Spanish, French and German.

- **Evaluation**. Linkage between the database and land evaluation systems/geographic information systems (LES/GIS) through the use of a soil layer generator which elaborates model input files with average or dominant values of selected variables by soil unit, depth range and group of profiles. This option can make use not only of stored variables, but also of derived variables calculated using pedotransfer functions.

- **Help**. Help screens and on-screen instructions assist the user in running the system.

SDBm Plus has been basically developed with funding of the Spanish Ministry of Environment (MIMAM) through the SEIS.net project, Sistema Español de Informacion de Suelos sobre Internet, (De la Rosa et al., 2000). Also, important apportions were made by the SIDASS EU project (Horn et al., 1999).

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List of abbreviations

AEZ	Agro-Ecological Zoning
ASCII	American Standard Code for Information Interchange
AGLL	Land and Plant Nutrition Management Service
CD ROM	Compact Disk Read Only Memory
CEBAC	Centro de Edafología y Biología Aplicada del Cuarto
CEC	European Commission
CGIAR	Consultive Group on International Agricultural Research
CIDE	Centro de Investigacion sobre la Desertificacion
CSIC	Consejo Superior de Investigaciones Científicas
DBF	Database File
DPSIR	Drivers-Pressures-State-Impacts-Responses framework
EPAGRI	Empresa de Pesquisa Agropecuaria e Extensao Rural
ETDA	Ethylenediaminetetra-Acetic Acid
FAO	Food and Agriculture Organization of the United Nations
GIS	Geographic Information System
IBM	International Business Machines Corporation
IRNAS	Instituto de Recursos Naturales y Agrobiología de Sevilla
ISRIC	International Soil Reference and Information Centre
IUSS	International Union of Soil Science
KU	Kiel University
LES	Land Evaluation System
LRIS	Land Resources Information System
LUP	Land Use Planning
MB RAM	Mega Byte Random Access Memory
M&E	Monitoring and Evaluation
MicroLEIS	Microcomputer-based Land Evaluation Information System
MIMAM	Ministerio Español de Medio Ambiente
PTF	Pedotransfer functions
RISSA	Research Institute for Soil Science and Agrochemistry
SDB	Soil Database
SDBm	Multilingual Soil Database
SEIS.net	Sistema Español de Información de Suelos sobre Internet
SOTER	Soil and Terrain Database
TEA	Triethanolamine
TDR	Time Domain Reflectometry
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
USDA	United States Department of Agriculture
WB	World Bank
WRB	World Reference Base for Soil Resources
WWW	Worldwide Web

Soil variables
(See **Appendix A** and **E**)

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Chapter 1

Introduction

</div>

BACKGROUND

The increasing pressure on natural resources leads to the erosion, physical degradation and chemical pollution of these resources, along with a reduction of their productive capacity. Computerised land evaluation techniques are a correct way to predict land productivity and land degradation, and to assess the consequences of change. Natural resources databases, as part of a preliminary stage, facilitate and simplify such interpretative processes. These databases, which includes data on climate, soils, topography, land use and management practices, offer the opportunity to **i**) ensure standardised procedures, **ii**) allow rapid extension of analyses and interpretations from local to national, continental, regional or universal levels, and **iii**) enhance repeatability of analyses and results.

Over the last two decades and within the Agro-Ecological Zoning (AEZ) programme, development of computerised systems for inventory, evaluation and planning of land resources has been made by FAO, specially for use in developing countries (FAO, 1997). The purpose of zoning, as carried out for rural land use planning, is to separate areas with similar sets of potentials and constraints for development. AEZ defines zones on the basis of combination of soil, landform, climate and management characteristics, making a special application of the information technologies (LRIS; Antoine, 1994). For surveys of land resources, a physiographic approach is also recommended, which integrates landforms, soils and vegetation (SOTER; FAO, 1995). In collaboration with the United Nations Environment Programme (UNEP) and other national and international institutions, FAO has recently developed an improved framework for sustainable land resources development and management that address the evolving nature of integrated land management (FAO-UNEP, 1999).

In 1977, the Consejo Superior de Investigaciones Cientificas (CSIC) through its Instituto de Recursos Naturales y Agrobiología de Sevilla (IRNAS; formerly Centro de Edafología y Biología Aplicada del Cuarto, CEBAC) undertook the development of a computerised methodology for soil survey and land evaluation with special reference to the Mediterranean regions, which has crystallised into the MicroLEIS system. The current version of this system (MicroLEIS 2000; De la Rosa, 1999), as an integrated package, provides an orderly arrangement of rural resources data through spatial databases and land evaluation (quality/vulnerability assessment) models. In the last part of this version, the land evaluation rationale has been adapted to the conceptual DPSIR framework (D-Drivers, P-Pressures, S-State, I-Impacts and R-Responses) in order to assess not only soil degradation risks, but also the potential impact of soil degradation on crop productivity and the response of agricultural management on soil vulnerability.

The **SDBm Plus** database resulted from co-operation between both institutions above: FAO and CSIC. Such a database is a user-friendly microcomputer programme designed to store, manipulate and transfer large amounts of soil survey and monitoring data in an efficient and systematic way. Soil surveys generate large quantities of data from both field description and laboratory analysis. Commonly their potentials to generate useful information are exploited to only a minimal extent because of the data handling limitations of manual methods of analysis and the summary in written documents of voluminous data recorded in the field.

By enabling the storage and retrieval of soil profile data in a quick, efficient and systematic way, **SDBm Plus** can enhance the exploitation of soil survey data for various purposes. In particular, it can ease the flow of such data into computerised land evaluation systems (LES) and land resource based geographic information systems (GIS).

The **SDBm Plus: FAO-CSIC Multilingual Soil Profile Database** was developed by CSIC/IRNAS with the collaboration of FAO/AGLS through a joint project (Letter of Agreement PR 15621, 7.12.99). This new database draws on the SDBm database previously carried out by FAO, ISRIC and CSIC (World Soil Resources Reports 81, 1995). Its development was funded by the Spanish Ministry of Environment through the SEIS.net project: Sistema Español de Informacion de Suelos sobre Internet (De la Rosa et al., 2000). Also, important contributions were made by the SIDASS EU project (Horn et al., 1999), specially for developing the database-models interface included in the Main option: 'Evaluation'; along with the German translation of codes and labels.

The previous SDB versions has been applied to numerous projects and adopted by various institutions world-wide. Examples of SDBm practical applications include ongoing environmental renewal projects in Eastern Europe supported by the World Bank (WB). The system was used to record the condition of contaminated or depleted soils before and after land restoration and clean-up projects, and to guide assessment of project investment and follow-up actions. The system is also being used by the Consultive Group on International Agricultural Research (CGIAR) to facilitate technical research and development planning decisions on an international scale. For example, SDBm has helped to identify areas where a new crop variety should thrive.

As the original SDB version developed by FAO and ISRIC (World Soil Resources Reports 64, 1989) and the previous SDBm developed by FAO, ISRIC and CSIC (World Soil Resources Reports 81, 1995), **SDBm Plus** remains being an 'open' system under continuous development.

INSTALLATION

System requirements

The minimum software and hardware configuration required for **SDBm Plus** installation is the following:

- ☐ IBM compatible computer 486

- ☐ 16 MB RAM memory

- ☐ 10 MB free disk space

- ☐ Colour monitor

- ☐ Graphic adapter supporting 800 x 640 pixels screen resolution

- ☐ Microsoft mouse or other compatible pointing device

- ☐ MS WINDOWS 95.

It has to be noted that a faster processor based computer and/or more board memory are recommended if frequent use of the programme is to be expected.

SDBm Plus version 1.00 is distributed on CD ROM. Also, this software is available free of charge through the FAO/AGLS Internet site:

Http://www.fao.org/WAICENT/FaoInfo/Agricult/AGL/Aglhomep.htm

or the CSIC/IRNAS WWW MicroLEIS site:

Http://leu.irnase.csic.es

Set-up

The set-up procedure, by double clicking the *setup.exe* file, is a typical MS WINDOWS application set-up environment. After set-up a reboot of MS WINDOWS is recommended. A new icon will have been added in the programme manager.

The set-up function will copy the main files in the destination directory (/PROGRAM FILE/SDBMPLUS is the default directory).

The **SDBm Plus** directory structure is as follows:

```
/SDBMPLUS/
          /DATA
          /EXPORT
          /EVALUATION
          /LANGUAGES/
                    /ENGLISH
                    /SPANISH
                    /FRENCH
                    /GERMAN
```

The data files and field names are described in the **Appendix E**.

Uninstall

An uninstall option is available. Use standard 'add/remove programme' procedure on the WINDOWS Control Panel to uninstall **SDBm Plus**.

CONVERSION FROM PREVIOUS DATABASES

Two earlier versions of the **SDBm Plus** database can be used: SDB (1989) and SDBm (1995), since they have the same 'SDB coding system'. However, this new version is different in that it offers:

☐ Blocks of soil analytical variables that include new soil variables referred to heavy metals, water content and hydraulic conductivity.

☐ Time-referenced dimension for the analytical variables of any stored soil profile.

☐ The possibility to store soil photographs.

☐ More detailed information on metadata for analytical methods.

SDBm Plus includes a conversion procedure to turn the SDB-type inventory into a SDBm Plus-type inventory, which is detailed in the Import/Export sub-option of the Main option: 'File'. However, the MicroLEIS group (CSIC/IRNAS) can make this conversion upon reception of all SDB dbf files (compressed, zipped into one file). The MicroLEIS group would in this case check the conversion and manually perform some splits that can not be done automatically.

Chapter 2
Structure and configuration

VARIABLE TYPES

Stored variables

The **SDBm Plus** database contains information on geo-referenced individual soil profiles. A 'soil profile' is a vertical exposure of a superficial portion of the earth's crust that includes all the layers that have been pedogenically altered during the period of soil formation and also deeper layers that influenced pedogenesis. A 'soil profile' is considered as the vertical exposure of the horizons of a 'soil individual', and may be observed in a freshly dug pit, along a road bank, or in many other places (Soil Survey Staff, 1950).

As shown in **Figure 2.1** and detailed in **Appendix A**, the field and laboratory information on a soil profile is grouped into the following data blocks:

☐ *Block 1: General information*. Information on the characteristics of the profile site as well as the information related to its identification and classification.

☐ *Block 2: Soil horizon description*. Information on the soil morphological and other characteristics are described horizon by horizon.

☐ *Block 3: Standard analyses*. Information on the standard analysis results in the soil survey characterization studies.

☐ *Block 4: Soluble salts/Heavy metals*. Information on the most frequent soluble salts in the soil, which are interesting from agricultural point of view, and on the most important trace elements related to soil contamination

☐ *Block 5: Physical data*. Information on soil physical determinations which used to be input data for crop simulation models and land evaluation systems.

☐ *Block 6: Water retention/Hydraulic conductivity*. Information on detailed water economy in soil for specific use in mechanistic simulation modelling.

☐ *Block 7: Additional analytical variables*. A total of up to 10 specific soil characteristics, such as: soil cohesion, internal friction angle, preconsolidation stress, void-load relationship, etc.

☐ *Block 8: Photographs*. Digitized information on site, soil profile and other plates.

☐ *Block 9: Metadata*. Information on the procedures and methods followed for elaborating soil analysis data.
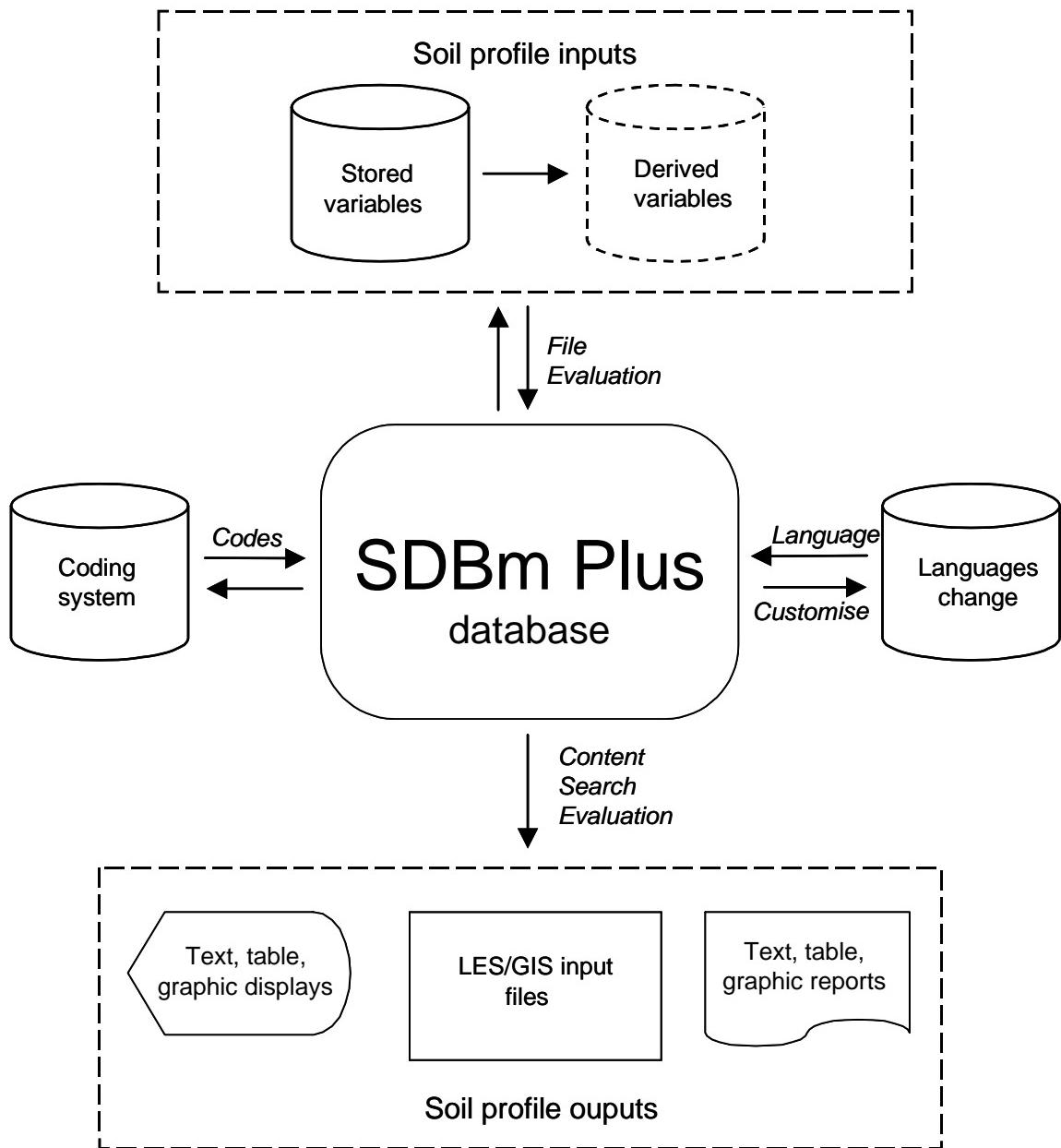
Figure 2.1 General scheme of the **SDBm Plus** database

The blocks should be seen as separate datasets which can be manipulated independently. For instance, for a certain soil profile, only the analytical results may be entered, updated, printed or selected. It is not important which data block is entered first, or in which order the soil profiles are entered in the data blocks.

Derived variables

A set of non-stored variables calculated by using pedotransfer functions through the evaluation interface facility is also considered by the **SDBm Plus** system. By using several approaches, soil mechanical and hydraulic properties, which are of difficult and time consuming determination, can be estimated from more readily-available, simple data obtained during soil surveys. This set of soil variables correspond to:

☐ ***Block 10: Derived variables***. Information calculated by pedotransfer functions.

DATA TYPE

As specified for each variable in **Appendix A**, the soil profile data stored in the **SDBm Plus** database are of the following types:

Coded data

General and horizon information is largely stored in a coded format according to the 'SDB coding system'. This system is flexible and is part of the database. It contains a set of default classes and codes; however, changes or additions can be made. See **Chapter 3** for more information on this subject.

Numerical data

Laboratory data are predominantly stored in a numerical format.

Text data

Text or descriptive data, such as remarks, are stored in exactly the same way as they are entered.

String data

Some variables are stored as a string of characters plus digits of limited size.

Binary data

Photographs are stored in JPEG format.

DATA ORGANISATION

In the **SDBm Plus** database the different datasets on soil profile are organized making use of the following data tables and connectors (**Figure 2.2**).   All the fields included in each of these tables are listed in **Appendix E**.

Profile code

The soil profile code, containing 6 digits (e.g. SE0123), is particularly important since it identifies the information in each block of data, links the data blocks and connects them to the actual horizon or sample.

Horizon number

A soil horizon in a soil profile is referenced by the horizon number (e.g. 1, 2, 3, etc.), although into the database it is referenced by the union of profile code plus horizon number. This one-to-many relationship means that several horizons belong to a single soil profile.

Sample code

A soil sample in a soil profile is referenced by the sample code (e.g. A, B, C, etc.). The analytical dataset maintains a one-to-many relationship with the general information through the profile code; likewise, a record is defined in the dataset by combining profile code and the sample code.
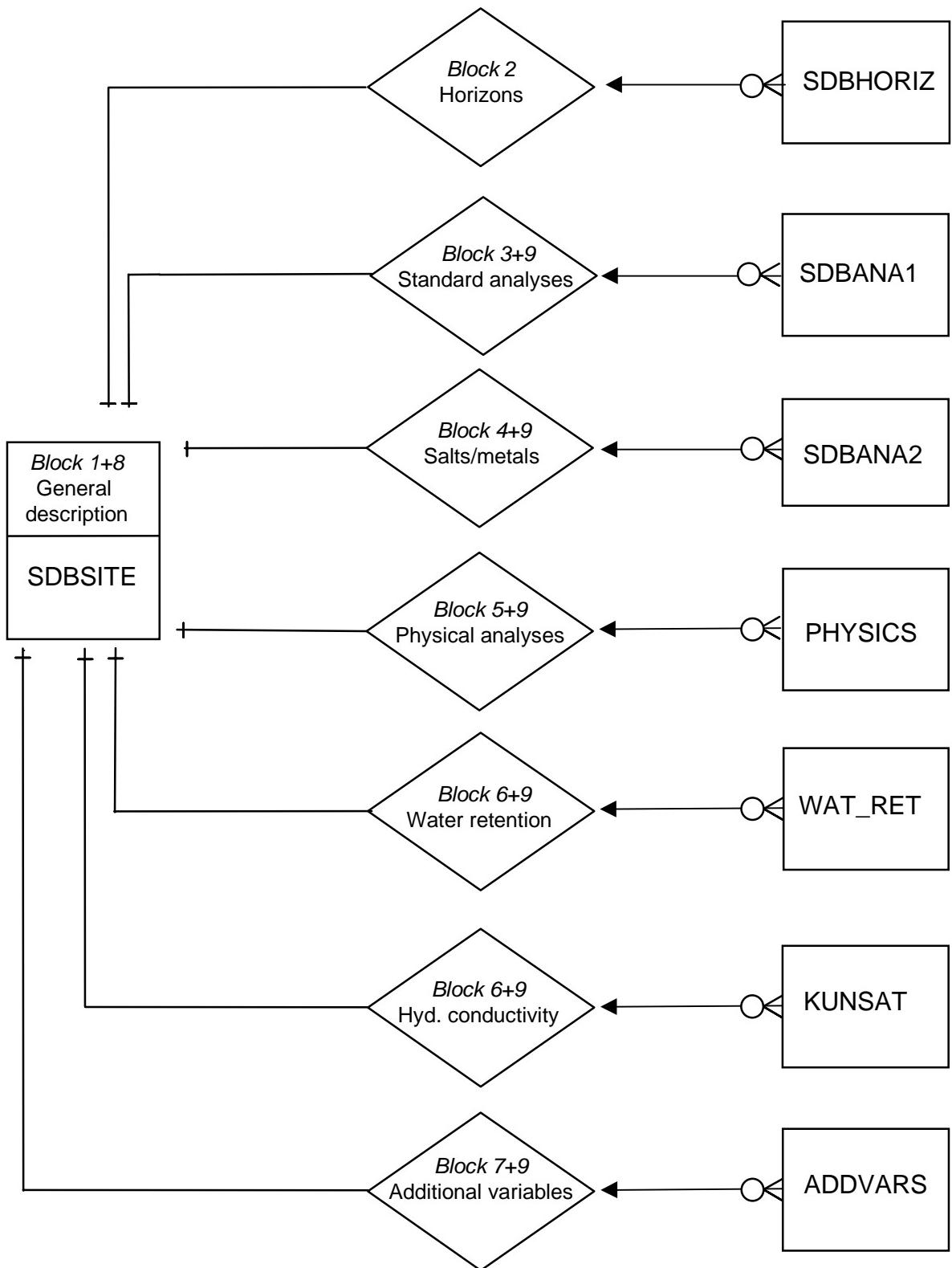
Figure 2.2 Structure of the **SDBm Plus** database tables

Date

Standard analyses, soluble salts and heavy metals, physical analyses, water content and hydraulic conductivity, and additional variables data all maintain a one-to-many relationship with the general information; but also, the designation of a sample is made through the combination of the profile code plus the sample code and plus the date when the determinations were performed (e.g. 10/01/2000). With this feature, the dataset also has a temporal reference.

Chapter 3

Software features

CONTROL FUNCTIONS

SDBm Plus is a standard WINDOWS application using the regular WINDOWS control functions. In addition, other helpful functions have been implemented, most of which are described in this chapter.

Menu controls

Figure 3.1 shows the software 'main menu' or start-up screen. *Mouse clicking* on any menu item on this screen opens a 'sub-menu' window or an a different screen. The *Down arrow* and *Up arrow* keys can be used to move through the sub-menu and the *Enter* key to activate the option highlighted.

Figure 3.1 SDBm Plus main menu screen

Common buttons

These buttons appear on several screens and fall within two categories:.

Navigation buttons. These buttons are on the top of the screen, and have well known graphic symbols. The functions of these buttons are the usual ones in databases:

New [+]   Delete [–]   Save [✓]   Cancel [✗]

First [I◄]   Prior [◄]   Next [►]   Last [►I]

Function buttons. These buttons are on the bottom of the screen and perform specific functions:

View	Print	Accept	Cancel	Help

Pop-up coding windows

These are combo boxes which appear as rectangular boxes containing a list of generalisation levels corresponding to the input coded variable marked by the selection cursor. There is a scroll bar on the right side, which scrolls the list as usual in WINDOWS.

These lists are arranged alphabetically by definition for the soil variables (**Appendix B**), and by code for the analytical metadata (**Appendix C**).

Help bars

Help windows provide additional on-screen information on the possible alternatives and data screen facilities to easily input and edit data.

DETAILED DESCRIPTION

Main menu

Upon entering the **SDBm Plus** database, a start-up window with logos and a 'main menu' appears on the top of the screen (**Figure 3.1**).

The following 'main options' are then visible:

☐ **'File'** – data manager which enables manipulation of data and files in the database.

☐ **'Codes'** – coding system which offers the classification and class codes of all the variables used in the soil profile description.

☐ **'Content'** – option which shows the list of soil profiles, or views or prints a selected soil profile description.

☐ **'Search'** – selection engine which searches soil profiles based on the presence of one or more variables with specified values.

☐ **'Customise'** – this option de/activates fields to facilitate and speed-up the data entry.

☐ **'Language'** – selects or creates a new working language.

☐ **'Evaluation'** – interface which allows the database to be utilised as a source of input data for land systems: GIS or LES models.

☐ **'Help'** – gives access to the user manual and to basic information about the programme.

Main option: 'File'

The database operations related to the entry and exit of soil data are made possible by this **SDBm Plus** main option.

Input/Edit/Delete

Input/Edit data

The ⊞ *button* is used to enter new profile descriptions and/or laboratory data into the database. The following set of input data screens appear one after the other:

☐ Block 1: General information screens (**Figure 3.2** and **3.3**)

☐ Block 2: Horizon description screen (**Figure 3.4**)

☐ Block 3: Standard analyses screen (**Figure 3.5**)

☐ Block 4: Soluble salts/heavy metals screen (**Figure 3.6**)

☐ Block 5: Physical analyses screen (**Figure 3.7**)

☐ Block 6: Water retention screen (**Figure 3.8**)

☐ Block 6: Hydraulic conductivity screen (**Figure 3.9**)

☐ Block 7: Additional variables screen (**Figure 3.10**)

☐ Block 8: Photographs screen (**Figure 3.11**)

Figure 3.2 Input data: soil profile general information (page 1) screen

Figura 3.3 Input data: soil profile general information (page 2) screen

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Figure 3.4 Input data: soil horizon description screen

Figure 3.5 Input data: soil standard analyses screen

Figure 3.6 Input data: soil soluble salts/heavy metals screen

Figure 3.7 Input data: soil physical analyses screen

Figure 3.8 Input data: soil water retention screen

Figure 3.9 Input data: soil hydraulic conductivity screen

Figure 3.10 Input data: soil additional variables screen

Figure 3.11 Input data: soil photographs screen

The metadata or method used for the analytical variables are entered on the same screen and after each analytical data.

The coded general and horizon information is entered according to the **SDBm Plus** coding system (**Appendix B**) and making use of the pop-up coding windows. Windows showing codes and definitions of the field on which the cursor is positioned can be opened from the input screen pressing the *F1* key or double clicking. In order to facilitate data entry tasks, normally tedious and slow, these tables of conversion, which are arranged alphabetically by definition, can be displayed for each coded variable. Codes are entered in the entry form using the selection bar to locate the desired definition and then pressing the *Enter* key.

Figure 3.12 shows an example of a pop-up window from the general information screen. This window shows a list of valid codes, and thus avoids checking the manual for the correct code to enter. Unknown codes (codes not included in the coding system) are not accepted during data entry. All coded information can be entered in both upper and lower cases. On screen, **SDBm Plus** automatically changes lower to upper case.

Each numerical information, basically an analytical variable, has a fixed number of decimals. The text information, such as site location and remarks, are stored exactly in the way it is entered.

Digitized photographic information is stored into the database through the menus that are shown after click the *Right mouse* button over the space reserved for the photograph.
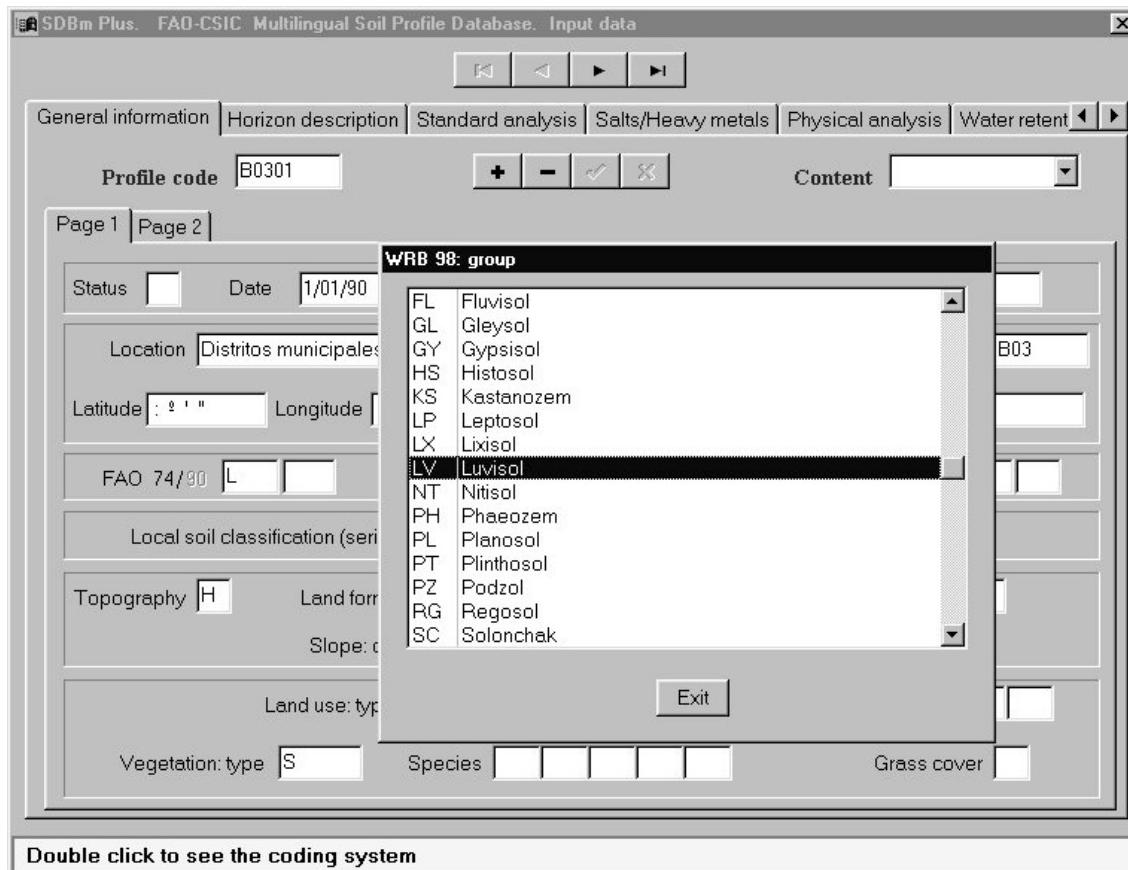
Figure 3.12 Pop-up window of the coding system

The options of these menus are *Load*, *Delete* and *Save* image. Clicking over *Load* option you will be able to select a photograph from a file in JPEG format; *Delete* option allows erase the photograph from the database; and *Save* option is used to store the image from the database to a JPEG file.

All data are entered for individual soil profiles. The soil profile is identified by its profile code. Invalid codes are not accepted. The profile codes are unique, i.e. it is not possible to enter duplicates: if a profile code that already exists is entered, an error message will appear on the screen.

Delete data

The ▬ *button* is used to remove all information stored under a particular soil profile code from the database. Before proceed to the deletion, **SDBm Plus** asks for confirmation.

SDBm Plus allows deletion of only part of the profile information stored. Upon selecting any of the existing profiles, it is possible to remove single horizons or analytical samples.

Methods used

In the **SDBm Plus** system, special attention is given to the harmonization of soil analytical measurement techniques among the different institutions. This sub-option intends to minimize the 'method-effect' on the class variability of the soil analytical properties.

Coded information on the methods used for the laboratory analysis should be entered under the heading 'Methods used' and should follow the same criteria used in coded soil variables (**Appendix C**).

Import/Export

Import data

This facility (**Figure 3.13**) is used to transfer information:

☐   From a previous SDBm database (**Chapter 1**)

☐   From other **SDBm Plus** databases.

Available data on a single soil profile or a series of profiles may be imported into the **SDBm Plus** database.

To import data from an older SDBm version, select the directory where the SDBm data file are sited, then choose the range of profiles to be imported writing the first and last profile codes, and finally indicate the language used to codified the original profiles.

To import data from **SDBm Plus**, select the directory where the export files are located clicking the *Directory* button, if the selected directory contains any export file, the screen will show the list of profiles contained into the files and will be shown the data blocks available in the profiles. Then, it will be able to select the range of profiles from the list and the data blocks to be imported.

All imported information on site/profile, soil analytical or physical properties is appended to the database. Existing data are overwritten.

Export data

For this sub-option (**Figure 3.14**), a series of stored soil profiles can be transferred from the **SDBm Plus** system.

The set of soil profiles to be exported, the groups of soil variables, and the export path, must be specified on the screen for each data export operation.
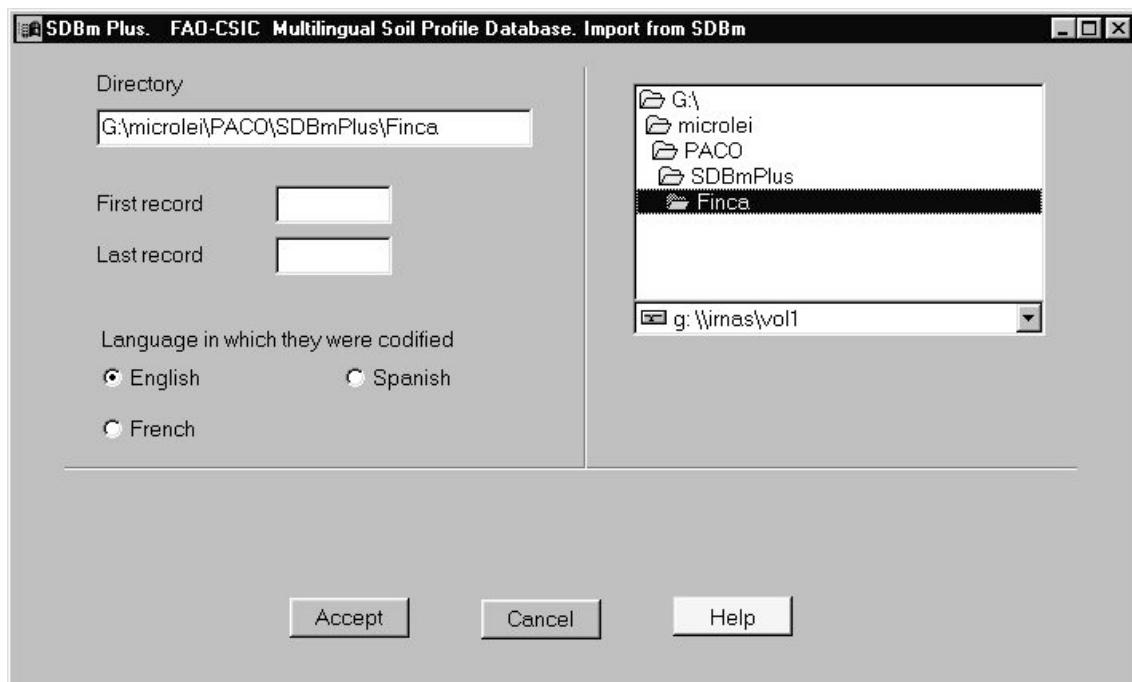
Figure 3.13 Import data screen
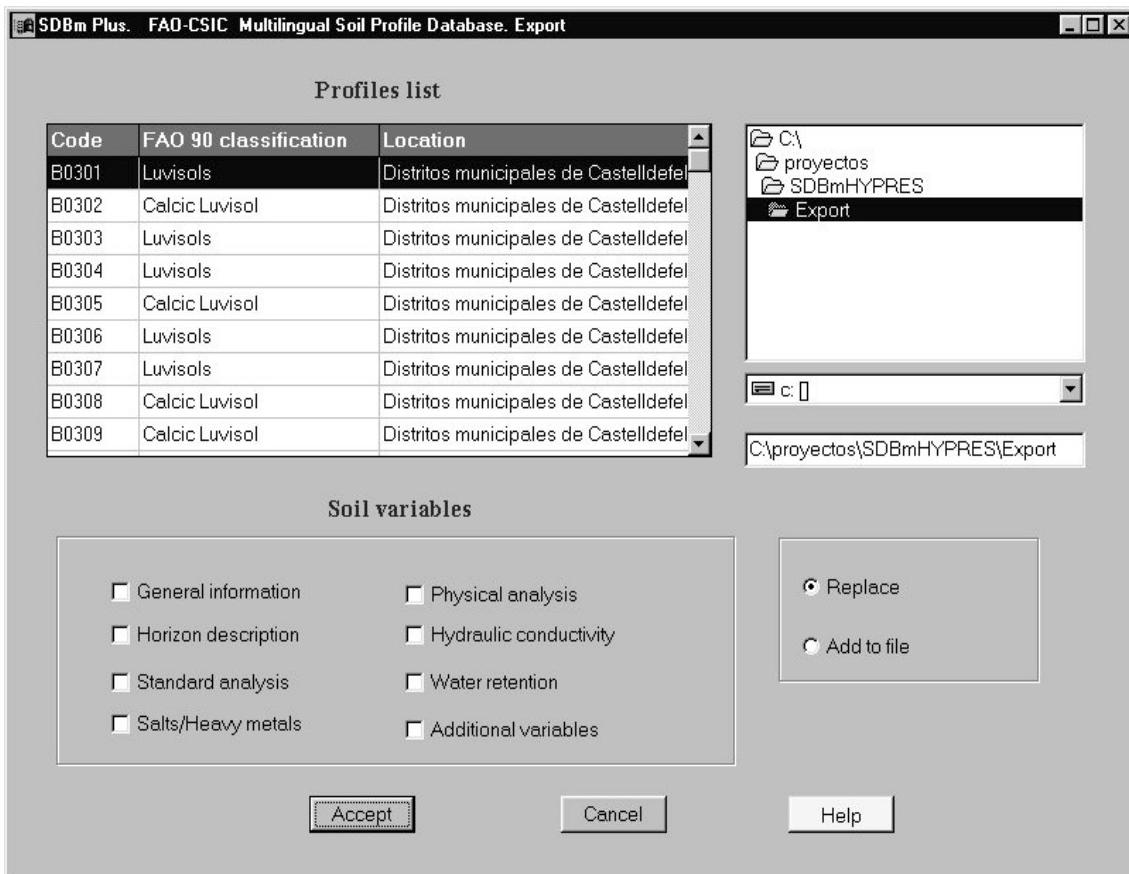
Figure 3.14 Export data screen

Backup/Restore

This option allows the user make backup copies into a file and restore them if any problem occurs.

Main option: 'Codes'

This **SDBm Plus** main option facilitates effective database management of most of the descriptive field data needed to be stored in a coded format. Storage of coded data and metadata reduces the size of the database, and what is equally important, it standardizes the descriptive data and thus allows for selection, comparison and validity control.

Data

The coding system gives the class codes and definitions of all the generalisation levels of each coded variable (**Appendix B**). This system recognizes the codes and the correspondent definitions for the variable groups:

☐   Block 1: General information (28 variables; 28 fields)

☐   Bock 2: Soil horizon description (12 variables; 77 fields)

The coding system, which forms an integral part of the **SDBm Plus** system and is stored in a number of conversion tables, is also used to develop the multilingual dimension of this database. As shown in **Figure 3.15** and **Appendix B**, the first field of the conversion table contains the code of each generalization level, whereas the following four contain the definition terms in the working languages: English, Spanish, French and German.

The coding system follows the "**Guidelines for Soil Profile Descriptions**" of FAO-ISRIC (1990). However, the classifications of the variables are not fixed. Each conversion table can be edited interactively. This means that codes can be added, definition terms can be changed, and codes and definitions can be removed from the classification of each variable. Consequently, the default **SDBm Plus** coding system for the site and horizon description can be enhanced and updated by the user.

The current coding system can be viewed or printed alphabetically by code as a **SDBm** output (**Chapter 4**).
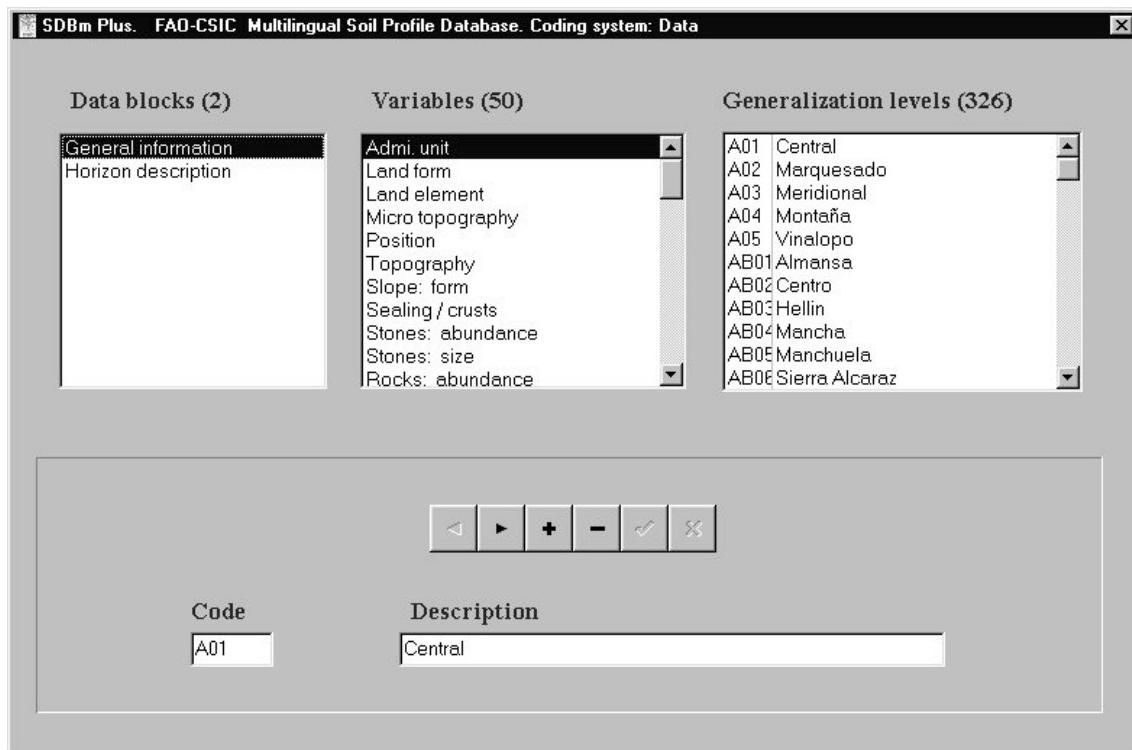
Figure 3.15 Coding system screen

Metadata

In the **SDBm Plus** system the coding system has also been extended to the metadata variables (**Appendix C**):

Block 9: Analytical metadata (32 variables)

following the same criteria used for data variables.

Main option: 'Content'

All the database contents can be visualized in different formats: text, photographic, tabular and graphic, using this **SDBm Plus** main option.

Soil profiles list

The current relation of soil profiles stored in the database is displayed on screen and may be printed (**Figure 3.16**; **Chapter 4**).   The total number of stored profiles appears on the top right corner.

Figure 3.16 Content screen

View/Print

Selecting from the previous list of stored soil profiles, this sub-option is used to view individual soil profiles on screen or to obtain printouts: standard morphological description, analytical data tables and graphics (**Chapter 4**). As well as a metadata report including every method used for the lab and field measurements.

Graphics

On the analytical data report, the button is shown under or next to the data column to be presented, clicking it the graph is shown in a separate window. This function calculates and displays the following graphic presentations:

☐ Vertical distribution of the analytical variables

☐ Suction vs. water content and hydraulic conductivity

In the vertical distribution, the x-axis shows the values of the variable examined and the y-axis the depth of the samples.

In the suction vs. hydraulic properties, up to 20 entries can be displayed.

This application, as screen display or printout, helps in the characterization of a soil profile and facilitates comparison with other soils (**Chapter 4**).

Statistics

From the soil profiles list, it is possible to see a summary statistical report of the data in this list. After select the analytical variables to be considered and clicking over the *Accept* button, a table with the following statistics is shown: number of soil samples (n), range (m, minimum value; and M, maximum value), standard deviation and coefficient of variation.

This application is very useful to make a first statistical analysis of the stored data (**Chapter 4**).

Metadata

On the report screen and by clicking over the *Metadata* button, it is possible to view the analytical method used for the determinations. Also, a report with the methods used in the analytical characterization of any soil profile can be printed (**Chapter 4**).

Main option: 'Search'

This **SDBm Plus** main option selects soil profiles based on the presence of one or

more variables with specified values.

Fast search

This procedure (**Figure 3.17**) should be used if the database is to be searched by one, or a combination of two, of the following key soil variables:

☐ Profile code: for instance profiles XXX000 to XXX100. Note that the lowest profile code should exist in the database, otherwise the procedure results in a no find.

☐ Soil classification: FAO 74 and 90, USDA 87 and 98, or/and WRB 98. Searches may be defined on a first and second level, and if needed, on a third level.

☐ Soil unit: selections of all soil profiles located in a particular soil unit.

☐ Profile status: selections according to the quality of the information stored.

☐ Administrative unit: searches according to the geographic administrative units where the soil profiles are located.

☐ Geographic coordinates: the database can be searched on any area defined by its coordinates. However, the area should be located in either the Eastern or Western hemisphere. Run two selection procedures if the area includes parts of both hemispheres.

This sub-option covers most of the ordinary selection requests in geo-referenced soil databases.
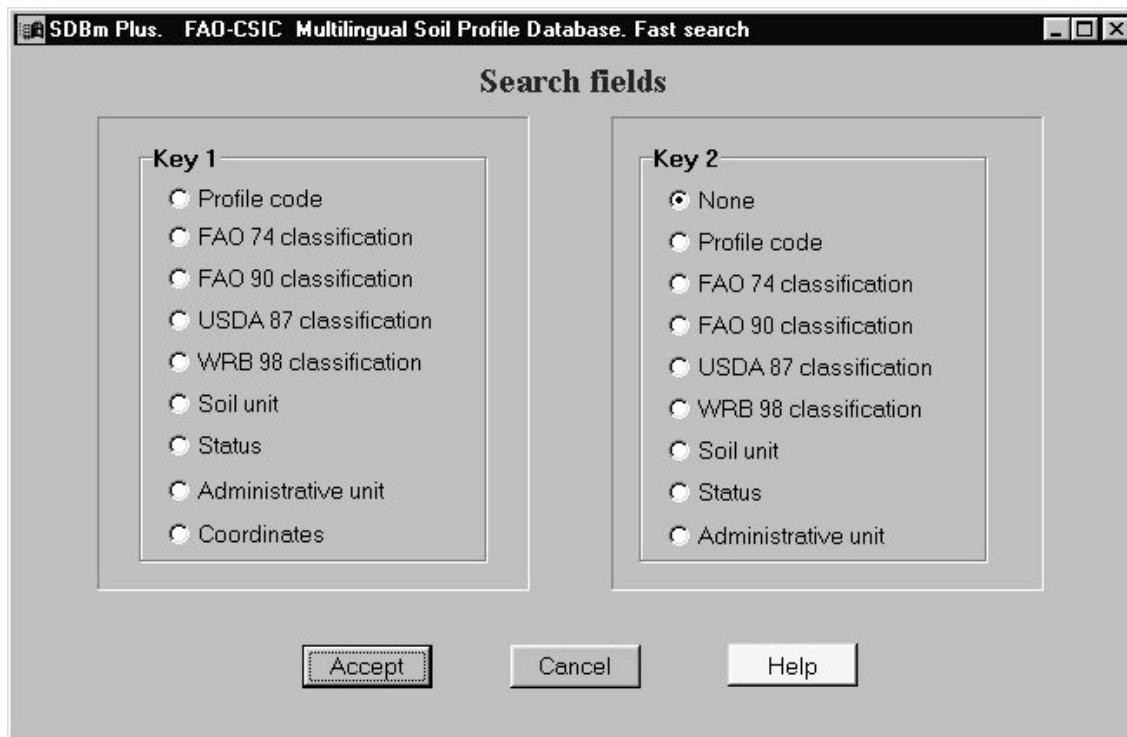
Figure 3.17 Fast search screen

Detailed search

This procedure (**Figure 3.18**) is used to select by virtually any field or laboratory characteristic, or combination of these. The key variables correspond to the following data blocks:

☐ Block 1: General information

☐ Block 2: Soil horizon description

☐ Block 3: Standard analyses

☐ Block 4: Soluble salts/Heavy metals

☐ Block 5: Physical data

☐ Block 6: Water retention/Hydraulic conductivity

☐ Block 7: Additional analytical variables

Appendix A lists potential key variables for each data block.

To do a search, select a data block, a variable of the data block double clicking, and then select a comparison operator from the list double clicking. Finally input the value of the variable into the box that will appear in the screen, strike the *Enter* key, and the search expression will be shown in the box for the expression. Simultaneously the number of selected profiles will be changed.

The user will be able to repeat this operation in order to refine the search. Furthermore, it is possible to return to the last state of the search clicking the *Undo* button.

Once the fast or detailed search operation is accepted, the search result is displayed on screen. The soil profiles that meet the selection criteria are listed alphabetically or numerically by codes. From this profile list, it is possible to continue through the options 'View/Print', 'Export' or 'Evaluation' checking the appropriate button.
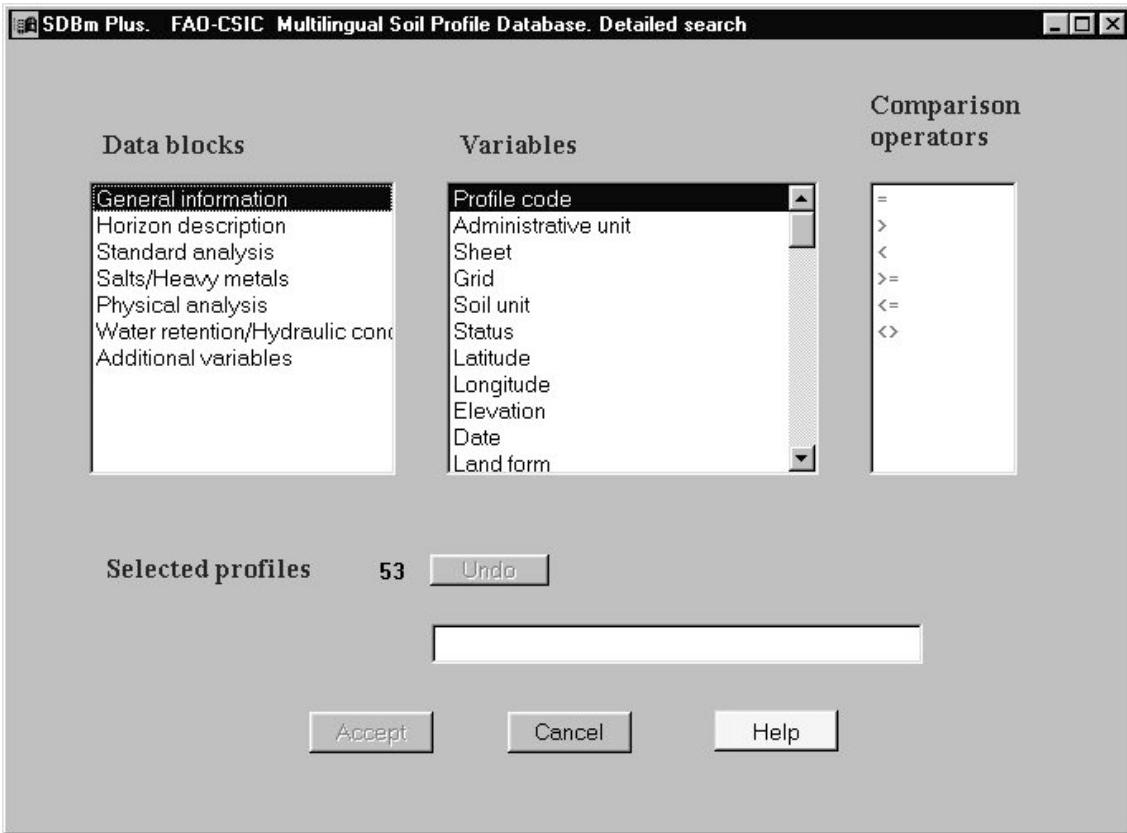
Figure 3.18 Detailed search screen

Main option: 'Customize'

This **SDBm Plus** main option tailors the database to the user needs.

Additional variables

In **SDBm Plus** up to ten 'blank' additional variables may be defined. These are shown in the Block 7: Additional analytical variables. This allows for the description of features which are not covered by the basic blocks, such as soil cohesion, internal friction angle, pre-consolidation stress, void-load relationship, etc.   These additional variable only contain numeric data.

These variables are defined by using the Main option: 'Language' (**Figure 3.19**), selecting the additional variable labels and introducing the new variable names in the same language.

Once the variables are activated they can be used as any other **SDBm Plus** variable. They may be printed, shown on data screens or used for selections.
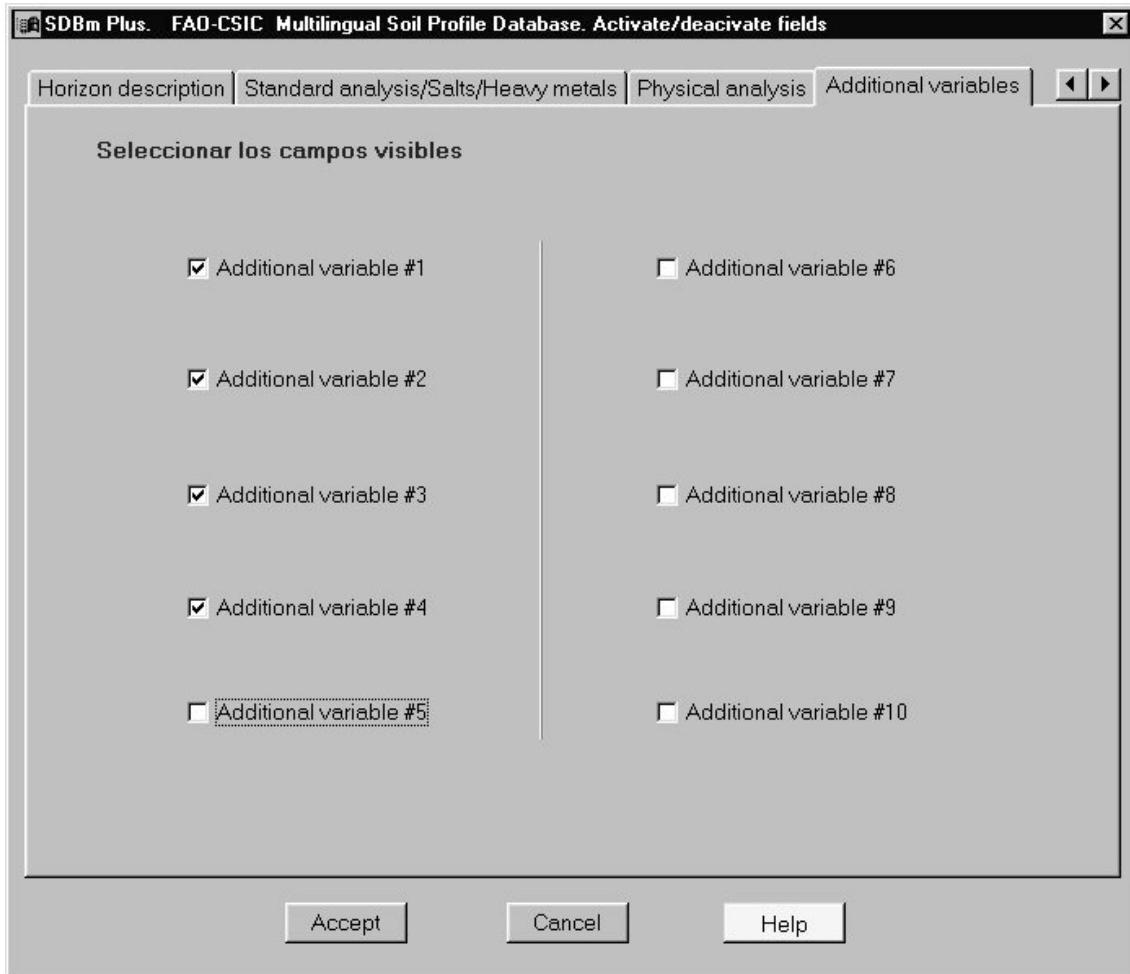
Figure 3.19 Additional variables screen

Deactivating fields

If not all the soil information available in **SDBm Plus** is to be entered, this function (**Figure 3.20**) allows to deactivate unnecessary fields. This makes data entry faster and easier. Deactivated fields will disappear from the 'Input/Edit/Delete' screens. The deactivation is permanent and it will be maintained until deactivated fields are re-activated by the user. Nevertheless, activation and deactivation do not compromise data previously entered.

The 'De/Activation' sub-option is possible with the following variable groups:

☐ Block 1: General description

☐ Block 2: Soil horizon description

☐ Block 3: Standard analyses

☐ Block 4: Soluble salts/Heavy metals

☐ Block 5: Physical data.

☐ Block 6: Water retention/Hydraulic conductivity

☐   Block 7: Additional variables.
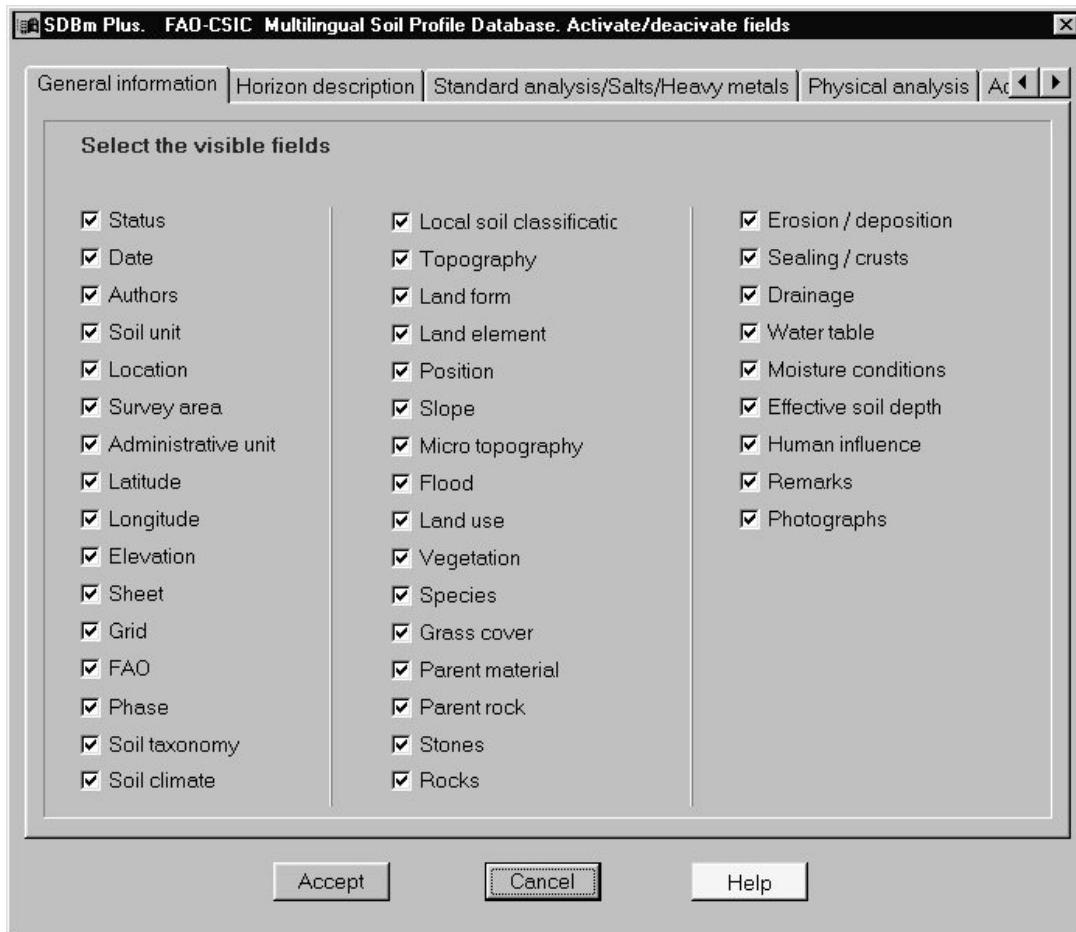
Figure 3.20 Deactivating fields screen

Main option: 'Language'

This **SDBm Plus** main option selects or creates a new working language. The default language used is English, and currently the database can also work in Spanish, French and German. The future software expansion is foreseen to include other languages.

In order to establish the grammatical rules for the sentences, specially in the horizon description, the language group: Romance (Spanish, French, etc.) or Germanic (English, German, etc.) must be specified for each new language. Upon selecting a different language, the program changes the memory variables to those of the new language selected.

Through the *Change language* option is possible to select a new language between the previously created languages.

To create a new language or change an existing one, select the *Edit/New language* sub-option. If the language is a new one, input the name of the language into the corresponding box. Then select the language group (Germanic or Romance). And finally translate the corresponding labels in the screen. After press the *Accept* button, the system will create a new folder into the *language* folder of the installation, containing the necessary files for the new language. The next time the user select the new language, he

will be using a copy of the coding system tables, this means that the next step to conclude the translation is to edit the coding system and change them for the new language.

Variables translation

As shown for the coding system (**Figure 3.15**), all the generalization levels presently defined for each coded soil variable can be translated into any other language maintaining the same codes. **Appendix B** includes these defined generalization levels, as translation tables (in English, Spanish, French and German).

Label translation

To develop a new working language in the **SDBm Plus** database, it is necessary to translate all the user interface labels (**Figure 3.21**). **Appendix D** includes, as translation tables (in English, Spanish, French and German), the labels needed for these four languages.
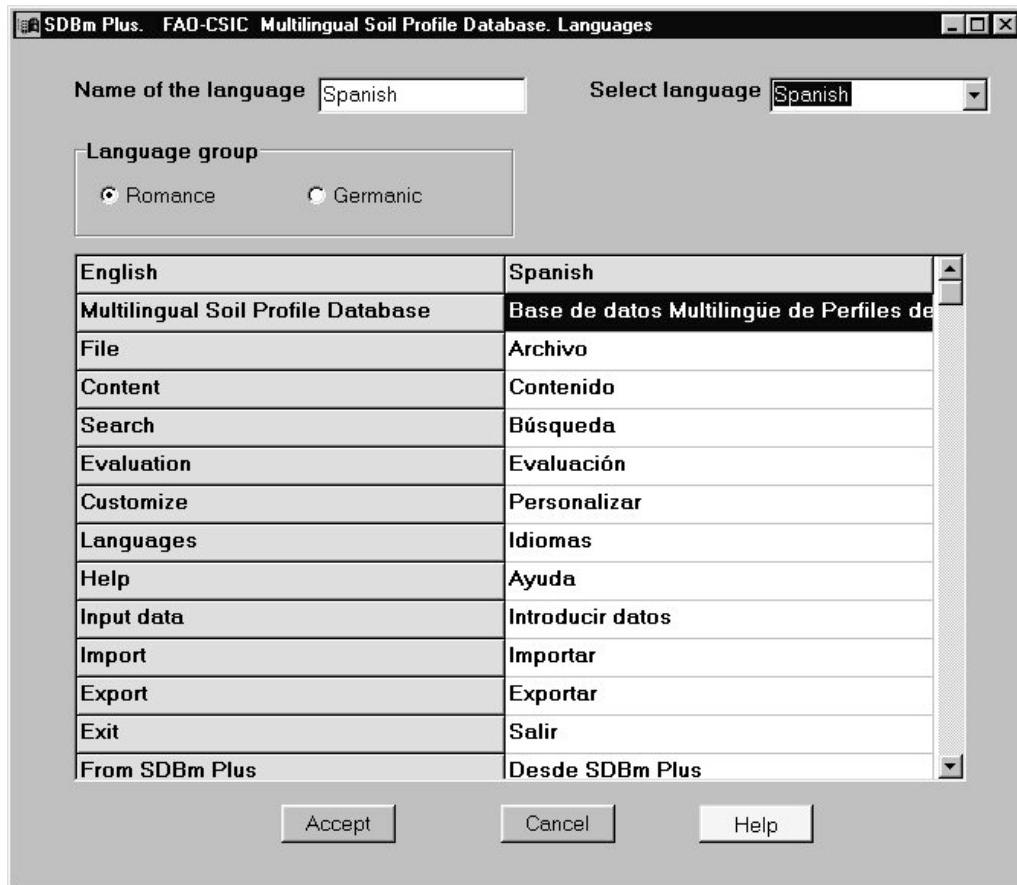
Figure 3.21 Labels translation screen

Main option: 'Evaluation'

This function allows **SDBm Plus** to be used as a data source for the automatic application of land evaluation systems or models (LESs) and of geographic information

systems (GISs). According to the Framework for Land Evaluation (FAO, 1976), a LES involves the interpretation of data concerning the physical environment, and past and present land use in terms of its resource potential. GISs are essentially databases which store and analyse a large amount of information in a spatial format. Both types of land systems, interpretation and spatialisation processes, are key tools to develop land use planning (LUP) approaches.

This main option offers the possibility to create LES/GIS input data files for a control section or layer within a profile or a group of profiles.

Derived variables

In order to enlarge the application possibilities of the Main option: 'Evaluation', a set of non-stored soil variables (Block 10: Derived variables) can be calculated by using pedotransfer functions. Pedotransfer functions relate costly and time-consuming soil determinations (e.g. mechanical or hydraulic properties) to more easily measured soil data such as soil texture, organic matter and/or other routinely determined by soil surveys. Hence, polynomial regression approaches can be formulated, specially for the estimation of soil mechanical and water properties from other stored soil variables in the database (e.g. De la Rosa, 1979; Simota and Mayr, 1996).

This sub-option (**Figure 3.22**) facilitates the formulation of regression pedotransfer functions in order to calculate dependent variables (Block 10: Derived variables), which will be used in the input file generator along with the basic variables stored. It uses the following variable groups as independent variables:

☐ Block 3: Standard analyses

☐ Block 5: Physical data

☐ Block 7: Additional variables

The dependent variable symbol is chosen by the user; and the symbols used for independent variable correspond to the field names in the database tables (**Appendix E**).
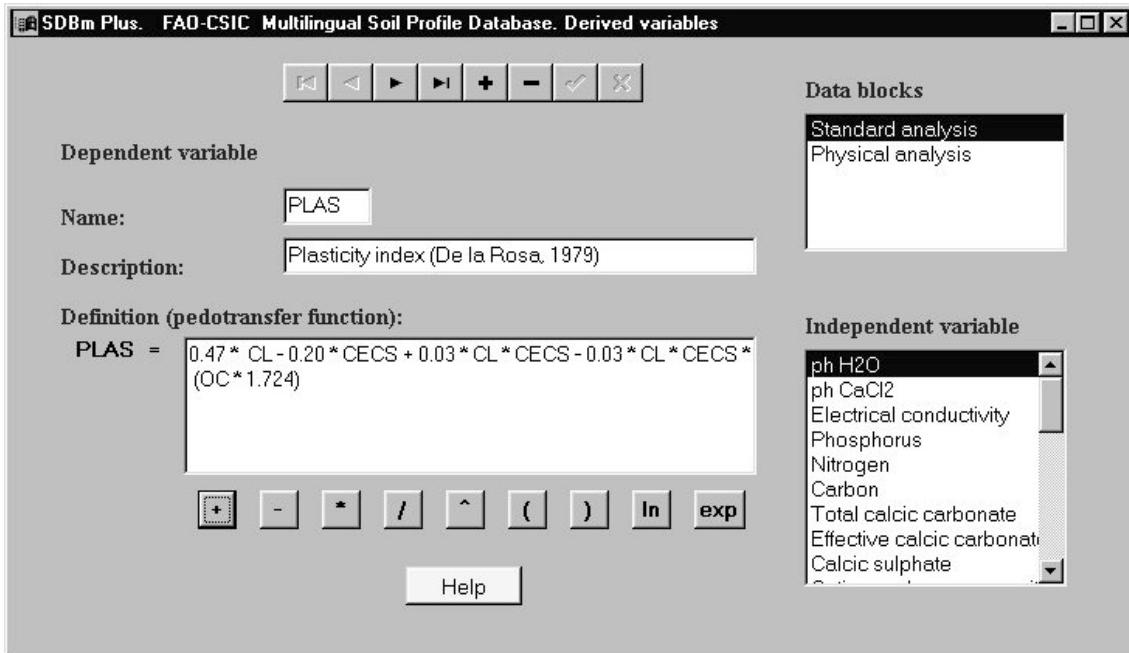
Figure 3.22 Derived variables screen

LES/GIS files generator

Input data files

This function (**Figure 3.23**) generates an input data file following a series of steps:

☐ Range of profiles: selection of the profiles to be included in this analysis.

☐ Soil characteristics: selection of the morphological and analytical variables to be analyzed. The following sets of soil variables can be used:
Block 1: General description
Block 2: Soil horizon description
Block 3: Standard analyses
Block 4: Soluble salts/Heavy metals
Block 5: Physical data
Block 6: Water retention/Hydraulic conductivity
Block 7: Additional variables
Block 10: Derived variables

☐ Control section: determination of the layer thickness or the control section to be analyzed within the vertical soil profile.

☐ Form of calculation: determination of the type of calculation, weighted average or dominant value. The latter refers to the most represented values in the control section; only codified variables use this method. For the site variables, codified as well as numerical, the value corresponding to each profile is considered.

☐ Type of export file: ASCII format and dBASE format can be produced.

The main input data files results is a matrix having as many rows as the number of selected soil profiles and the columns corresponding to the chosen soil variables. The soil variable symbols correspond to the field names in the database tables (**Appendix E**). Also, a set of descriptive files are generated which explain the codes used in each coded variable selected, along with the corresponding analytical metadata (**Chapter 4)**
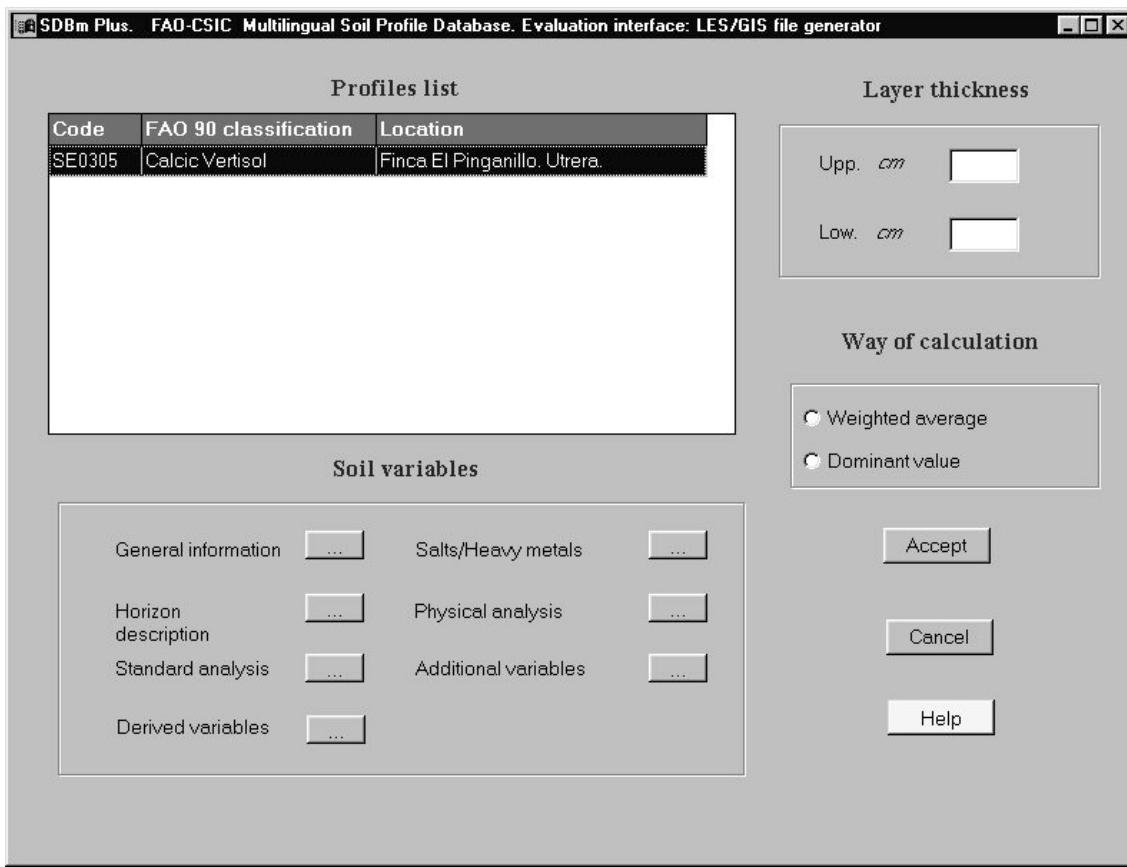
Figure 3.23 LES/GIS file generation screen

Main option: 'Help'

This main function (**Figure 3.24**) displays the **SDBm Plus** information included in this manual.
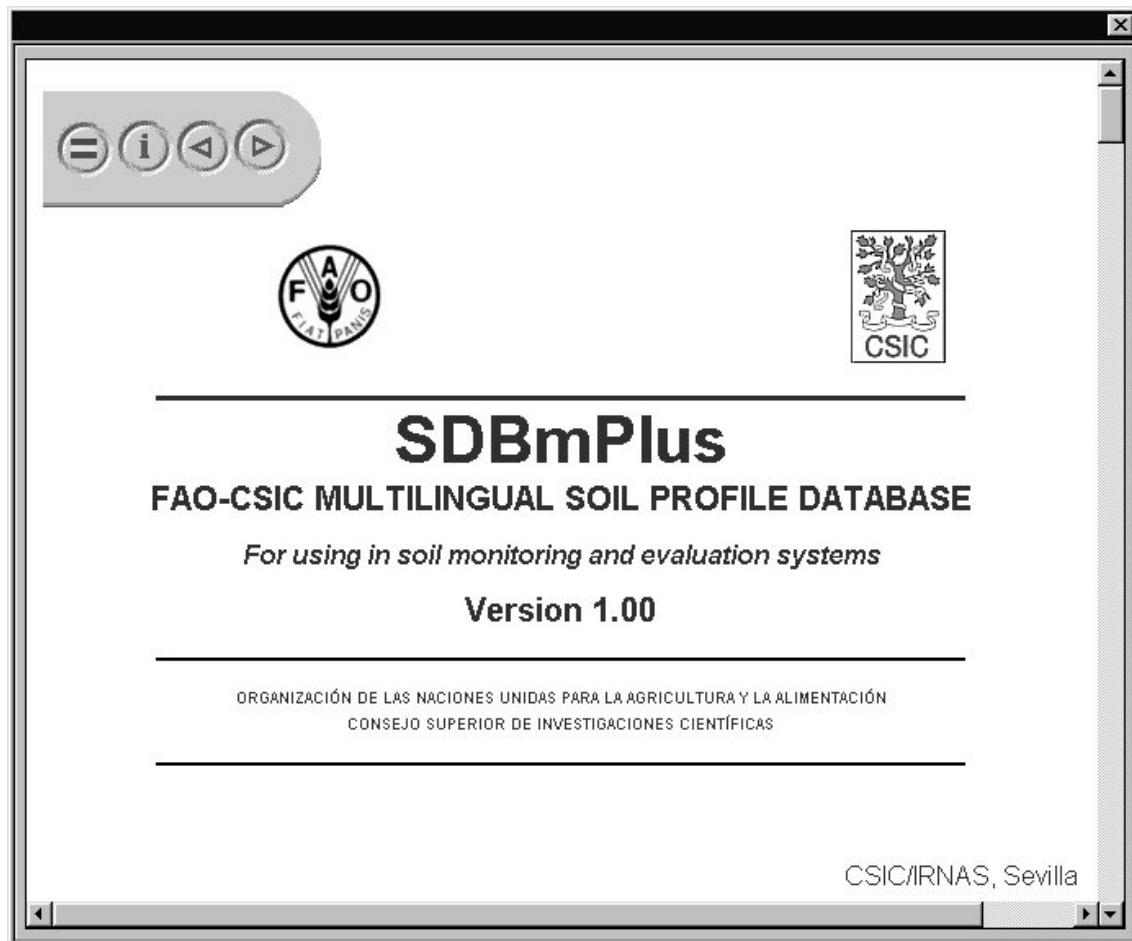
Figure 3.24 Help screen

Chapter 4

Soil profile outputs

The **SDBm Plus** system gives access to a range of functions to report the stored data and metadata on soil profiles. These reports or outputs can be displayed on screen, printed or exported as text files, basically as HTML reports.

The output files with the HTML extension are kept in the directory designed by the user.

Examples of the **SDBm** soil profile outputs, basically printouts, are shown in this chapter.

STORED SOIL PROFILES LIST

A printout with the list of current stored soil profiles (**Figure 4.1**) is generated using the Main option: 'Content' (**Chapter 3**).

For each soil profile stored, this list includes the profile code, FAO classification, location and type of stored information: morphological (M), photographical (P), analytical (A), physical (F) and hydraulic (H) data.

MORPHOLOGICAL DESCRIPTION

A printout with the conventionally accepted morphological description: **i**) general; **ii**) horizons; and **iii**) photographs, of a selected soil profile (**Figure 4.2**) is generated using the Main options: 'Content' and 'Search' (**Chapter 3**).

This soil profile morphological description, horizon by horizon, which follows the "**Guidelines for Soil Profile Descriptions**" (FAO-ISRIC, 1990), is intended to enhance the standardisation and comparison of soil descriptions.

ANALYTICAL DATA TABLES

Several printouts with the analytical data tables: **i**) general analyses; **ii**) particle size; **iii**) soluble salts; **iv**) heavy metals; **v**) physical properties; **vi**) water retention; and **vii**) hydraulic conductivity, of the soil profile previously selected (**Figure 4.3**) can be generated using the Main options: 'Content' and 'Search' (**Chapter 3**).

This set of seven analytical data tables can be enlarged, sample by sample, if any block of data has been determined for more than one date.

Profiles list

Profile	FAO 90 classification	Location	Data type*
SE0211	Cambisols	Finca El Aljarafe (La Hampa). Km 13.5 de la c	M A F H
SE0305	Calcic Vertisol	Finca El Pinganillo. Utrera.	M A F H
SE0306	Vertisols	Las Marismas de Lebrija	M A F H
SE0403	Fluvisol	Guillena (Finca Torre de la Reina)	M A F H
SE0502	Calcic Luvisol	La Rinconada. Finca Casa de las Vacas.	M A F H
SE0503	Cambisols	Finca La Hampa	M A F H
SE0504	Fluvisol	Finca La Suerte. Tocina.	M A F H
SE0505	Fluvisol	Finca El Aljarafe (La Hampa). Km 13.5 de la c	M P A F H
SE0601	Salic Fluvisol	Puebla del Río. (Finca La Mejorada).	M A F H
SE0602	Salic Fluvisol	Puebla del Río. (Finca La Mejorada).	M A F H

(*) M = Morphological data ; A = Analytical data ; F = Physical data ; H = Hydraulical data ; P = Photographs

Figure 4.1 Example of stored soil profiles list printout

SOIL PROFILE DESCRIPTION

Profile code : SE0305
Sheet / grid : 1020 /
Survey area : Zonas Agrícolas del Bajo Guadalquivir
location : Finca El Pinganillo. Utrera.
Authors : Jose L. Arrue

Date : 1/06/76
Coordinates : N370700 / W 054720
Elevation, : 18
Administrative unit : La Campiña

FAO 90 classification : Calcic Vertisol
WRB 98 classification : Vertisol Calcic
USDA 87 classification : Pelloxerert

Soil climate :
Local soil classification (serie) :

Land use : Annual field cropping
Human influence :
Crops : Wheat
Vegetation :
Species :
Grass cover :

Topography : Flat
Land form : Plain
Land element : depression
Position :
Slope : 2 - 8%
Micro topography :

Parent material :
Effective soil depth: >150
Rock outcrops :
Surface stoniness :
Erosion :
Sealing / crusts :

Drainage :
Water table :
Flood :
Moisture conditions :

Remarks :   PROYECTO METALES PESADOS SUELOS DE ANDALUCIA (MEPESA). ARRUE UGARTE, J.L., 1976. Factores químicos, fisico-químicos y físicos determinantes de los caracteres, propiedades y dinámica de la porosidad de los suelos. Tesis Doctoral. Universidad de Sevi

Horizon	Depth, cm	Morphological description
A p	0-30	Very dark gray (10YR 3/1) (moist) and Light gray to gray (10YR 6/1) (dry); clay; weak medium subangular prismatic parting into fine structure; hard in dry and friable in moist, sticky and plastic in wet; high porosity, many Voids fine, many voids very fine; common nodules calcareous white hard; strongly calcareous; common biological activity; abundant fine roots and abundant medium roots; clear smooth boundary.
B 21	30-48	Dark gray (10YR 4/1) (moist) and Light gray to gray (10YR 6/1) (dry); clay; weak medium structure; very hard in dry and firm in moist, very sticky and very plastic in wet; few slickensides on pedfaces Cutans; high porosity, common Voids fine, common voids very fine; common nodules calcareous white hard; strongly calcareous; many biological activity; abundant fine roots and abundant medium roots; diffuse smooth boundary.
B 22	48-82	Dark gray (10YR 4/1) (moist) and Light gray to gray (10YR 6/1) (dry); clay; moderate medium structure; very hard in dry and firm in moist, very sticky and very plastic in wet; common distinct slickensides on pedfaces Cutans; few Voids fine, common voids very fine; strongly calcareous; common biological activity; common fine roots; diffuse smooth boundary.
C 1	82-	Very dark gray (10YR 3/1) (moist) and Light gray to gray (10YR 6/1) (dry); clay; strong medium structure; very hard in dry and very firm in moist, very sticky and very plastic in wet; low porosity, few Voids fine; strongly calcareous; very few biological activity; few fine roots and few very fine roots.

Figura 4.2 Example of soil profile standard morphological description printout

PHOTOGRAPHS

Profile code : SE0305

Date : 1/06/76

Position
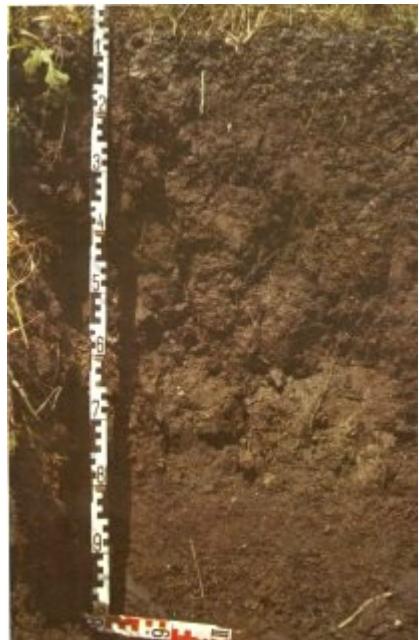
Profile
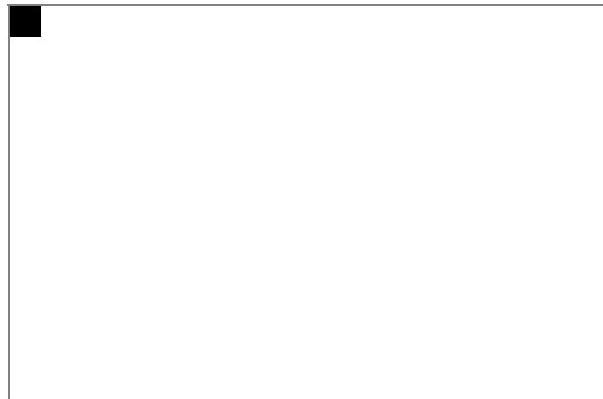
Other
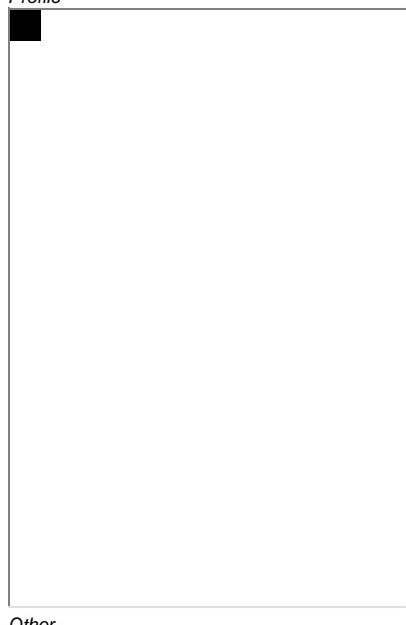
Other

Figura 4.2 Example of soil profile standard morphological description printout (Cont.)

GRAPHICAL PRESENTATIONS

Graphical presentations of: **i**) the vertical variability of analytical variables; and **ii**) suction vs. hydraulic properties, of the soil profile previously selected (**Figures 4.4a** y **4.4b**) can be generated using the Main options: 'Content' and 'Search' (**Chapter 3**).

Both kinds of sample-by-sample representations are useful to analyse the soil profile variability of a soil and to compare it with that of other soils.

STATISTICAL SUMMARY

A statistical summary (**Figure 4.5**) is developed from the soil profiles list, with reference to a set of soil profiles and of analytical variables. This summary includes a table with the following statistics: number of soil samples (n), range (m, minimum value; and M, maximum value), standard deviation and coefficient of variation.

This application is very useful to make a first statistical analysis of the stored data.

ANALYTICAL METADATA REPORT

A report with the methods used for the analytical determinations of the soil profile previously selected (**Figure 4.6**) can be generated using the Main options: 'Content' and 'Search' (**Chapter 3**).

This metadata report, displayed variable by variable, is designed to facilitate data accuracy and the harmonisation of soil analytical measurement techniques.

CODING SYSTEM REPORT

A printout of the coding system stored in the database (**Figure 4.7**) is generated using the Main option: 'Codes' (**Chapter 3**). This printout includes the conversion tables in the four different languages.

This report gives transparency to the coding system stored, allowing for correction of the codes and definitions and also for the comparison between **SDBm Plus** databases.

SOLUBLE SALTS

Profile code : SE0305

Sample	Depth, cm	pH	EC mS/cm	Ca	Mg	K	Na	Bo	CO₃ meq/100g	HCO₃
A	0-30	7.7	1.53	0.511	0.134	0.035	0.52	0	0	0.166
B	30-48	7.5	1.93	0.667	0.139	0.037	0.686	0	0	0.114
C	48-82	7.5	3.63	1.349	0.254	0.044	1.184	0	0	0.146
D	82-	7.5	4.81	1.756	0.362	0.048	1.734	0.005	0	0.153

HEAVY METALS

Profile code : SE0305

Sample	Depth, cm	As	Cd	Co	Cr	Cu	Hg	Mn mg/kg	Mo	Ni
A	0-30	6.1	0	12.1	56.5	26.9	0.05	511		28.4
B	30-48	6	0	12.5	57	27.1	0	603		31.9
C	48-82	5.7	0	11.8	59.5	26.9	0	530		30.9
D	82-	5.7	0	5.02	67.5	27.8	0	472		29.2

Figura 4.3 Example of soil profile analytical data table printout
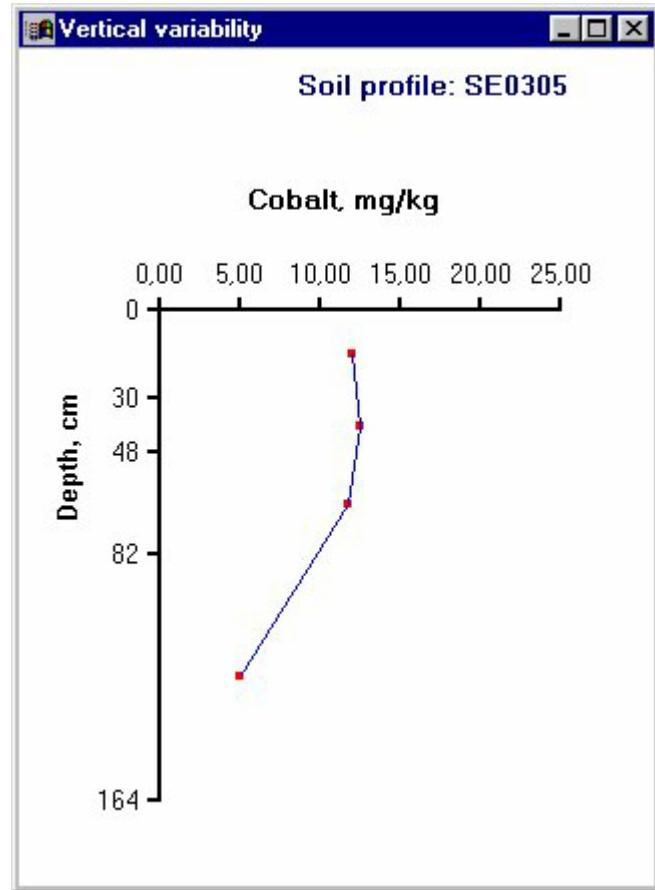
Figure 4.4a Example of soil profile graphical presentation printout. Vertical distribution
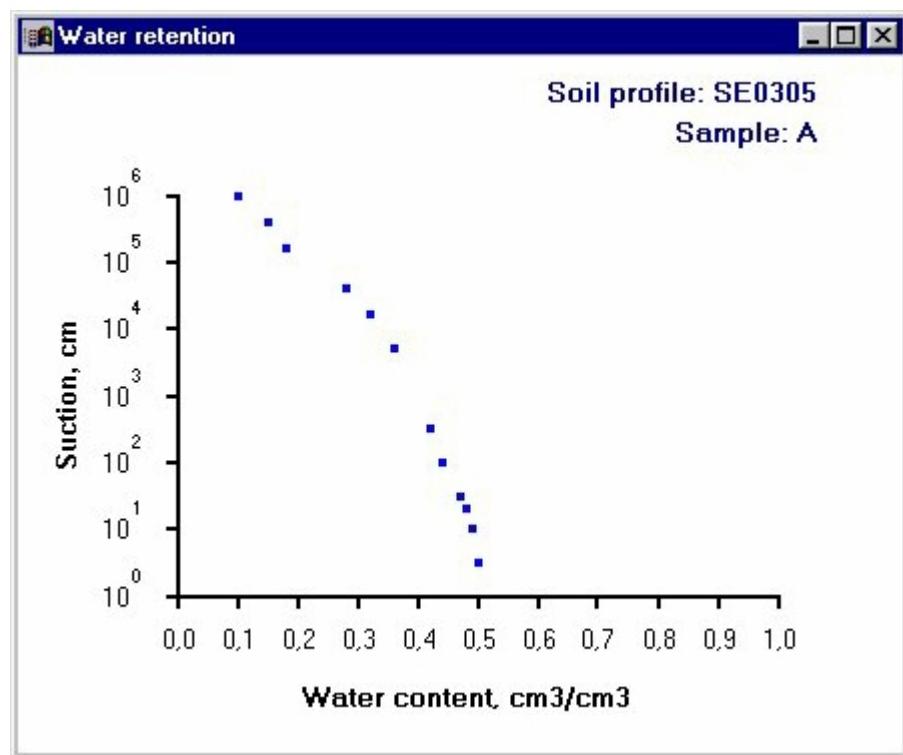
Figure 4.4b Example of soil profile graphical presentation printout. Suction vs.water content

STATISTICAL SUMMARY

Variables	n	Minimum	Maximum	Mean	σ	CV
pH H2O	294	3.9 *(CA0510)*	8.8 *(SE0601)*	7,20	1,06	14,77
ph CaCl2	98	3 *(CA0510)*	7.5 *(CA0504)*	5,59	1,38	24,73
Electrical conductivity	17	1.09 *(SE0601)*	3.5 *(SE0602)*	1,98	0,81	40,70
Phosphorus	31	0.53 *(LU0501)*	85 *(CA0104)*	14,42	16,66	115,55
Nitrogen	204	0 *(CA0509)*	1.42 *(CA0510)*	0,28	0,46	160,58
Carbon	301	0 *(CA0507)*	59.02 *(CA0507)*	4,57	9,48	207,62
Total calcic carbonate	275	0 *(SE0502)*	69.38 *(CA0503)*	16,09	14,56	90,49
Effective calcic carbonate	3	14.5 *(CO0205)*	15.8 *(CO0205)*	15,23	2,27	14,90
Calcic sulphate	0	N/A	N/A	N/A	N/A	N/A
Cation exchange capacity	144	3.23 *(CA0503)*	132.22 *(CA0514)*	40,85	32,20	78,81
Exchangeable calcium	144	0.07 *(CA0506)*	59.78 *(CA0508)*	19,14	14,83	77,47

Figure 4.5 Example of statistical summary printout

METADATA REPORT

List of methods used for analytical characterization of soil profile

Profile code: SE0305

* **General analysis:**

Date: 1/06/76

pH water:	Saturated paste
Nitrogen:	Total - Kjeldahl
Organic Carbon:	Walkley & Black
Total CaCO3:	Calcimeter with HCl
CEC Soil:	NH4OAc at pH 7
Exchangeable calcium:	NH4OAc
Exchangeable magnesium:	NH4OAc
Exchangeable Potassium:	NH4OAc
Exchangeable Sodium:	NH4OAc
Coarse Sand:	Hydrometer
Fine Sand:	Hydrometer
Sand:	Hydrometer
Silt:	Hydrometer
Clay:	Hydrometer

Date: 26/07/00

pH water:	1:2.5 soil/water suspension
Phosphorus:	Olsen-extractable
Nitrogen:	Total - Kjeldahl
Organic Carbon:	Walkley & Black
Total CaCO3:	Calcimeter with HCl
Coarse Sand:	Hydrometer
Fine Sand:	Hydrometer
Sand:	Hydrometer
Silt:	Hydrometer
Clay:	Hydrometer

Figure 4.6 Example of soil profile analytical metadata report printout

Code	Biological features: type
AB	biological activity
AR	artefacts
BI	infilled burrows
BO	open burrows
BU	burrows
CC	charcoal
EW	earthworms
IA	insect activity
PT	pedotubules
TC	termite channels

Code	Biological features: quantity
0	nil
C	common
F	few
M	many
V	very few

Code	Boundary: topography
B	broken
I	irregular
S	smooth
W	wavy

Code	Boundary: width
A	abrupt
C	clear
D	diffuse
G	gradual

Figure 4.7 Example of coding system report printout

LES/GIS INPUT FILES

The input data files: **i**) main file; and **ii**) descriptive files, of the selected soil profiles and soil variables (**Figures 4.8a** y **4.8b**) are generated using the Main option: 'Evaluation' (**Chapter 3**).

This output result facilitates the linkage of soil data to computerised information systems. **Figure 4.9** shows an example of a GIS map combining polygon information with point information related to the 'STGG' variable from the **SDBm Plus** database.

/ SDBMPLUS / EVALUATION / E1_.DBF

PRNO	NUT4	STGG	STSG	LAT	LON	ELEV	LAFO	LAEL	SLGR	SLFR	STOQ	STOS	DRAI	LUT	CRO1
CA0101	CA01	VXL	CH	N364832	W060030	53	VA	VA	3		0		I	AA	WH
CA0102	CA01	ER	RE	N364456	W061130	60	HI	SL	4		0		W	AP	FR
CA0201	CA02	VXR	AA	N361214	W052250	70	HI	SL	4		0		W	AA	WH
CA0401	CA04	AXR	CA	N363049	W060908	20	HI	SL	3		0		M	AA	WH
CA0402	CA04	AXB		N363014	W054015	450	MO	SL	6		A	S	W	U	
CO0101	CO01	EOX	RE	N373110	W043950	240	HI	SL	6		0		W	AP	OL
CO0201	CO02	VXR	AA	N374903	W044702	130	HI	SL	4		0		I	AA	WH
CO0202	CO02	IOX	LI02	N375825	W044730	620	MO	SL	5		M	S	W	U	
CO0501	CO05	IOX	AA	N382105	W043928	670	HI	SL	4		V	S	W	AP	FR
CO0502	CO05	AXA	AA	N381145	W044856	710	HI	SL	4		V	S	W	AP	OL
CO0601	CO06	AXA		N372304	W040820	1020	MO	SL	6		A	S	W	U	
H0101	H01	EQV	SA	N371214	W072335	1	VA	VA	3	C	0		I	U	
H0201	H02	EOX		N373330	W065638	170	HI	SL	3		A	S	W	AF	
H0301	H03	VXL	EN	N372738	W062208	75	HI	SL	4	S	0		I	AA	WH
H0401	H04	IMX	EN	N370104	W063028	22	HI	SL	3	C	0		S	AF	
H0501	H05	AXB	AQ06	N372046	W070010	50	HI	SL	4		0		M	AF	
H0601	H06	IOX	LI02	N375025	W070335	570	HI	SL	6		A	S	S	AF	
H0602	H06	IOE	DY02	N375304	W062835	607	VA	VA	3	C	F		M	AF	
SE0101	SE01	MXA	EN	N371655	W045445	480	HI	SL	5		F	S	W	AP	OL
SE0201	SE02	AXR	AA	N372258	W061120	100	HI	SL	4		0		W	AP	OL
SE0301	SE03	AXA	CA	N371410	W053935	80	PT	ME	4		0		W	AT	FR
SE0302	SE03	VXR	AA	N372238	W053930	60	HI	SL	4		0		M	AA	WH
SE0401	SE04	UXB		N375520	W053815	740	MO	SL	5		M	S	W	AF	
SE0501	SE05	EVX	AA	N373204	W055510	10	VA	VA	4	C	0		W	AT	FR
SE0701	SE07	VXR		N370250	W052625	250	HI	SL	5		A	S	M	AP	OL

Figure 4.8a. Example of LEIS/GIS input file. Main file

E1_ADMINUNIT.DBF		E1_USDA87GROUP.DBF		E1_LANDFORM.DBF		E1_STONESABUNDANC.DBF		E1_LANDUSE.DBF	
NUT4	D_NUT4	**STGG**	D_STGG	**LAFO**	D_LAFO	**STOQ**	D_STOQ	**LUT**	D_LUT
CA01	Campiña de Cadiz	AXA	Haploxeralf	HI	hill	0	nil	AA	annual field cropping
CA02	Campo de Gibraltar	AXB	Palexeralf	MO	mountain	A	abundant	AF	agroforestry system
CA04	De la Janda	AXR	Rhodoxeralf	PT	plateau	F	few	AP	perennial field cropping
CO01	Campiña Alta	EOX	Xerorthent	VA	valley	M	many	AT	tree cropping
CO02	Campiña Baja	EQV	Fluvaquent			V	very few	U	not used and not managed
CO05	Pedroches	ER	Arent						
CO06	Penibetica	EVX	Xerofluvent						
H01	Andevalo-Occidental	IMX	Xerumbrept						
H02	Andevalo-Oriental	IOE	Eutrochrept						

E1_LANDELEMENT.DBF — E1_STONESSIZE.DBF — E1_CROPTYPE.DBF

H03	Condado Campiña	IOX	Xerochrept	**LAEL**	D_LAEL	**STOS**	D_STOS	**CRO1**	D_CRO1
H04	Condado Litoral	MXA	Haploxeroll						
H05	Costa	UXB	Palexerult	ME	meseta	S	stones	FR	fruits
H06	Sierra	VXL	Pelloxerert	SL	slope			OL	olive tree
SE01	De Estepa	VXR	Chromoxerert	TE	terrace			WH	wheat
SE02	El Aljarafe			VA	valley				
SE03	La Campiña								
SE04	La Sierra Norte								
SE05	La Vega								
SE07	Sierra Sur								

E1_USDA87SUBGR.DBF — E1_SLOPEGRADIENT.DBF — E1_INTDRAINAGE.DBF

		STSG	D_STSG	**SLGR**	D_SLGR	**DRAI**	D_DRAI		
		AA	Typic	3	0.7 - 2%	I	imperfect		
		AQ06	Aquic	4	2 - 8%	M	moderately well		
		CA	Calcic	5	8 - 16%	S	somewhat excess		
		DY02	Dystric	6	16 - 30%	W	well		
		EN	Entic						
		LI02	Lithic						
		RE	Rendollic						
		SA	Salorthidic						

E1_SLOPEFORM.DBF

SLFR	D_SLFR
C	concave
S	straight

Figure 4.8b. Example of LEIS/GIS input file. Descriptive files
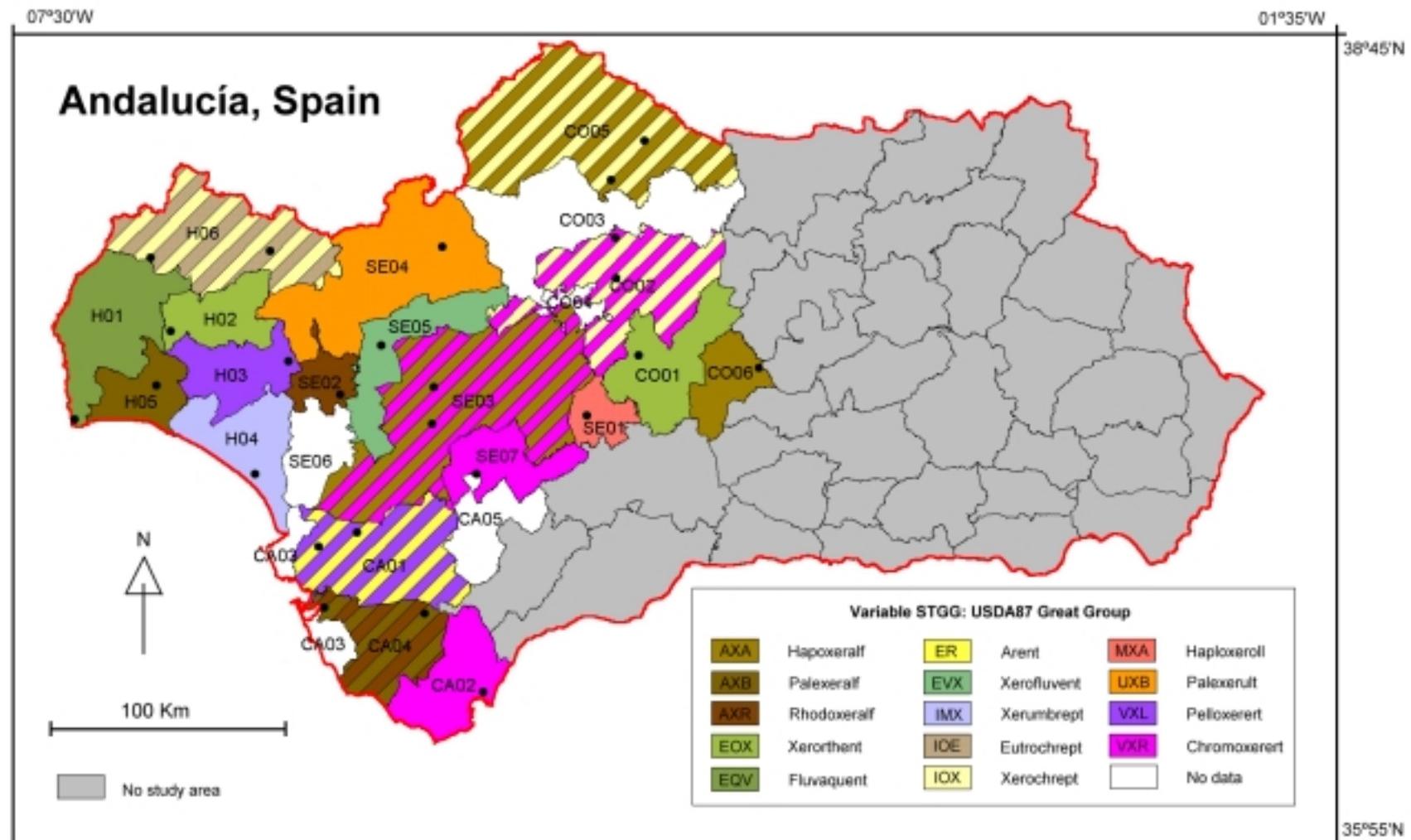
Figure 4.9 Example of GIS map showing the combination of polygon information with point information referred to the STGG variable from **SDBm Plus**

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SOFTWARE USED

BORLAND C++ Builder, Version 5. 2000. Borland International Inc.

HTML Report, Version 3.1. 2000. ProGa Inc.

Appendix A

List of stored soil variables

VARIABLE DESCRIPTION*	TYPE /RANGE**

Profile code — *string*

Block 1. GENERAL INFORMATION

Registration and location

Soil profile description status	*string*
Date of description	*string*
Author(3)	*string*
Soil unit	*string*
Location	*string*
Survey area	*string*
Administrative unit	*string*
Latitude	*string*
Longitude	*string*
Elevation, *m*	*####*
Sheet	*string*
Grid	*string*

Soil classification

FAO 74 classification: unit, phase	*code*
FAO 90 classification: unit, third level	*code*
WRB 98 classification: group, unit, specifier	*code*
USDA 87 classification: great group, subgroup, family (t, m, r)	*code*
USDA 98 classification: great group, subgroup, family (t, m, r)	*code*
Local soil classification (Serie)	*code*
Soil climate: class, moisture regime, thermic regime	*code*

Landform and topography

Topography	*code*
Landform	*code*
Land element	*code*
Position	*code*
Slope: class, form	*code*
Microtopography	*code*

Land use and vegetation

Land use type	*code*
Human influence	*code*
Crops (2 entries)	*code*
Vegetation type	*code*
Species (5 entries)	*code*
Grass cover	*code*

Parent material

Parent material: over, derived from	*code*
Effective soil depth	*code*

Surface characteristics

Stones: abundance, size	*code*
Rock outcrops: abundance, distance, height	*code*
Erosion/deposition: type, intensity	*code*
Sealing/crusting	*code*

Soil-water relationships

Drainage: class, internal, external	*code*
Flood: frequency, duration	*code*
Watertable: type, maximum and minimum depth, observation	*code*
Moisture condition (3 entries): condition, depth	*code, ###*

Other

Remarks	*text*

Block 2. SOIL HORIZON DESCRIPTION

Horizon number   *string*

Horizon designation and dimensions

Horizon symbol	
Depth, *cm*: upper, lower	*###, ###*

Soil colour

Matrix colour (2 entries): hue, value, chroma, modifier	*string*
Mottles (2 entries): abundance, size, contrast, boundary, colour	*code*

Primary constituents

Texture of the fine earth (2 entries)	*code*
Rock fragments (2 entries): abundance, size, shape, weathering, nature	*code*

Organisation and constituents

Structure (2 entries): grade, size, type, relation	*code*
Consistence: dry, moist, stickiness, plasticity	*code*

Voids (porosity)

Voids (2 entries): abundance, size, type, porosity   *code*

Concentrations

Cutanic features (2 entries): quantity, contrast, nature, location   *code*
Cementation/Compaction: continuity, structure, grade, nature   *code*
Nodules (2 entries): abundance, kind, size, shape, hardness, nature, colour   *code*

Biological activity

Roots (2 entries): abundance, size   *code*
Biological features (2 entries): abundance, kind   *code*

Soil reaction

Carbonates   *code*
Field pH*   *5.0 – 9.0*

Horizon boundary

Boundary: width, topography   *code*

Block 3. STANDART ANALYSES

Sample code   *string*
Date   *string*

Depth, *cm*: upper, lower   *###, ###*
pH: H2O, other*   *5.0 – 9.0*
Electrical conductivity, EC*, *mS/cm*   *0.0 – 4.0*
Phosphorus, P*, *mg/kg*   *0.0 – 40.0*
Organic carbon, OC*, *g/100g*   *0.00 – 5.00*
Nitrogen, N*, *g/100g*   *0.00 – 0.50*
Cation exchange capacity, CEC*, *meq/100g*   *2.0 – 25.0*
Exchangable cations*, *meq/100g*:
    Calcium, Ca   *0.0 – 25.0*
    Magnesium, Mg   *0.0 – 15.0*
    Potassium, K   *0.00 – 3.00*
    Sodium, Na   *0.00 – 5.00*
    Hydrogenum, H   *##.##*
    Aluminium, Al   *##.##*
Percentage of base saturation, *%*   *0 - 100*
Potassium, K*, *mg/kg*   *##.##*

Particles size

Sand*, *g/100g*: very coarse, coarse, medium, fine, very fine, total   *0 - 100*
Silt*, *g/100g*: coarse, fine, total   *0 - 100*
Clay*, *g/100g*   *0 - 100*

Cation exchange capacity of clay*, meq/100g	0.0 – 150.0
Carbonates content, CaCO3*, g/100g: total, active	0.0 – 50.0
Gypsum content, CaSO4*, g/100g	0.0 – 15.0

Block 4. SOLUBLE SALTS/HEAVY METALS

Sample code	string
Date	string
Depth, cm: upper, lower	###, ###
pH*	3.0 –9.0
Electrical conductivity, EC*, mS/cm	0.0 – 10.0

Soluble cations

Calcium, Ca*, meq/100g	0.00 – 4.00
Magnesium, Mg*, meq/100g	0.00 – 4.00
Potassium, K*, meq/100g	0.00 – 1.00
Sodium, Na*, meq/100g	0.00 – 20.0
Boron, B*, meq/100g	##.##

Soluble anions

Carbonate, CO3*, meq/100g	0.00 – 1.00
Bicarbonate, HCO3*, meq/100g	0.00 – 3.00
Chloride, Cl*, meq/100g	0.0 – 20.0
Sulphate, SO4*, meq/100g	0.00 – 5.00
SAR	0.0 – 40.0

Heavy metals

Arsenic, As*, mg/kg	2.0 – 20.0
Cadmium, Cd*, mg/kg	0.01 – 2.00
Cobalt, Co*, mg/kg	3.0 – 25.0
Chromium, Cr*, mg/kg	3 - 150
Copper, Cu*, mg/kg	2 - 250
Mercury, Hg*, mg/kg	0.01 – 0.50
Manganese, Mn*, mg/kg	10 - 3000
Molybdenum, Mo*, mg/kg	0.1 – 40.0
Nickel, Ni*, mg/kg	3 - 100
Lead, Pb*, mg/kg	3 - 200
Antimony, Sb*, mg/kg	0.2 – 10.0
Selenium, Se*, mg/kg	0.01 – 12.00
Zinc, Zn*, mg/kg	3 - 1000

Block 5. PHYSICAL ANALYSES

Sample code	string
Date	string
Depth, cm: upper, lower	###, ###

Actual water content*, *cm3/cm3*	*0.2 – 0.6*
Bulk density*, *g/cm3*	*1.0 – 1.7*
Resistance to penetration*, *Mpa*	*0.01 – 7.00*
Stability index	*##.##*
Particle density*, *g/cm3*	*2.55 – 2.85*
Total porosity*, *cm3/cm3*	*0.3 – 0.6*
Saturated hydraulic conductivity*, *cm/d*	*0.001 - 100*

Block 6. WATER RETENTION/HYDRAULIC CONDUCTIVITY

Sample code	*string*
Date	*string*
Depth, *cm*: upper, lower	*###, ###*
Suction (1 to 25 entries)*, *cm, bar or kPa*	*####.##*
Water content (1 to 25 entries)*, *cm/cm or g/100g*	*#######.##*
Hydraulic conductivity (1 to 25 entries)*, *cm/d or mm/s*	*####.##*

Block 7. ADDITIONAL ANALYTICAL VARIABLES

Sample code	*string*
Date	*string*
Additional variable #1	*####.##*
Additional variable #2	*####.##*
Additional variable #3	*####.##*
Additional variable #4	*####.##*
Additional variable #5	*####.##*
Additional variable #6	*####.##*
Additional variable #7	*####.##*
Additional variable #8	*####.##*
Additional variable #9	*####.##*
Additional variable #10	*####.##*

Block 8. PHOTOGRAPHS

Profile site	*graphic*
Soil profile	*graphic*
Other	*graphic*

Block 9. METADATA

Method used for each analytical variable	*code*

(*) The corresponding 'field name' of each soil variable can be find in the **Appendix E**
(**) Tentative ranges for the numeric variables which corresponds to the most frequent soil values,
although the SDBm Plus database allow any values out of these ranges.

Coding system: Translation tables of coded soil variable (in English, Spanish, French and German)

The coding system followed below correspond basically to the standardized codes included in the publications: Guidelines for Soil Profile Description, 3rd Edition (FAO-ISRIC, 1990); and previous versions of this **SDBm Plus** database (FAO-ISRIC, 1989; FAO-ISRIC-CSIC, 1995).

Block 1. GENERAL INFORMATION

1.1.   Soil classifications (only in English language)

FAO 74 CLASSIFICATION: SOIL UNITS

A	Acrisols	GK	Calcic Gleysol			SO	Orthic Solonetz
AF	Ferric Acrisol	GD	Dystric Gleysol	N	Nitosols		
AG	Gleyic Acrisol	GE	Eutric Gleysol	ND	Dystric Nitosol	T	Andosols
AH	Humic Acrisol	GH	Humic Gleysol	NE	Eutric Nitosol	TH	Humic Andosol
AO	Orthic Acrisol	GM	Mollic Gleysol	NH	Humic Nitosol	TM	Mollic Andosol
AP	Plinthic Acrisol	GP	Plinthic Gleysol			TO	Ochric Andosol
		GX	Gelic Gleysol	O	Histosols	TV	Vitric Andosol
B	Cambisols			OD	Dystric Histosol		
BC	Chromic Cambisol	H	Phaeozems	OE	Eutric Histosol	U	Rankers

Code	Name
BD	Dystric Cambisol
BE	Eutric Cambisol
BF	Ferralic Cambisol
BG	Gleyic Cambisol
BH	Humic Cambisol
BK	Calcic Cambisol
BV	Vertic Cambisol
BX	Gelic Cambisol
C	Chernozems
CG	Glossic Chernozem
CH	Haplic Chernozem
CK	Calcic Chernozem
CL	Luvic Chernozem
D	Podzoluvisols
DD	Dystric Podzoluvisol
DE	Eutric Podzoluvisol
DG	Gleyic Podzoluvisol
E	Rendzinas
F	Ferralsols
FA	Acric Ferralsol
FH	Humic Ferralsol
FO	Orthic Ferralsol
FP	Plinthic Ferralsol
FR	Rhodic Ferralsol
FX	Xanthic Ferralsol
G	Gleysols
HC	Calcaric Phaeozem
HG	Gleyic Phaeozem
HH	Haplic Phaeozem
HL	Luvic Phaeozem
I	Lithosol
J	Fluvisols
JC	Calcaric Fluvisol
JD	Dystric Fluvisol
JE	Eutric Fluvisol
JT	Thionic Fluvisol
K	Kastanozems
KH	Haplic Kastanozem
KK	Calcic Kastanozem
KL	Luvic Kastanozem
L	Luvisols
LA	Albic Luvisol
LC	Chromic Luvisol
LF	Ferric Luvisol
LG	Gleyic Luvisol
LK	Calcic Luvisol
LO	Orthic Luvisol
LP	Plinthic Luvisol
LV	Vertic Luvisol
M	Greyzems
MG	Gleyic Greyzem
MO	Orthic Greyzem
OX	Gelic Histosol
P	Podzols
PF	Ferric Podzol
PG	Gleyic Podzol
PH	Humic Podzol
PL	Leptic Podzol
PO	Orthic Podzol
PP	Placic Podzol
Q	Arenosols
QA	Albic Arenosol
QB	Cambic Arenosol
QC	Calcaric Arenosol
QD	Dystric Arenosol
QE	Eutric Arenosol
QF	Ferralic Arenosol
QK	Calcic Arenosol
QL	Luvic Arenosol
QP	Petrocalcic Arenosol
R	Regosols
RC	Calcaric Regosol
RD	Dystric Regosol
RE	Eutric Regosol
RX	Gelic Regosol
S	Solonetz
SG	Gleyic Solonetz
SM	Mollic Solonetz
V	Vertisols
VC	Chromic Vertisol
VP	Pellic Vertisol
W	Planosols
WD	Dystric Planosol
WE	Eutric Planosol
WH	Humic Planosol
WM	Mollic Planosol
WS	Solodic Planosol
WX	Gelic Planosol
X	Xerosols
XH	Haplic Xerosol
XK	Calcic Xerosol
XL	Luvic Xerosol
XY	Gypsic Xerosol
Y	Yermosols
YH	Haplic Yermosol
YK	Calcic Yermosol
YL	Luvic Yermosol
YT	Takyric Yermosol
YY	Gypsic Yermosol
Z	Solonchaks
ZG	Gleyic Solonchak
ZM	Mollic Solonchak
ZO	Orthic Solonchak
ZT	Takyric Solonchak

FAO 74 CLASSIFICATION: PHASES

LI	Lithic	PE	Petric (skeletic)	GI	Gilgai	YE	Yermic
PC	Petrocalcic	SO	Sodic	PF	Petroferric	CL	Clayey
DU	Duripan	ST	Stony (rudic)	SS	Saline and sodic	PH	Phreatic
PG	Petrogypsic	FR	Fragipan	IN	Inundic		

FAO 90 CLASSIFICATION: SOIL UNITS

FL	Fluvisols	ANI	Gelic Andosol	PHJ	Stagnic Phaeozem		
FLE	Eutric Fluvisol			PHL	Luvic Phaeozem	AL	Alisols
FLC	Calcaric Fluvisol	VR	Vertisols			ALH	Haplic Alisol
FLD	Dystric Fluvisol			GR	Greyzems	ALF	Ferric Alisol
FLM	Mollic Fluvisol	VRY	Gypsic Vertisol	GRH	Haplic Greyzem	ALU	Humic Alisol
FLU	Umbric Fluvisol	VRD	Dystric Vertisol	GRG	Gleyic Greyzem	ALP	Plinthic Alisol
FLT	Thionic Fluvisol	VRK	Calcic Vertisol			ALJ	Stagnic Alisol
FLS	Salic Fluvisol	VRH	Haplic Vertisol	LV	Luvisols	ALG	Gleyic Alisol
				LVH	Haplic Luvisol		
GL	Gleysols	CL	Calcisols	LVF	Ferric Luvisol	NT	Nitisols
GLE	Eutric Gleysol	CLH	Haplic Calcisol	LVX	Chromic Luvisol	NTH	Haplic Nitisol
GLK	Calcic Gleysol	CLL	Luvic Calcisol	LVK	Calcic Luvisol	NTR	Rhodic Nitisol
GLD	Dystric Gleysol	CLP	Petric Calcisol	LVJ	Stagnic Luvisol		
GLA	Andic Gleysol			LVG	Gleyic Luvisol	NTU	Humic Nitisol
GLM	Mollic Gleysol	GY	Gypsisols			FR	Ferralsols
GLU	Umbric Gleysol	GYH	Haplic Gypsisol	PL	Planosols	FRH	Haplic Ferralsol
GLT	Thionic Gleysol	GYK	Calcic Gypsisol	PLE	Eutric Planosol	FRX	Xanthic Ferralsol
GLI	Gelic Gleysol	GYL	Luvic Gypsisol	PLD	Dystric Planosol	FRR	Rhodic Ferralsol
		GYP	Petric Gypsisol	PLM	Mollic Planosol	FRU	Humic Ferralsol

RG   Regosols
RGE   Eutric Regosol
RGC   Calcaric Regosol
RGY   Gypsic Regosol
RGD   Dystric Regosol
RGU   Umbric Regosol
RGI   Gelic Regosol

LP   Leptosols
LPE   Eutric Leptosol
LPD   Dystric leptosol
LPK   Rendzic Leptosol
LPM   Mollic Leptosol
LPU   Umbric leptosol
LPQ   Lithic Leptosol
LPI   Gelic leptosol
LPC   Calcaric Leptosol

AR   Arenosols
ARH   Haplic Arenosol
ARB   Cambic Arenosol
ARL   Luvic Arenosol
ARO   Ferralic Arenosol
ARA   Albic Arenosol
ARK   Calcic Arenosol
ARC   Calcaric Arenosol
ARG   Gleyic Arenosol

AN   Andosols
ANH   Haplic Andosol
ANM   Mollic Andosol
ANU   Umbric Andosol
ANZ   Vitric Andosol

SN   Solonetz
SNH   Haplic solonetz
SNM   Mollic Solonetz
SNK   Calcic Solonetz
SNY   Gypsic Solonetz
SNJ   Stagnic Solonetz

SC   Solonchaks
SCH   Haplic Solonchak
SCM   Mollic Solonchak
SCK   Calcic Solonchak
SCY   Gypsic Solonchak
SCN   Sodic Solonchak
SCG   Gleyic Solonchak
SCI   Gelic Solonchak

KS   Kastanozems
KSH   Haplic Kastanozem
KSL   Luvic Kastanozem
KSK   Calcic Kastanozem
KSY   Gypsic Kastanozem

CH   Chernozems
CHH   Haplic Chernozem
CHK   Calcic Chernozem
CHL   Luvic Chernozem
CHW   Glossic Chernozem
CHG   Gleyic Chernozem

PH   Phaeozems
PHG   Gleyic Pheaozem
PHH   Haplic Phaeozem

PLU   Umbric Planosol
PLI   Gelic Planosol

PD   Podzoluvisols
PDE   Eutric Podzoluvisol
PDD   Dystric Podzoluvisol
PDJ   Stagnic Podzoluvisol
PDG   Gleyic Podzoluvisol
PDI   Gelic Podzoluvisol

PZ   Podzols
PZH   Haplic Podzol
PZB   Cambic Podzol
PZF   Ferric podzol
PZC   Carbic Podzol
PZG   Gleyic Podzol
PZI   Gelic Podzol

LX   Lixisols
LXH   Haplic Lixisol
LXF   Ferric Lixisol
LXP   Plinthic Lixisol
LXA   Albic Lixisol
LXJ   Stagnic Lixisol
LXG   Gleyic Lixisol

AC   Acrisols
ACH   Haplic Acrisol
ACF   Ferric Acrisol
ACU   Humic Acrisol
ACP   Plinthic Acrisol

FRG   Geric Ferralsol
FRP   Plinthic Ferralsol

PT   Plinthosols
PTE   Eutric Plinthosol
PTD   Dystric Plinthosol
PTU   Humic Plinthosol
PTA   Albic Plinthosol

CM   Cambisols
CME   Eutric Cambisol
CMD   Dystric Cambisol
CMU   Humic Cambisol
CMC   Calcaric Cambisol
CMX   Chromic Cambisol
CMV   Vertic Cambisol
CMO   Ferralic Cambisol
CMG   Gleyic Cambisol
CMI   Gelic Cambisol
CMJ   Stagnic Cambisol

AT   Anthrosols
ARA   Aric Anthrosol
ATC   Cumulic Anthrosol
ATF   Fimic Anthrosol
ATU   Urbic Anthrosol

HS   Histosols
HSL   Folic Histosol
HSS   Terric Histosol
HSF   Fibric Histosol
HST   Thionic Histosol
HSI   Gelic Histosol

ANG Gleyic Andosol   PHC   Calcaric Phaeozem   ACG   Gleyic Acrisol

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FAO 90 CLASSIFICATION: THIRD LEVEL

AL	Albi-	NI	Niti-	EU	Eutri-	MA	Mazi-
FE	Ferralo-	AR	Areni-	DY	Dystri-	GU	Grumi-
CM	Cambi-	GL	Gleyi-	UM	Umbri-	AL	Albi-
AN	Andi-	SO	Sodi-	MO	Molli-	SM	Sombri-
LU	Luvi-	OR	Orthi-	CA	Calcari-		
FL	Fluvi-	CH	Chromi-	KA	Calci-		
VE	Verti-	RH	Rhodi-	PE	Pelli-		

WRB 98 CLASSIFICATION: SOIL GROUP

AC	Acrisol	CH	Chernozem	KS	Kastanozem	PT	Plinthosol
AB	Albeluvisol	CR	Cryosol	LP	Leptosol	PZ	Podzol
AL	Alisol	DU	Durisol	LX	Lixisol	RG	Regosol
AN	Andosol	FR	Ferralsol	LV	Luvisol	SC	Solonchak
AT	Anthrosol	FL	Fluvisol	NT	Nitisol	SN	Solonetz
AR	Arenosol	GL	Gleysol	PH	Phaeozem	UM	Umbrisol
CL	Calcisol	GY	Gypsisol	PL	Planosol	VR	Vertisol
CM	Cambisol	HS	Histosol				

AP	Abruptic	ES	Eutrisilic	LL	Lamellic	RG	Regic
AE	Aceric	FL	Ferralic	LE	Leptic	RZ	Rendizc
AC	Acric	FLH	Hyperferralic	LEN	Endoleptic	RH	Rheic
AO	Acroxic	FLW	Hypoferralic	LEP	Epileptic	RO	Rhodic
AB	Albic	FR	Ferric	LI	Lithic	RU	Rubic
ABH	Hyperalbic	FRH	Hyperferric	LIP	Paralithic	RP	Ruptic
ABG	Glossalbic	FI	Fibric	LX	Lixic	RS	Rustic
AX	Alcalic	FO	Folic	LV	Luvic	SZ	Salic
AL	Alic	FV	Fluvic	LVW	Hypoluvic	SZN	Endosalic
AU	Alumic	FG	Fragic	MG	Magnesic	SZP	Episalic
AN	Andic	FU	Fulvic	MZ	Mazic	SZW	Hyposalic
ANA	Aluandic	GA	Garbic	ME	Melanic	SA	Sapric
ANS	Silandic	GE	Gelic	MS	Mesotrophic	SI	Silic
AQ	Anthraquic	GT	Gelistagnic	MO	Mollic	SL	Siltic
AM	Anthric	GR	Geric	NA	Natric	SK	Skeletic
AH	Anthropic	GI	Gibbsic	NI	Nitic	SKN	Endoskeletic
AI	Aric	GC	Glacic	OH	Ochric	SKP	Episkeletic
AR	Arenic	GL	Gleyic	OHH	Hyperochric	SO	Sodic
AD	Aridic	GLN	Endogleyic	OM	Ombric	SON	Endosodic
AZ	Arzic	GLP	Epigleyic	OR	Orthic	SOW	Hyposodic
CA	Calcaric	GS	Glossic	OA	Oxyaquic	SD	Spodic
CC	Calcic	GSM	Molliglossic	PH	Pachic	SP	Spolic
CCH	Hypercalcic	GSU	Umbriglossic	PE	Pellic	ST	Stagnic
CCW	Hypocalcic	GZ	Greyic	PT	Petric	STN	Endostagnic
CCO	Orthicalcic	GM	Grumic	PTP	Epipetric	SU	Sulphatic
CB	Carbic	GY	Gypsic	PC	Petrocalcic	TY	Takyric
CN	Carbonatic	GYH	Hypergypsic	PD	Petroduric	TF	Tephric
CH	Chernic	GYW	Hypogypsic	PG	Petrogypsic	TR	Terric
CL	Chloridic	GP	Gypsiric	PP	Petroplinthic	TI	Thionic
CR	Chromic	HA	Haplic	PS	Petrosalic	TIO	Orthithionic

CY	Cryic	HI	Histic	PI	Placic	TIT	Protothionic
CT	Cutanic	HIF	Fibrihistic	PA	Plaggic	TX	Toxic
DN	Densic	HIS	Saprihistic	PN	Planic	TU	Turbic
DU	Duric	HIB	Thaptohistic	PL	Plinthic	UM	Umbric
DY	Dystric	HT	Hortic	PLP	Epiplinthic	UB	Urbic
DYE	Epidystric	HU	Humic	PLH	Hyperplinthic	VT	Vetic
DYH	Hyperdystric	HUM	Mollihumic	PLO	Orthiplinthic	VM	Vermic
DYO	Orthidystric	HUU	Umbrihumic	PLR	Paraplinthic	VR	Vertic
ET	Entic	HG	Hydragric	PO	Posic	VI	Vitric
EU	Eutric	HY	Hydric	PF	Profondic	XA	Xanthic
EUN	Endoeutric	HK	Hyperskeletic	PR	Protic	YE	Yermic
EUH	Ypereutric	IR	Irragric	RD	Reductic	YES	Nudiyermic
EUO	Orthieutric						

WRB 98 CLASSIFICATION: SOIL UNIT SPECIFIER

D	Bathi	P	Epi	O	Orthi	T	Proto
C	Cumuli	H	Hyper	R	Para	B	Thapto
N	Endo	W	Hypo				

USDA 87 CLASSIFICATION: GREAT GROUPS

Alfisols		EQS	Psammaquent	IQL	Plinthaquept	OUA	Haplustox
ABB	Paleboralf	EQT	Tropaquent	IQN	Andaquept	OUC	Acrustox
ABE	Eutroboralf	EQV	Fluvaquent	IQP	Placaquept	OUE	Eutrustox
ABF	Fragiboralf	EQW	Hydraquent	IQS	Sulfaquept	OUK	Kandiustox
ABG	Glossoboralf	ER	Arent	IQT	Tropaquept	OUS	Sombriustox

ABN	Natriboralf	ESC	Cryopsamment	IQX	Halaquept		
ABO	Cryoboralf	ESD	Udipsamment	ITE	Eutropept	***Spodosols***	
ADA	Hapludalf	ESP	Torripsamment	ITH	Humitropept	SHA	Haplohumod
ADB	Paleudalf	EST	Tropopsamment	ITS	Sombritropept	SHC	Cryohumod
ADC	Agrudalf	ESU	Ustipsamment	ITU	Ustropept	SHF	Fragihumod
ADF	Fragiudalf	ESX	Xeropsamment	ITY	Dystropept	SHP	Placohumod
ADG	Glossudalf	ESZ	Quartzipsamment			SHT	Tropohumod
ADI	Ferrudalf	EVC	Cryofluvent	***Mollisols***		SI	Ferrod
ADK	Kandiudalf	EVD	Udifluvent	MBA	Haploboroll	SOA	Haplorthod
ADN	Natrudalf	EVP	Torrifluvent	MBB	Paleboroll	SOC	Cryorthod
ADR	Rhodudalf	EVT	Tropofluvent	MBC	Cryoboroll	SOF	Fragiorthod
AGF	Fraglossudalf	EVU	Ustifluvent	MBK	Calciboroll	SOP	Placorthod
AQD	Duraqualf	EVX	Xerofluvent	MBN	Natriboroll	SOT	Troporthod
AQF	Fragiaqualf			MBR	Argiboroll	SQA	Haplaquod
AQG	Glossaqualf	***Histosols***		MBV	Vermiboroll	SQC	Cryaquod
AQK	Kandiaqualf	HAC	Cryosaprist	MDA	Hapludoll	SQD	Duraquod
AQL	Plinthaqualf	HAM	Medisaprist	MDB	Paleudoll	SQF	Fragiaquod
AQM	Umbraqualf	HAR	Borosaprist	MDR	Argiudoll	SQP	Placaquod
AQN	Natraqualf	HAT	Troposaprist	MDV	Vermudoll	SQS	Sideraquod
AQO	Ochraqualf	HEB	Borohemist	MQA	Haplaquoll	SQT	Tropaquod
AQW	Albaqualf	HEC	Cryohemist	MQC	Cryaquoll		
AUA	Haplustalf	HEI	Sulfihemist	MQD	Duraquoll	***Ultisols***	
AUB	Paleustalf	HEL	Luvihemist	MQK	Calciaquoll	UDA	Hapludult
AUD	Durustalf	HEM	Medihemist	MQN	Natraquoll	UDB	Paleudult
AUH	Kanhaplustalf	HEO	Sulfohemist	MQR	Argiaquoll	UDF	Fragiudult
AUK	Kandiustalf	HET	Tropohemist	MR	Rendoll	UDL	Plinthudult
AUL	Plinthustalf	HIB	Borofibrist	MUA	Haplustoll	UDR	Rhodudult
AUN	Natrustalf	HIC	Cryofibrist	MUB	Paleustoll	UHA	Haplohumult
AUR	Rhodustalf	HIL	Luvifibrist	MUD	Durustoll	UHB	Palehumult
AXA	Haploxeralf	HIM	Medifibrist	MUK	Calciustoll	UHH	Kandihaplohumult
AXB	Palexeralf	HIS	Sphagnofibrist	MUN	Natrustoll	UHK	Kandihumult
AXD	Durixeralf	HIT	Tropofibrist	MUR	Argiustoll	UHL	Plinthohumult
AXF	Fragixeralf	HLB	Borofolist	MUV	Vermustoll	UHS	Sombrihumult

AXL	Plinthoxeralf	HLC	Cryofolist
AXN	Natrixeralf	HLT	Tropofolist
AXR	Rhodoxeralf		

Inceptisols

IG	Plaggept
IMA	Haplumbrept
IMC	Cryumbrept
IMF	Fragiumbrept
IMX	Xerumbrept
INC	Cryandept
IND	Durandept
INE	Eutrandept
INP	Placandept
INV	Vitrandept
INW	Hydrandept
INY	Dystrandept
IOC	Cryochrept
IOD	Durochrept
IOE	Eutrochrept
IOF	Fragiochrept
IOU	Ustochrept
IOX	Xerochrept
IOY	Dystrochrept
IQA	Haplaquept
IQC	Cryaquept
IQF	Fragiaquept
IQH	Humaquept

Aridisols

DOB	Paleorthid
DOD	Durorthid
DOG	Gypsiorthid
DOK	Calciorthid
DOM	Camborthid
DOS	Salorthid
DRA	Haplargid
DRB	Paleargid
DRD	Durargid
DRJ	Nadurargid
DRN	Natrargid

Entisols

EOC	Cryorthent
EOD	Udorthent
EOP	Torriorthent
EOT	Troporthent
EOU	Ustorthent
EOX	Xerorthent
EQA	Haplaquent
EQC	Cryaquent
EQI	Sulfaquent

MWN	Natralboll
MWR	Argialboll
MXA	Haploxeroll
MXD	Durixeroll
MXK	Calcixeroll
MXN	Natrixeroll
MXR	Argixeroll
MXP	Palexeroll

Oxisols

ODA	Hapludox
ODC	Acrudox
ODE	Eutrudox
ODK	Kandiudox
ODS	Sombriudox
OPA	Haploperox
OPC	Acroperox
OPE	Eutroperox
OPK	Kandiperox
OPS	Sombriperox
OQA	Haplaquox
OQC	Acraquox
OQE	Eutraquox
OQL	Plinthaquox
OTA	Haplotorrox
OTC	Acritorrox
OTE	Eutrotorrox

UQB	Paleaquult
UQF	Fragiaquult
UQK	Kandiaquult
UQL	Plinthaquult
UQM	Umbraquult
UQO	Ochraquult
UQW	Albaquult
UUA	Haplustult
UUB	Paleustult
UUH	Kandihaplustult
UUK	Kandiustult
UUL	Plinthustult
UUR	Rhodustult
UXA	Haploxerult
UXB	Palexerult

Vertisols

VDL	Pelludert
VDR	Chromudert
VP	Torrert
VUL	Pellustert
VUR	Chromustert
VXL	Pelloxerert
VXR	Chromoxerert

AA	Typic	AR32	Argic Vertic	GR11	Grossarenic Rhodic	PE14	Petrocalcic Xerollic
AB	Abruptic	AR34	Aridic	GR12	Grossarenic Petrocalcic	PE16	Petroferric
AB04	Abruptic Aridic	AR36	Aridic Calcic	GR13	Grossarenic Ustollic	PE17	Petroferric Rhodic
AB08	Abruptic Cryic	AR36	Aridic Calcic	GR14	Grossarenic Ustalfic	PE20	Petrogypsic
AB10	Abruptic Haplic	AR42	Aridic Duric	GR15	Grossarenic Aridic	PK	Placic
AB14	Abruptic Udic	AR42	Aridic Duric	HA	Haplaquodic	PK10	Plaggeptic
AB16	Abruptic Xerollic	AR50	Aridic Pachic	HA01	Haplaquic	PK12	Plaggic
AC	Acric	AR52	Aridic Petrocalcic	HA02	Haplic	PL	Plinthaquic
AC05	Acric Plinthic	BO	Boralfic	HA05	Haplohumic	PL04	Plinthic
AE	Aeric	BO02	Boralfic Lithic	HA07	Haploxerollic	PL06	Plinthudic
AE03	Aeric Arenic	BO04	Boralfic Udic	HA09	Hapludic	PS	Psammaquentic
AE05	Aeric Grossarenic	BO06	Borollic	HA12	Hapludollic	PS02	Psammentic
AE06	Aeric Mollic	BO08	Borollic Glossic	HA16	Haplustollic	PS04	Psammentic Kandic
AE09	Aeric Tropic	BO10	Borollic Lithic	HE	Hemic	PS06	Psammentic Rhodic
AE10	Aeric Umbric	BO12	Borollic Vertic	HE02	Hemic Terric	PS08	Psammentic Kandic Rhodic
AE12	Aeric Xeric	CA	Calcic	HI	Histic	PS09	Psammentic Ustollic
AL	Albaquic	CA04	Calcic Pachic	HI02	Histic Lithic	PS10	Psammentic Ustalfic
AL02	Albaquultic	CA06	Calciorthidic	HI06	Histic Pergelic	QU	Quartzipsammentic
AL04	Albic	CA10	Calcixerollic	HU	Humic	RE	Rendollic
AL08	Albic Glossic	CA20	Cambic	HU02	Humic Lithic	RH	Rhodic
AL09	Albic Alfic	CH	Chromic	HU05	Humic Pergelic	RU02	Ruptic-Alfic
AL10	Alfic	CH06	Chromudic	HU06	Humoxic	RU09	Ruptic-Lithic
AL12	Alfic Arenic	CR	Cryic	HU10	Humaqueptic	RU11	Ruptic-Lithic-Entic
AL13	Alfic Andeptic	CR10	Cryic Lithic	HU15	Humic Rhodic	RU15	Ruptic-Lithic-Xerochreptic
AL16	Alfic Lithic	CR14	Cryic Pachic	HU20	Humic Xanthic	RU17	Ruptic-Ultic
AN	Andic	CU	Cumulic	HY	Hydric	RU19	Ruptic-Vertic
AN01	Andeptic	CU02	Cumulic Udic	HY02	Hydric Lithic	SA	Salorthidic
AN03	Andaquic	CU04	Cumulic Ultic	IN	Inceptic	SA02	Sapric
AN06	Andic Dystric	DU	Durargidic	KA	Kandic	SA04	Sapric Terric
AN11	Andeptic Glos soboric	DU02	Duric	KA02	Kandiudalfic	SI	Sidfric

Code	Name	Code	Name	Code	Name	Code	Name
AN20	Andic Udic	DU08	Duroxerollic	KA04	Kandiustalfic	SO	Sombric
AN22	Andic Ustic	DU10	Duroxerollic Lithic	KH	Kanhaplic	SO04	Sombrihumic
AN24	Andaqueptic	DU11	Durochreptic	LE	Leptic	SP	Sphagnic
AN25	Anionic	DU12	Durorthidic	LI	Limnic	SP02	Sphagnic Terric
AN30	Anthropic	DU14	Durorthidic Xeric	LI02	Lithic	SP04	Spodic
AQ	Aqualfic	DY02	Dystric	LI03	Lithic Petrocalcic	SU	Sulfic
AQ02	Aquentic	DY03	Dystric Enthic	LI04	Lithic Mollic	TE	Terric
AQ04	Aqueptic	DY04	Dystric Fluventic	LI05	Lithic Pergelic	TH04	Thapto-Histic
AQ06	Aquic	DY06	Dystric Lithic	LI06	Lithic Ruptic-Alfic	TH06	Thapto-Histic Tropic
AQ08	Aquic Arenic	DY08	Dystropeptic	LI07	Lithic Ruptic-Argic	TO	Torrertic
AQ14	Aquic Duric	EN	Entic	LI08	Lithic Ruptic-Entic Xerollic	TO02	Torrifluventic
AQ16	Aquic Durorthidic	EN02	Enthic Lithic	LI09	Lithic Ruptic-Entic	TO04	Torriorthentic
AQ18	Aquic Dystric	EN04	Eutropeptic	LI10	Lithic Udic	TO06	Torripsammentic
AQ24	Aquic Haplic	EN06	Enthic Ultic	LI11	Lithic Ruptic-xerorthentic	TO10	Torroxic
AQ26	Aquic Lithic	EP	Epiaquic	LI12	Lithic Ultic	TR	Tropaquodic
AQ31	Aquic Psammentic	EP10	Epiaquic Orthoxic	LI13	Lithic Ruptic-Ultic	TR02	Tropeptic
AQ34	Aquollic	EU	Eutric	LI14	Lithic Umbric	TR04	Tropic
AQ36	Aquultic	EU02	Eutrochreptic	LI15	Lithic Ruptic-Xerochreptic	UD	Udertic
AR	Arenic	EU04	Eutropeptic	LI16	Lithic Ustic	UD01	Udalfic
AR02	Arenic Aridic	FE	Ferrudalfic	LI18	Lithic Ustollic	UD02	Udic
AR04	Arenic Plinthaquic	FI	Fibric	LI20	Lithic Vertic	UD03	Udollic
AR06	Arenic Plinthic	FI02	Fibric Terric	LI22	Lithic Xeric	UD05	Udorthentic
AR07	Arenic Kandic	FL02	Fluvaquentic	LI24	Lithic Xerollic	UD10	Udoxic
AR08	Arenic Rhodic	FL06	Fluventic	MO	Mollic	UL	Ultic
AR09	Arenic Kandic Rhodic	FL12	Fluventic Umbric	NA06	Natric	UM	Umbreptic
AR10	Arenic Ultic	FR10	Fragiaquic	OC	Ochreptic	UM02	Umbric
AR11	Arenic Kanhaplic	FR18	Fragic	OR	Orthidic	US	Ustalfic
AR12	Arenic Kanhaplic Rhodic	GL02	Glossaquic	OR01	Orthic	US02	Usteric
AR13	Arenic Petrocalcic	GL04	Glossic	OR02	Orthoxic	US04	Ustic
AR14	Arenic Umbric	GL10	Glossic Udic	PA	Pachic	US06	Ustochreptic
AR15	Arenic Calciorthidic	GL12	Glossic Ustollic	PA02	Pachic udic	US08	Ustollic
AR16	Arenic Ustalfic	GL14	Glossoboralfic	PA04	Pachic Ultic	US12	Ustoxic
AR17	Arenic Ustochreptic	GL16	Glossoboric	PA06	Paleorthidic	VE	Vermic

AR18	Arenic Ustollic	GR	Grossarenic	PA08	Paleustollic	VE01	Vertic
AR19	Arenic Petroferric	GR01	Grossarenic Entic	PA10	Palexerollic	XA	Xanthic
AR20	Arenic Petroferric Rhodic	GR04	Grossarenic Plinthic	PA20	Paralithic Vertic	XE	Xeralfic
AR21	Arenic Paleorthidic	GR05	Grossarenic Petroferric	PE	Pergelic	XE02	Xerertic
AR22	Argiaquic	GR06	Grossarenic petroferric Rhodic	PE01	Pergelic Ruptic-Histic	XE04	Xeric
AR24	Argiaquic Xeric	GR07	Grossarenic Kandic	PE02	Pergelic Sideric	XE08	Xerollic
AR26	Argic	GR08	Grossarenic Kandic Rhodic	PE04	Petrocalcic		
AR28	Argic Lithic	GR09	Grossarenic Kanhaplic	PE06	Petrocalcic Ustalfic		
AR30	Argic Pachic	GR10	Grossarenic Kanhaplic Rhodic	PE08	Petrocalcic Ustollic		

USDA 87 CLASSIFICATION: FAMILIES

Mineralogy

03	allitic	16	ferrigenous	28	kaolinitic	40	oxidic
05	carbonatic	18	gibbsitic	30	marly	44	serpentinitic
08	coprogenous	20	glauconitic	32	micaceous	46	siliceous
09	chloritic	22	gypsic	34	mixed	50	vermiculitic
10	diatomaceous	24	halloysitic	35	mixed(calcareous)		
12	ferrihumic	26	illitic	37	montmorrilonitic		
14	ferritic	27	illitic(calcareous)	38	montmorrilonitic(calc.)		

Texture

003	cindery	020	medial o.loamy skeletal	056	clayey skeletal	098	fine loamy o.fragmental
004	cindery over sandy	022	medial over sandy	058	clayey-skeletal o.sandy	100	fine loamy o.sandy (skel)
005	ashy	024	medial o.thixotropic	062	sandy	102	fine loamy o.clayey
006	cindery over loamy	026	thixotropic	063	sandy or sandy skeletal	106	fine silty
007	ashy over cindery	027	thixotropic skeletal	064	sandy over clayey	108	fine silty o.fragmental
008	ashy over loamy	028	thixotropic o.fragmental	066	sandy over clayey	110	fine silty o.sandy
009	ashy skeletal	030	thixotropic o. sandy (sk)	068	loamy	112	fine silty o.clayey
010	medial	032	thixotropic o.loamy skel.	072	loamy over sandy(skel)	114	clayey
011	medial skeletal	034	thixotropic over loamy	080	coarse loamy	116	clayey over fragmental
012	medial o. cindery	036	fragmental	082	coarse loamy o.fragmental	118	clayey over sandy
013	ashy over loamy skeletal	044	sandy skeletal	084	coarse loamy o.sandy (sk)	120	clayey o.loamy skeletal
014	medial o.clayey	046	sandy skeletal o. loamy	086	coarse loamy o.clayey	122	clayey over fine silty
015	cindery o.medial skeletal	050	loamy skeletal	088	coarse silty	124	clayey over loamy
016	medial o.fragmental	051	loamy skeletal o.fragment	092	coarse silty o.sandy	126	fine
017	cindery over medial	052	loamy skeletal o.sandy	094	coarse silty o.clayey	134	very fine
018	medial o.loamy	054	loamy skeletal o. clayey	096	fine loamy		
019	ashy over medial	055	loamy or clayey skeletal	097	fine-loamy over cindery		

Reaction

AL	allic	AC	acid	EU	euic	DY	dysic
NC	noncalcareous	NA	nonacid				

Alfisols

JAA	Cryaqualfs
JAB	Plinthaqualfs
JAC	Duraqualfs
JAD	Natraqualfs
JAE	Fragiaqualfs
JAF	Kandiaqualfs
JAG	Vermaqualfs
JAH	Albaqualfs
JAI	Glossaqualfs
JAJ	Epiaqualfs
JAK	Endoaqualfs
JBA	Palecryalfs
JBB	Glossocryalfs
JBC	Haplocryalfs
JCA	Durustalfs
JCB	Plinthustalfs
JCC	Natrustalfs
JCD	Kandiustalfs
JCE	Kanhaplustalfs
JCF	Paleustalfs
JCG	Rhodustalfs
JCH	Haplustalfs
JDA	Durixeralfs
JDB	Natrixeralfs
JDC	Fragixeralfs
JDD	Plinthoxeralfs
JDE	Rhodoxeralfs
JDF	Palexeralfs
JDG	Haploxeralfs

GDB	Natrigypsids
GDC	Argigypsids
GDD	Calcigypsids
GDE	Haplogypsids
GEA	Petroargids
GEB	Natrargids
GEC	Paleargids
GED	Gypsiargids
GEE	Calciargids
GEF	Haplargids
GFA	Petrocalcids
GFB	Haplocalcids
GGA	Aquicambids
GGB	Petrocambids
GGC	Anthracambids
GGD	Haplocambids

Entisols

LAA	Sulfaquents
LAB	Hydraquents
LAC	Cryaquents
LAD	Psammaquents
LAE	Fluvaquents
LAF	Epiaquents
LAG	Endoaquents
LBA	Ustarents
LBB	Xerarents
LBC	Torriarents
LBD	Udarents
LCA	Cryopsamments

Inceptisols

KAA	Sulfaquepts
KAB	Petraquepts
KAC	Halaquepts
KAD	Fragiaquepts
KAE	Cryaquepts
KAF	Vermaquepts
KAG	Humaquepts
KAH	Epiaquepts
KAI	Endoaquepts
KBA	Plagganthrepts
KBB	Haplanthrepts
KCA	Eutrocryepts
KCB	Dystrocryepts
KDA	Durustepts
KDB	Calciustepts
KDC	Dystrustepts
KDD	Haplustepts
KEA	Durixerepts
KEB	Calcixerepts
KEC	Fragixerepts
KED	Dystroxerepts
KEE	Haploxerepts
KFA	Sulfudepts
KFB	Durudepts
KFC	Fragiudepts
KFD	Eutrudepts
KFE	Dystrudepts

EDE	Haploperox

Inceptisols *(Oxisols)*

EEA	Sombriudox
EEB	Acrudox
EEC	Eutrudox
EED	Kandiudox
EEE	Hapludox

Spodosols

CAA	Cryaquods
CAB	Alaquods
CAC	Fragiaquods
CAD	Placaquods
CAE	Duraquods
CAF	Epiaquods
CAG	Endoaquods
CBA	Placocryods
CBB	Durycriods
CBC	Humicryods
CBD	Haplocryods
CCA	Placohumods
CCB	Durihumods
CCC	Fragihumods
CCD	Haplohumods
CDA	Placorthods
CDB	Durorthods
CDC	Fragiorthods
CDD	Alorthods
CDE	Haplorthods

Ultisols

JEA	Natrudalfs	LCB	Torripsamments	**Mollisols**		HAA	Plinthaquults
JEB	Ferrudalfs	LCC	Quartzipsamments	IAA	Natralbolls	HAB	Fragiaquults
JEC	Fraglossudalfs	LCD	Ustipsamments	IAB	Argialbolls	HAC	Albaquults
JED	Fragiudalfs	LCE	Xeropsamments	IBA	Cryaquolls	HAD	Kandiaquults
JEE	Kandiudalfs	LCF	Udipsamments	IBB	Duraquolls	HAE	Kanhaplaquults
JEF	Kanhapludalfs	LDA	Cryofluvents	IBC	Natraquolls	HAF	Paleaquults
JEG	Paleudalfs	LDB	Xerofluvents	IBD	Calciaquolls	HAG	Umbraquults
JEH	Rhodudalfs	LDC	Ustifluvents	IBE	Argiaquolls	HAH	Epiaquults
JEI	Glossudalfs	LDD	Torrifluvents	IBF	Epiaquolls	HAI	Endoaquults
JEJ	Hapludalfs	LDE	Udifluvents	IBG	Endoaquolls	HBA	Sombrihumults
		LEA	Cryiorthents	ICA	Cryrendolls	HBB	Plinthohumults
Andisols		LEB	Torriorthents	ICB	Haprendolls	HBC	Kandihumults
DAA	Cryaquands	LEC	Xerorthents	IDA	Duricryolls	HBD	Kanhaplohumults
DAB	Placaquands	LED	Ustorthents	IDB	Natricryolls	HBE	Palehumults
DAC	Duraquands	LEE	Udorthents	IDC	Palecryolls	HBF	Haplohumults
DAD	Vitraquands			IDD	Argicryolls	HCA	Plinthudults
DAE	Melanaquands	**Gelisols**		IDE	Calcicryolls	HCB	Fragiudults
DAF	Epiaquands	AAA	Folistels	IDF	Haplocryolls	HCC	Kandiudults
DAG	Endoaquands	AAB	Glacistels	IEA	Durixerolls	HCD	Kanhapludults
DBA	Duricryands	AAC	Fibristels	IEB	Natrixerolls	HCE	Paleudults
DBB	Hydrocryands	AAD	Hemistels	IEC	Palexerolls	HCF	Rhodudults
DBC	Melanocryands	AAE	Sapristels	IED	Calcixerolls	HCG	Hapludults
DBD	Fulvicryands	ABA	Histoturbels	IEE	Argixerolls	HDA	Plinthustults
DBE	Vitricryands	ABB	Aquiturbels	IEF	Haploxerolls	HDB	Kandiustults
DBF	Haplocryands	ABC	Anhyturbels	IFA	Durustolls	HDC	Kanhaplustults
DCA	Duritorrands	ABD	Molliturbels	IFB	Natrustolls	HDD	Paleustults
DCB	Vitritorrands	ABE	Umbriturbels	IFC	Calciustolls	HDE	Rhodustults
DCC	Haplotorrands	ABF	Psammoturbels	IFD	Paleustolls	HDF	Haplustults
DDA	Vitrixerands	ABG	Haploturbels	IFE	Argiustolls	HEA	Palexerults
DDB	Melanoxerands	ACA	Historthels	IFF	Vermustolls	HEB	Haploxerults
DDC	Haploxerands	ACB	Aquorthels	IFG	Haplustolls		
DEA	Ustivitrands	ACC	Anhyorthels	IGA	Natrudolls	**Vertisols**	
DEB	Udivitrands	ACD	Mollorthels	IGB	Calciudolls	FAA	Salaquerts

Code	Name	Code	Name	Code	Name	Code	Name
DFA	Durustands	ACE	Umbrorthels	IGC	Paleudolls	FAB	Duraquerts
DFB	Haplustands	ACF	Argiorthels	IGD	Argiudolls	FAC	Natraquerts
DGA	Placudands	ACG	Psammorthels	IGE	Vermudolls	FAD	Calciaquerts
DGB	Durudands	ACH	Haplorthels	IGF	Hapludolls	FAE	Dystraquerts
DGC	Melanudands					FAF	Epiaquerts
DGD	Hydrudands	***Histosols***		***Oxisols***		FAG	Endoaquerts
DGE	Fulvudands	BAA	Cryofolists	EAA	Acraquox	FBA	Humicryerts
DGF	Hapludands	BAB	Torrifolist	EAB	Plinthaquox	FBB	Haplocryerts
		BAC	Ustifolists	EAC	Eutraquox	FCA	Durixererts
Aridisols		BAD	Udifolists	EAD	Haplaquox	FCB	Calcixererts
GAA	Salicryids	BBA	Cryofibrists	EBA	Acrotorrox	FCC	Haploxererts
GAB	Petrocryids	BBB	Sphagnofibrists	EBB	Eutrotorrox	FDA	Salitorrerts
GAC	Gypsicryids	BBC	Haplofibrists	EBC	Haplotorrox	FDB	Gypsitorrerts
GAD	Argicryids	BCA	Sulfosaprists	ECA	Sombriustox	FDC	Calcitorrerts
GAE	Calcicryids	BCB	Sulfisaprists	ECB	Acrustox	FDD	Haplotorrerts
GAF	Haplocryids	BCC	Cryosaprists	ECC	Eutrustox	FEA	Dystrusterts
GBA	Aquisalids	BCD	Haplosaprists	ECD	Kandiustox	FEB	Salusterts
GBB	Haplosalids	BDA	Sulfohemists	ECE	Haplustox	FEC	Gypsiusterts
GCA	Natridurids	BDB	Sulfihemists	EDA	Sombriperox	FED	Calciusterts
GCB	Argidurids	BDC	Luvihemists	EDB	Acroperox	FEE	Haplusterts
GCC	Haplodurids	BDD	Cryohemists	EDC	Eutroperox	FFA	Dystruderts
GDA	Petrogypsids	BDE	Haplohemists	EDD	Kandiperox	FFB	Hapluderts

USDA 98 CLASSIFICATION: SUBGROUPS

Code	Name	Code	Name	Code	Name	Code	Name
AA00	Typic	BA01	Argiaquic Xeric	CH00	Haploxerollic	DQ00	Placic
AB00	Abruptic	BB00	Argic	CI00	Hapto-Histic	DR00	Plagganthreptic
AB01	Abruptic Argiduridic	BC00	Argidic	CJ00	Hemic	DS00	Plinthaquic
AB02	Abruptic Haplic	BD00	Argiduridic	CK00	Histic	DT00	Plinthic
AB03	Abruptic Xeric	BE00	Aridic	CK01	Histic Lithic	DU00	Psammentic
AC00	Acraquoxic	BE01	Aridic Leptic	CK02	Histic Placic	DV00	Rendollic

Code	Name	Code	Name	Code	Name	Code	Name
AD00	Acrudoxic	BE02	Aridic Lithic	CL00	Humaqueptic	DW00	Rhodic
AD01	Acrudoxic Hydric	BF00	Calciargidic	CM00	Humic	DX00	Ruptic
AD02	Acrudoxic Plinthic	BG00	Calcic	CM01	Humic Inceptic	DY00	Ruptic-Alfic
AD03	Acrudoxic Thaptic	BG01	Calcic Lithic	CM02	Humic Lithic	DZ00	Ruptic-Histic
AD04	Acrudoxic Ultic	BG02	Calcic Pachic	CM03	Humic Pachic	EA00	Ruptic-Lithic
AD05	Acrudoxic Vitric	BG03	Calcic Udic	CM04	Humic Psammentic	EB00	Ruptic-Ultic
AE00	Acrustoxic	BH00	Calcidic	CM05	Humic Rhodic	EC00	Salic
AF00	Aeric	BI00	Cambidic	CM06	Humic Xanthic	ED00	Salidic
AF01	Aeric Chromic Vertic	BJ00	Chromic	CM07	Humic Xeric	EE00	Sapric
AF02	Aeric Fragic	BJ01	Chromic Udic	CN00	Hydraquentic	EF00	Sodic
AF03	Aeric Humic	BJ02	Chromic Vertic	CO00	Hydric	EF01	Sodic Ustic
AF04	Aeric Umbric	BK00	Cumulic	CO01	Hydric Pachic	EF02	Sodic Xeric
AF05	Aeric Vertic	BK01	Cumulic Ultic	CO02	Hydric Thaptic	EG00	Sombric
AG00	Albaquic	BK02	Cumulic Vertic	CP00	Inceptic	EH00	Sphagnic
AH00	Albaquultic	BL00	Duric	CQ00	Kandic	EI00	Spodic
AI00	Albic	BL01	Duric Histic	CR00	Kandiudalfic	EJ00	Sulfaqueptic
AI01	Albic Glossic	BL02	Duric Xeric	CS00	Kandiustalfic	EK00	Sulfic
AJ00	Alfic	BM00	Duridic	CT00	Kanhaplic	EL00	Sulfuric
AJ01	Alfic Arenic	BN00	Durinodic	CU00	Lamellic	EM00	Terric
AJ02	Alfic Humic	BN01	Durinodic Xeric	CU01	Lamellic Ustic	EN00	Thaptic
AJ03	Alfic Lithic	BO00	Dystric	CV00	Leptic	EO00	Thapto-Histic
AJ04	Alfic Oxyaquic	BO01	Dystric Fluventic	CV01	Leptic Torrertic	EP00	Torrertic
AJ05	Alfic Vertic	BO02	Dystric Vitric	CV02	Leptic Udic	EQ00	Torrifluventic
AK00	Alic	BP00	Entic	CV03	Leptic Vertic	ER00	Torriorthentic
AL00	Andic	BP01	Entic Grossarenic	CW00	Limnic	ES00	Torripsammentic
AL01	Andic Ombroaquic	BP02	Entic Lithic	CX00	Lithic	ET00	Torroxic
AM00	Anionic	BP03	Entic Udic	CX01	Lithic Mollic	EU00	Udandic
AM01	Anionic Aquic	BP04	Entic Ultic	CX02	Lithic Petrocalcic	EV00	Udertic
AN00	Anthraquic	BQ00	Eutric	CX03	Lithic Ruptic-Entic	EW00	Udic
AO00	Anthropic	BQ01	Eutric Lithic	CX04	Lithic Ruptic-Inceptic	EX00	Udifluventic
AP00	Aqualfic	BQ02	Eutric Pachic	CX05	Lithic Ultic	EY00	Udollic
AQ00	Aquandic	BQ03	Eutric Thaptic	CX06	Lithic Ustic	EZ00	Udorthentic
AR00	Aquentic	BR00	Fibric	CX07	Lithic Xeric	FA00	Udoxic

AS00	Aqueptic	BS00	Fluvaquentic	CY00	Lithic-Ruptic-Entic	FB00	Ultic
AT00	Aquertic	BS01	Fluvaquentic Vertic	CZ00	Mollic	FC00	Umbric
AT01	Aquertic Chromic	BT00	Fluventic	DA00	Natrargidic	FD00	Umbric Xeric
AU00	Aquic	BT01	Fluventic Humic	DB00	Natric	FD01	Ustalfic
AU01	Aquic Arenic	BU00	Fragiaquic	DC00	Natrixeralfic	FE00	Ustandic
AU02	Aquic Cumulic	BV00	Fragic	DE00	Nitric	FF00	Ustertic
AU03	Aquic Duric	BV01	Fragic Oxyaquic	DF00	Ombroaquic	FG00	Ustic
AU04	Aquic Durinodic	BW00	Glacic	DG00	Oxic	FH00	Ustifluventic
AU05	Aquic Dystric	BX00	Glossaquic	DH00	Oxyaquic	FI00	Ustollic
AU06	Aquic Humic	BY00	Glossic	DH01	Oxyaquic Ultic	FJ00	Ustoxic
AU07	Aquic Lithic	BY01	Glossic Ustic	DH02	Oxyaquic Vertic	FK00	Vermic
AU08	Aquic Natrargidic	BY02	Glossic Vertic	DI00	Pachic	FL00	Vertic
AU09	Aquic Petroferric	BZ00	Grossarenic	DI01	Pachic Udertic	FM00	Vitrandic
AV00	Aquicambidic	BZ01	Grossarenic Plinthic	DI02	Pachic Ultic	FN00	Vitric
AW00	Aquodic	CA00	Gypsic	DI03	Pachic Vertic	FO00	Vitritorrandic
AX00	Aquollic	CB00	Halic	DI04	Pachic Vitric	FP00	Vitrixerandic
AY00	Aquultic	CB01	Halic Terric	DJ00	Paleargidic	FQ00	Xanthic
AZ00	Arenic	CC00	Haplargidic	DK00	Palexerollic	FR00	Xeralfic
AZ01	Arenic Aridic	CD00	Haplic	DL00	Petrocalcic	FS00	Xereptic
AZ02	Arenic Plinthaquic	CD01	Haplic Haploxerollic	DM00	Petrocalcidic	FT00	Xerertic
AZ03	Arenic Plinthic	CD02	Haplic Palexerollic	DN00	Petroferric	FU00	Xeric
AZ04	Arenic Rhodic	CD03	Haplic Ustic	DO00	Petrogypsic	FV00	Xerofluventic
AZ05	Arenic Ultic	CE00	Haplocalcidic	DO01	Petrogypsic Ustic	FW00	Xerollic
AZ06	Arenic Umbric	CF00	Haploduridic	DP00	Petronodic		
AZ07	Arenic Ustic	CG00	Haploxeralfic	DP01	Petronodic Ustic		
BA00	Argiaquic	CG01	Haploxeralfic Natrargids	DP02	Petronodic Xeric		

USDA 98 CLASSIFICATION: FAMILIES

Mineralogy

01	Allitic	09	Gibbsitic	17	Isotic	25	Mixed
02	Amorphic	10	Glassy	18	Kaolinitic	26	Paramicaceous
03	Carbonatic	11	Glauconitic	19	Kaolinitic	27	Parasesquic
04	Ferrihydritic	12	Gypsic	20	Magnesic	28	Sesquic
05	Ferritic	13	Halloysitic	21	Micaceous	29	Siliceous
06	Ferritic	14	Halloysitic	22	Mixed	30	Smectitic
07	Ferruginous	15	Illitic	23	Mixed	31	Vermiculitic
08	Gibbsitic	16	Isotic	24	Mixed		

Texture

01	Ashy	08	Coarse-silty	15	Hydrous-skeletal	23	Sandy
02	Ashy-pumiceous	09	Fine	16	Loamy	24	Sandy-skeletal
03	Ashy-skeletal	10	Fine-loamy	18	Loamy-skeletal	25	Strongly Contrasting Particle-Size Classes
04	Cindery	11	Fine-silty	19	Medial	26	Very-fine
05	Clayey	12	Fragmental	20	Medial-pumiceous		
06	Clayey-skeletal	13	Hydrous	21	Medial-skeletal		
07	Coarse-loamy	14	Hydrous-pumiceous	22	Pumiceous		

Reaction

01	Acid	02	Allic	03	Calcareous	04	Nonacid

1.2. Climate classification (only in English language)

SOIL CLIMATE (USDA 87 AND 98): MOISTURE REGIME

AQ	Aquic	AR	Aridic	UD	Udic	US	Ustic
PQ	Peraquic	TO	Torric	PU	Perudic	XE	Xeric

SOIL CLIMATE (USDA 87 AND 98): TEMPERATURE REGIME

PG	Pergelic	TH	Thermic	IT	Isothermic	SG	Subgelic
CR	Cryic	HT	Hyperthermic	IH	Isohyperthermic		
FR	Frigid	IF	Isofrigid	MT	Megathermic		
ME	Mesic	IM	Isomesic	HG	Hypergelic		

1.3. Landform and topography

CODE	TOPOGRAPHY	TOPOGRAFÍA	TOPOGRAPHIE	TOPOGRAPHIE
F	flat	plana	plate	flach
A	almost flat	casi plana	fresque plate	nahezu flach
G	gently undulating	ligeramente ondulada	légèrement ondulée	leicht wellig
U	undulating	ondulada	ondulée	wellig
R	rolling	moderadamente ondulada	légèrement ondulée	wellig
H	hilly	colinada	collinaire	hügelig
S	steeply dissected	a fuertemente socavada	abrupte	steil zerklüftet
M	mountainous	montañosa	montagneuse	bergig

CODE	LANDFORM	GEOMORFOLOGÍA	GEOMORPHOLOGIE	GEOMORPHOLOGIE
AP	alluvial plain	llano aluvial	plaine alluviale	alluviale Ebene
BA	basin	cuenca	bassin	Becken
PY	beach	playa	plage	Strand
CP	coastal plain	llano costero	plaine côtière	Küstenebene
DT	delta	delta	delta	Delta
DU	dunefield	campo de dunas	champ de dunes	Dünenfeld
FG	fluvio-glacial plain	llano fluvio-glacial	plaine fluvio-glaciale	fluvio-glaziale Ebene
GP	glacial plain	llano glacial	plaine glaciaire	glaziale Ebene
HI	hill	colina	colline	Hügel
LP	lacustrine plain	llano lacustre	plaine lacustre	Ebene aus Seesedimenten
LA	lava plain	llano de lava	plaine de lave	Lavafeld
MO	mountain	montaña	montagne	Berg

PE	pediment	piedemonte	pédiment	Bergfußniederung
PN	peneplane	penillanura	pénéplaine	Fastebene, Penepläne
PL	plain	llano	plaine	Ebene
PT	plateau	meseta	plateau	Plateau, Hochebene
SP	sand plain	llano de arena	plaine de sable	Sandebene
TF	tidal flat	llanura mareal	slikke	Watt
UP	upland	sierra	chaîne de montagne	Hochland
VA	valley	valle	vallée	Tal
VO	volcano	volcán	volcan	Vulkan

CODE	LAND ELEMENT	POSICION FISIOGRÁFICA	POSITION PHYSIOGRAPHIQUE	LANDELEMENT
AF	alluvial fan	abanico aluvial	glacis alluvial	Schwemmfächer
BA	backswamp	pantano	marais	Auesumpf
BR	beachridge	frente de dunas	front de dunes maritimes	Strandwall
CA	caldera	caldera	cratère	Kaldera
CH	channel	canal	canal	Kanal
CO	coral reef	arrecife de coral	récif de corail	Korallenriff
DE	depression	depresión	dépression	Senke
DU	dune	duna	dune	Düne
FP	flood plain	llano inundable	plaine alluviale	Überschwemmungsgebiet
ID	interdune depression	depresión interdunar	dépression interdunaire	Dünensenke
IF	interfluve	interfluvio	interfluve	Riedel
LA	lagoon	laguna	lagune	Lagune
LE	levee	leve	levée	Damm
LD	longitudinal dune	duna longitudinal	dune longitudinale	langgestreckte Düne, angeschnittene Düne
ME	meseta	meseta	meseta	Hochebene
PA	pan	pan	pan	
RI	ridge	cordillera	crête de montagne	Kamm, Erddamm
SL	slope	pendiente	pente	Hang

TE	terrace	terraza	terrasse	Terasse
VA	valley	valle	vallée	Tal
VF	valley floor	fondo de valle	fond de vallée	Talgrund

CODE	POSITION	EMPLAZAMIENTO DEL PERFIL	POSITION DU PROFIL	POSITION DES PROFILS
CR	crest	cima	crête	Kamm
US	upper slope	pendiente alta	pente supérieure	Oberhang
MS	middle slope	pendiente media	pente intermédiaire	Mittelhang
LS	lower slope	pendiente baja	pente inférieure	Unterhang
SL	slope	pendiente	pente	Hang
HI	higher part	parte más alta	partie plus élevée	höhergelegenes Stück
IN	intermediate part	parte intermedia	partie intermédiaire	mittleres Stück
LO	lower part	parte más baja	partie plus basse	unteres Stück
BO	bottom	fondo	fond	Fuß

CODE	SLOPE GRADIENT	CLASE DE PENDIENTE	CLASSE DE PENTE DU TERRAIN	GEFÄLLE
0	0 - 0.1%			
1	0.1 - 0.3%			
2	0.3 - 0.7%			
3	0.7 - 2%			
4	2 - 8%			
5	8 - 16%			
6	16 - 30%			
7	> 30%			

CODE	SLOPE FORM	FORMA DE LA PENDIENTE	FORME DE LA PENTE	HANGFORM
S	straight	recta	droite	gerade
C	concave	cóncava	concave	konkav
V	convex	convexa	convexe	konvex
T	terraced	aterrazada	étagée en terrasses	terassenförmig
X	complex	compleja	complexe	komplex

CODE	MICROTOPOGRAPHY	MICROTOPOGRAFÍA	MICROTOPOGRAPHIE	MIKROTOPOGRAPHIE
GL	low gilgai	gilgai poco desarrollado	gilgai peu développé	niedriger Gilgai
GM	medium gilgai	gilgai moderadamente desarrollado	gilgai modérément développé	mittlerer Gilgai
GH	high gilgai	gilgai muy desarrollado	gilgai très développé	hoher Gilgai
GI	gilgai	gilgai	gilgai	Gilgai
TM	termite mounds	túmulos de termitas	tumulus de termites	Termitenhügel
AT	animal tracks	huellas de animales	empreintes d'animoux	Tierpfade
AB	animal burrows	madrigueras	galeries d'animaux	Tierhöhlen/-bau
HL	low hummocks	montículos bajos	monticules bas	niedrieger Hummock (Hügel)
HM	medium hummocks	montículos medios	monticules moyens	mittlerer Hummock (Hügel)
HH	high hummocks	montículos altos	monticules hauts	hoher Hummock (Hügel)
HU	hummocks	montículos	monticules	Hügel
UN	uneven	terreno no nivelado	terrain non nivelé	uneben
SS	shifting sands	arenas móviles	sables mobiles	Treibsand
LE	level	llano	niveau	Meeresniveau (?)
0	even	terreno nivelado	terrain nivelé	eben

1.4. Land use and vegetation

CODE	LAND USE	USO DEL TERRENO	USAGE DU TERRAIN	LANDNUTZUNG
0	none	ninguno	néant	keine
U	not used and not managed	sin uso ni manejo	non utilisé	ungenutzt und nicht verwaltet
S	settlements	urbano	agglomérations urbaines	Siedlungen
A	agriculture	agrícola	agricole	Landwirtschaft
AA	annual field cropping	cultivo anual	cultures annuelles	Jahreskultur
AP	perennial field cropping	cultivo perenne	cultures pérennes	halbjährliche Kultur
AT	tree cropping	cultivo arboreo	arbre	Baumanbau
H	animal husbandry	cria de ganado	élevage	Tierzucht
F	forestry	forestal	forêt	Forst
M	mixed farming	agricultura mixta	agriculture mixte	gemischte Landwirtschaft
E	extraction and collection	cantera	extraction et collection	
P	nature protection	zona protegida	zone protégée	Naturschutz
AF	agroforestry system	dehesa	système agro-sylvicole	
SR	residential use	uso residencial	usage résidence	Wohngebiete
SI	industrial use	uso industrial	usage industriel	Industrie
ST	roads	carreteras	routes	Straßen
SC	recreational use	uso recreativo	usage récréatif	
SX	excavation	excavación	excavation	Ausgrabungen
A1	shifting cultivation	cultivo migratorio	divagation des cultures	Wechselwirtschaft
A2	fallow system	barbecho	terre en jachère	Brache
A3	ley system cultivation	prado temporal	pâture temporaire	
A4	rainfed arable	cultivo arable inundado	culture arable inondée	Acker
A5	paddy rice cultivation	arroz bajo inundación	culture de riz inondée	Reiskultur
A6	irrigated cultivation	cultivo de riego	culture d'irrigation	Bewässerungskultur

CODE	HUMAN INFLUENCE	INFLUENCIA ANTRÓPICA	INFLUENCE HUMAINE	MENSCHLICHER EINFLUSS
0	no influence	sin influencia	sans influence	kein Einfluß
FE	application of fertilizers	fertilizado	application d'engrais	Einsatz von Düngemitteln
AD	artificial drainage	artificialmente drenado	drainage artificiel	künstliche Entwässerung
BU	bunding	cercado	bunding	
BR	burning with	con restos quemados	avec restes d'incendies	Verbrennung
CL	clearing	aclarado	éclairci	Rodung, Abholzung
IP	flood irrigation	riego a manta	irrigation par inondation	Bewässerng durch Überschwemmung
IF	furrow irrigation	riego por surco	irrigation par sillon	Rillen-, Furchenbewässerung
IU	irrigation	de regadío	irrigation	Bewässerung
IB	Border irrigation	riego	irrigation	Bewässerung
MU	mineral fertilizer use	uso de fertilizantes	usage des engrais	Nutzung von Mineraldüngern
VM	moderat. disturbed vegetation	vegetación modera. disturbada	végétation modérément troublé	mäßig gestörte Vegetation
NK	not known	desconocida	inconnue	unbekannt
MP	plaggen	plágeno	plaggen	plaggen
PL	ploughing	arado	labourage	pflügen
PO	pollution	contaminado	pollution	Verschmutzung
MR	raised beds	levantado	billons surélevés	Hochbeete
MS	sand additions	enarenado	apports de sable	Sandzugabe
VS	slightly disturbed vegetation	veget. ligeramente disturbada	végétation légèrement troublé	leicht gestörte Vegetation
IS	sprinkler irrigation	riego por aspersión	irrigation par aspersion	künstliche Beregnung
VE	strongly disturbed vegetation	vegetación fuert. disturbada	végétation fortement troublé	stark gestörte Vegetation
SC	surface compaction	compactado superficialmente	compaction de la surface	Oberflächenverdichtung
TE	terracing	aterrazado	terrassement	Terassierung
VU	vegetation disturbed	con vegetación alterada	végétation dégradée	gestörte Vegetation

CODE	CROPS	CULTIVOS	CULTURES	FELDFRUCHT
AL	alfalfa	alfalfa	luzerne	Luzerne
AM	almond tree	almendro	amandier	Mandelbaum
BA	barley	cebada	orge	Gerste
BE	beans	judías	haricots verts	Bohnen
CR	carthamus	cártamo	cartheme	
CH	cashew	anacardo	noix d'acajou	Cashewnüsse
CA	cassava	mandioca	cassave	
CO	cocoa	cacao	cacao	Kakao
CC	coconut	coco	noix de coco	Kokosnuß
CF	coffee	café	café	Kaffee
CT	cotton	algodón	coton	Baumwolle
CP	cowpea	frijol	niébé	
FB	flooded rice	arroz inundación	riz inondation	Reis
FR	fruits	cultivos frutícolas	fruits	Obst
GR	groundnut	cacahuete	arachide	Erdnuß
MA	maize	maíz	maïs	Mais
MI	millet	mijo	millet	Hirse
AV	oats	avena	avoine	Hafer
OP	oil palm	palma aceitera	palme à huile	Ölpalme
OL	olive tree	olivos	olivier	Olivenbaum
PE	peas	guisantes	petit pois	Erbsen
PO	potato	patata	pomme de terre	Kartoffel
RI	rice	arroz	riz	Reis
RR	rubber	caucho	caoutchouc	Kautschuk
SO	sorghum	sorgo	sorghum	
SY	soyabean	soja	soja	Sojabohne
SC	sugar cane	caña de azúcar	canne à sucre	Zuckerrohr
SB	sugarbeet	remolacha	betterave	Zuckerrübe
SF	sunflower	girasol	tournesol	Sonnenblumen
SP	sweet potato	batata	patate douce	Süßkartoffel

TE	tea	té	thé	Tee
TB	tobacco	tabaco	tabac	Tabak
RU	upland rice	arroz de tierras altas	riz de montagne	Hochlandreis
VE	vegetables	cultivos hortícolas	horticulture	Gemüse
VI	vine	vid	vigne	Wein
WH	wheat	trigo	blé	Weizen
YA	yams	ñame	igname	Jams

CODE	VEGETATION TYPE	TIPO DE VEGETACION	TYPE DE VÉGÉTATION	VEGETATIONSTYP
N	no vegetation	sin vegetación	sans vegetation	ohne Vegetation
F	closed forest	bosque cerrado	forêt dense	geschlossener Wald
FE	evergreen forest	bosque perennifolio	forêt à feuillage permoment	immergrüner Wald
FS	semi-deciduous forest	bosque semi-caducifolio	forêt à feuillage semi-caduc	Mischwald
FD	deciduous forest	bosque caducifolio	forêt à feuillage caduque	Laubwald
FX	xeromorphic forest	bosque xeromórfico	forêt xéromorphe	xeromorhischer Wald
W	woodland	bosque maderero	forêt claire	Waldland
WE	evergreen woodland	bosque maderero perennifolio	forêt claire sempervirente	immergrünes Waldland
WS	semi-deciduous woodland	bosque maderero semi-caducifolio	forêt claire à feuillage semi-caduque	gemischtes Waldland
WD	deciduous woodland	bosque maderero caducifolio	forêt claire à feuillage caduque	Laubwaldland
WX	xeromorphic woodland	bosque maderero xeromórfico	forêt claire xéromorphe	xeromorphisches Waldland
S	shrub	arbusto	arbuste	Strauch
SE	evergreen shrub	arbusto perennifolio	arbuste sempervirent	immergrüne Sträucher
SS	semi-deciduous shrub	arbusto semi-caducifolio	arbuste à feuillage semi-caduque	gemischte Sträucher
SD	deciduous shrub	arbusto caducifolio	arbuste à feuillage caduque	Laubsträucher
SX	xeromorphic shrub	arbusto xeromórfico	arbuste xéromorphe	xeromorphische Sträucher
D	dwarf shrub	arbusto enano	arbuste nain	Zwergsträucher
DE	evergreen dwarf shrub	arbusto enano perennifolio	arbuste nain sempervirent	immergrüne Zwergsträucher
DS	semi-deciduous dwarf shrub	arbusto enano semi-caducifolio	arbuste nain à feuillage semi-caduque	gemischte Zwergsträucher

DD	deciduous dwarf shrub	arbusto enano caducifolio	arbuste nain à feuillage caduque	Laubzwergsträucher
DX	xeromorphic dwarf shrub	arbusto enano xeromórfico	arbuste nain xéromorphe	xeromorphische Zwergsträucher
DT	tundra	tundra	toundra	Tundra
H	herbaceous	herbáceos	herbe	krautartige Pflanzen
HT	tall grassland	pasto alto	prairie haute	Langgrassteppe
HM	medium tall grassland	pasto medio	prairie moyenne	Steppe mit mittellangem Gras
HS	short grassland	pasto bajo	prairie basse	Kurzgrassteppe
HF	forb	helecho	herbe	
G	grassland	pradera	herbages	Steppe
SA	savanna	sabana	brousse	Savanne

CODE	SPECIES	ESPECIES	ESPECES	ARTEN
AO	andaluz oak	roble andaluz	chêne d'Andalousie	Andalusische Eiche
AP	aspen poplar	chopo temblón	peuplier tremble	
BP	black pine	pino negro	pin noir	Schwarzkiefer
CN	black poplar	chopo negro	peuplier noir	Schwarzpappel
CP	canario pine	pino canario	pin canario	Kanarische Kiefer
AL	carob tree	algarrobo	caroubier	Johannesbrotbaum
CT	chestnut tree	castaño	châtaigne	Kastanie
CO	cork oak	alcornoque	chêne-liège	Korkeiche
GU	guayule	guayule	guayule	
HO	holm oak	encina	yeuse	Stecheiche
LP	laricio pine	pino laricio	pin laricio	Lärche
MP	monterey pine	pino insigne	pin monterey	
MO	muricated oak	quejigo	chêneau	
PI	pinsapo	pinsapo	pinsapo	
RE	red eucaliptus	eucalipto rojo	eucalyptus rouge	roter Eukalyptus
SP	silvestre pine	pino silvestre	pin sylvestre	
PP	stone pine	pino piñonero	pin à pignons comestibles	Steinkiefer

WP	swamp pine	pino carrasco	pin des marécages	Sumpfkiefer
TO	Turkey oak	rebollo	chêne de Turquie	Türkische Eiche
WE	white eucaliptus	eucalipto blanco	eucalyptus blanc	weißer Eukalyptus
CB	white poplar	chopo blanco	peuplier blanc	Weißpappel
WO	wild olive	acebuche	olivier sauvage	Wilder Olivenbaum

CODE	GRASS COVER	CUBIERTA VEGETAL	COUVERTURE HERBACEE	GRASBEDECKUNG
0	0-15%			
1	15-40%			
2	40-80%			
3	>80%			

1.5. Parent material

CODE	PARENT MATERIAL	MATERIAL ORIGINAL	MATERIAU PARENTAL	AUSGANGSMATERIAL
AU	aeolian deposits	depósitos eólicos	dépôts éoliens	äolische Ablagerungen
AS	aeolian sand	arenas eólicas	sable éolien	Äolische Sande
AV	alluvium	terreno aluvial	sol alluvial	Alluvium
AH	alluvium (Holocene)	aluvial (Holoceno)	sol alluvial (Holocène)	Alluvium (Holozän)
AP	alluvium (Pleistocene)	aluvial (Pleistoceno)	sol alluvial (Pléistocène)	Alluvium (Pleistozän)
CO	colluvium	terreno coluvial	sol colluvial	Kolluvium
FL	fluvial deposits	depósitos fluviales	dépôts fluviaux	fluviale Ablagerungen
GL	glacial deposits	depósitos glaciales	dépôts glaciaires	glaziale Ablagerungen
WE	in situ weathered	meteorizado in situ	altéré in situ	in situ Verwitterung

LA	lacustrine deposits	depósitos lacustres	dépôts lacustres	Seeablagerungen
LG	lagoonal deposits	depósitos lagunares	dépôts lagunaires	Haff-Ablagerungen
LI	littoral deposits	depósitos litorales	dépôts littoraux	littorale Ablagerungen
LO	loess	loess	loess	Löß
LH	loess (Holocene)	loess (Holoceno)	loess (Holocène)	Löß (Holozän)
MA	marine deposits	depósitos marinos	dépôts marins	marine Ablagerungen
OR	organic deposits	depósitos orgánicos	dépôts organiques	organische Ablagerungen
PY	pyroclastic deposits	depósitos piroclásticos	dépôts pyroclastiques	pyroklastische Ablagerungen
UU	unconsolidated	sin consolidar	sans consolider	unverdichtet
VA	volcanic ash	cenizas volcánicas	cendres volcaniques	vulkanische Asche

CODE	PARENT ROCK	ROCA ORIGINAL	ROCHE-MÈRE	AUSGANGSGESTEIN
AC	acid igneous/metamorphic	roca ácida ígnea/metamórfica	roche acide ignée/métamorphique	sauer igneous/metamorph (?)
AN	andesite	andesita	andésite	Andesit
BT	basalt	basalto	basalte	Basalt
BA	basic igneous/metamorphic	roca básica ígnea/metamórfica	roche basique ignée/métamorphique	basisch igneous/metamorph
AH	clay (Holocene)	arcilla (Holoceno)	argile (Holocène)	Ton (Holozän)
AP	clay (Pliocene)	arcilla (Plioceno)	argile (Pliocène)	Ton (Pliozän)
CO	conglomerate	conglomerado	conglomérat	Konglomerat
CQ	conglomerate (Pleistocene)	conglomerado (Pleistoceno)	conglomérat (Pléistocène)	Konglomerat (Pleistozän)
CP	conglomerate (Pliocene)	conglomerado (Plioceno)	conglomérat (Pliocène)	Konglomerat (Pliozän)
DI	diorite	diorita	diorite	Diorith
DO	dolerite	dolerita	dolérite	Dolerith
DM	dolomite	dolomita	dolomite	Dolomit
EV	evaporite	evaporita	évaporite	Evaporite
GN	gneiss	gneis	gneiss	Gneis
GR	granite	granito	granite	Granit
IA	igneous rock	roca ígnea	roche ignée	
LM	lime (Miocene)	caliza (Mioceno)	calcaire (Miocène)	Kalk (Miozän)

LC	lime-sandstone (Miocene)	arenisca caliza (Mioceno)	grès calcaire (Miocène)	Kalksandstein (Miozän)
LS	lime-sandstone (Pliocene)	arenisca caliza (Plioceno)	grès limoniteux (Pliocène)	Kalksandstein (Pliozän)
LI	limestone	caliza	calcaire	Kalkstein
LK	limestone (Cambrium)	caliza (Cámbrico)	calcaire (Cambrique)	Kalkstein (Kambrium)
LE	limestone (Eocene)	caliza (Eoceno)	calcaire (Eocène)	Kalkstein (Eozän)
LJ	limestone (Jurassic)	caliza (Jurásico)	calcaire (Jurassique)	Kalkstein (Jura)
MA	marl	marga	marne	Mergel
MC	marl (Cretaceous)	marga (Cretáceo)	marne (Crétacé)	Mergel (Kreide)
ME	marl (Eocene)	marga (Eoceno)	marne (Eocène)	Mergel (Eozän)
MM	marl (Miocene)	marga (Mioceno)	marne (Miocène)	Mergel (Miozän)
MO	marl (Oligocene)	marga (Oligoceno)	marne (Oligocène)	Mergel (Oligozän)
MT	marl (Trias)	marga (Trías)	marne (Trias)	Mergel (Trias)
MP	marl-gypsum (Pliocene)	marga yesífera (Plioceno)	marne-gypsum (Pliocène)	Mergel-Gips (Pliozän)
MY	marl-gypsum (Triassic)	marga yesífera (Triásico)	marne-gypsum (Trias)	Mergel-Gips (Trias)
NK	not known	desconocida	inconnue	unbekannt
PU	pumice	pumita	pierre ponce	Bimsstein
PY	pyroclastic rock	roca piroclástica	roche pyroclastique	pyroklastiches Gestein
QZ	quartzite	cuarcita	quartzite	Quarzit
SA	sandstone	arenisca	grès	Sandstein
SO	sandstone (Oligocene)	arenisca (Oligoceno)	grès (Oligocène)	Sandstein (Oligozän)
SP	sandstone (Pleistocene)	arenisca (Pleistoceno)	grès (Pléistocène)	Sandstein (Pleistozän)
SC	schist	esquisto	schiste	Schiefer
SM	schist (Cambrium)	esquisto (Cámbrico)	schiste (Cambrique)	Schiefer (Kambrium)
ST	schist (Triassic)	esquisto (Triásico)	schiste (Triassique)	Schiefer (Trias)
SE	sedimentary rock	roca sedimentaria	roche sédimentaire	Sedimentgestein
SH	shale	lutita	shale	Schiefer
SK	shale (Cambrium)	lutita (Cámbrico)	shale (Cambrique)	Schiefer (Kambrium)
SN	shale (Carboniferous)	lutita (Carbonífero)	shale (Carbonifère)	Schiefer (?)
SD	shale (Devonian)	lutita (Devónico)	shale (Dévonien)	Schiefer (?)
SD	shale (Devonian)	lutita (Devónico)	shale (Dévonien)	Schiefer (Devon)
SI	siltstone	limonita	limonite	
TU	tuff	toba volcánica	tuf	Tuff
UB	ultrabasic rock	roca ultrabásica	roche ultrabasique	extrem basisches Gestein

CODE	EFFECTIVE SOIL DEPTH	PROFUNDIDAD ÚTIL	PROFONDEUR UTIL	EFFEKTIVE BODENTIEFE
1	0 -25cm			
2	25-50cm			
3	50-100cm			
4	100-150cm			
5	>150			

1.6.   Surface characteristics

CODE	STONES ABUNDANCE	PEDREGOSIDAD	ABONDANCE D'ELEMENTS GROSSIERS	STEINVORKOMMEN
0	nil	ninguna	néant	keine
V	very few	muy poca	très peu nombreux	sehr wenige
F	few	poca	peu nombreux	wenige
C	common	frecuente	nombreux	einige
M	many	mucha	très nombreux	viele
A	abundant	abundante	abondants	vorkommend
D	dominant	dominante	dominant	dominierend

CODE	STONES SIZE	TAMAÑO DE PIEDRAS	DIMENSIONS DES ÉLÉMENTS	GRÖßE DER STEINE
G	gravel	gravas	graviers	Kies
F	fine gravel	gravas finas	graviers fins	feiner Kies
M	medium gravel	gravas medias	graviers moyens	Mittelkies
C	coarse gravel	gravas gruesas	graviers grossiers	grober Kies
S	stones	piedras	cailloux	Steine
B	boulders	cantos rodados	blocs	Geröll
L	large boulders	grandes cantos rodados	grands cailloux roulés	großes Geröll

CODE	ROCK OUTCROPS ABUNDANCE	AFLORAMIENTOS ROCOSOS	/ AFFLEUREMENTS ROCHEUX	
0	nil	ningunos	non rocheux	keine
V	very few	muy pocos	très peu rocheux	sehr wenige
F	few	pocos	assez rocheux	wenige
C	common	frecuentes	rocheux fréquents	einige
M	many	muchos	très rocheux	viele
A	abundant	abundantes	excessivement rocheux	vorkommend
D	dominant	dominantes	dominant	dominierend

CODE	ROCK OUTCROPS DISTANCE	DISTANCIA ENTRE AFLORAMIENTOS	DISTANCE ENTRE AFFLEUREMENTS	
1	>100m			
2	35-100m			
3	10-35m			
4	3-10m			
5	<3m			

CODE	EROSION-DEPOSITION TYPE	TIPO DE EROSIÓN-DEPOSICIÓN	TYPE D'ÉROSION-DÉPôT	EROSIONSTYP
WG	gully erosion	erosión en cárcavas	érosion par ravinement	Gulli-Erosion
WR	rill erosion	erosión en surcos	érosion en rigoles	Rinnenerosion
WS	sheet erosion	erosión laminar	érosion en nappe	flächenhafte Erosion/Massenversatz
AM	wind erosion/deposition	erosión/deposición eólica	érosion/accumulation éolienne	Winderosion/akkumulation
AE	wind erosion	erosión eólica	érosion éolienne	Winderosion
AD	wind deposition	deposición eólica	dépôt éolien	Windakkumulation
WD	deposition by water	deposición por agua	dépôt aquatique	Akkumulation durch Wasser
WT	tunnel erosion	erosión en túnel	érosion souterraine	Tunnelerosion

CODE	EROSION-DEPOSITION INTENSITY	INTENSIDAD DE EROSIÓN-DEPOSICIÓN	INTENSITÉ DES DÉPôTS	EROSIONSINTENSITÄT
0	nil	nula	nulle	keine
SL	slight	ligera	légère	leicht

MO	moderate	moderada	modérée	mäßig
ST	strong	fuerte	forte	stark
SE	severe	severa	sévère	besonders stark
E	extreme	extrema	extrême	extrem

CODE	SEALING-CRUSTING	SELLADO-ENCOSTRAMIENTO	CIMENTATION-CUIRASSE	VERSIEGELUNGSKRUSTEN
0	nil	ninguno	néant	keine
CR	crust	costra	cuirasse	Krusten
SL	slight sealing	ligeramente cementado	peu cimenté	leichte Versiegelung
MO	moderate sealing	moderadamente cementado	fortement cimenté	mäßige Versiegelung
ST	strong sealing	fuertemente cementado	induré	starke Versiegelung

1.7.   Soil-water relationships

CODE	DRAINAGE CLASS	CLASE DE DRENAJE	CLASSE DE DRAINAGE	ENTWÄSSERUNG
V	very poor	muy pobre	très pauvre	schlecht
P	poor	pobre	pauvre	schlecht/unzureichend
I	imperfect	imperfecto	imparfait	mangelhaft/unvollkommen
M	moderately well	moderadamente bueno	modéré	mäßig gut

W	well	bueno	normal	gut
S	somewhat excessively	algo excesivo	légèrement excessif	
E	excessively	excesivo	excessif	übermäßig

CODE	INTERNAL DRAINAGE	DRENAJE INTERNO	DRAINAGE INTERNE	
V	very slow	muy lento	très pauvre	sehr langsam
S	slow	lento	pauvre	langsam
M	moderate	moderado	modéré	mäßig
H	high	rápido	excessif	hoch

CODE	EXTERNAL DRAINAGE	DRENAJE EXTERNO	DRAINAGE SUPERFICIEL	EXTERNE ENTWÄSSERUNG
P	ponded	impedido	très pauvre	
S	slow	lento	pauvre	langsam
M	moderate	moderado	modéré	mäßig
R	rapid	rápido	excessif	schnell

CODE	FLOOD FREQUENCY	FRECUENCIA DE INUNDACIONES	FRÉQUENCE DES INONDATIONS	ANZAHL DER ÜBERSCHWEMMUNGEN
0	nil	nula	néant	keine
D	daily	diaria	journalière	täglich
W	weekly	semanal	hebdomadaire	wöchentlich
M	monthly	mensual	mensuelle	monatlich

A	annually	anual	annuelle	jährlich
B	biennually	bianual	bisannuelle	halbjährlich
R	rare	escasa	rare	selten
F	every 2-4 years	cada 2-4 años	chaque 2-4 ann.	alle 2-4 Jahre
T	every 5-10 ye.	cada 5-10 años	chaque 5-10 an.	alle 5-10 Jahre
N	not known	desconocida	inconnu	unbekannt

CODE	FLOOD DURATION	TIEMPO DE INUNDACIÓN	PÉRIODE DES INONDATIONS	DAUER DER ÜBERSCHWEMMUNG
1	less than 1 day	menos de 1 día	moins d'1 jour	weniger als 1 Tag
2	1-15 days	1-15 días	1 à 15 jours	1-15 Tage
3	15-30 days	15-30 días	15 à 30 jours	15-30 Tage
4	30-90 days	30-90 días	30 à 90 jours	30-90 Tage
5	90-180 days	90-180 días	90 à 180 jours	90-180 Tage
6	180-360 days	180-360 días	180 à 360 jours	180-360 Tage
7	continuous	continuamente	continuellement	kontinuierlich

CODE	WATER TABLE TYPE	TIPO DE CAPA FREÁTICA	TYPE DE NAPPE PHRÉATIQUE	GRUNDWASSERTYP
SA	saline	salina	saline	salzig
BR	brackish	salobre	saumâtre	brackig
FR	fresh	agua dulce	eau douce	frisch
OX	oxygenated	oxigenada	oxygénée	sauerstoffreich
PO	polluted	contaminada	polluée	verschmutzt
SG	stagnating	estancada	stagnante	stagnierend

CODE	WATER TABLE DEPTH	PROFUNDIDAD DE LA CAPA FREÁTICA	PROFONDEUR DE LA NAPPE PHRÉATIQUE	TIEFE DES GRUNDWASSERS
0	not observed	no observada	néant	nicht untersucht
1	0-25cm	0-25 cm	0-25 cm	0-25 cm
2	25-50cm	25-50 cm	25-50 cm	25-50 cm
3	50-100cm	50-100 cm	50-100 cm	50-100 cm
4	100-150cm	100-150 cm	100-150 cm	100-150 cm
5	> 150cm	> 150 cm	> 150 cm	>150 cm

CODE	MOISTURE CONDITION	CONDICIONES DE HUMEDAD	ETAT HYDRIQUE DU SOL	WASSERVERHÄLTNISSE
D	dry	seco	sec	trocken
S	slightly moist	ligeramente húmedo	légèrement humide	mäßig feucht
M	moist	húmedo	humide	feucht
W	wet	mojado	mouillé	naß

Block 2. SOIL HORIZON DESCRIPTION

2.1. Horizon designation and dimensions

2.2. Soil colour

CODE	COLOUR MODIFIER	MODIFICADOR DE COLOR	MODIFICATEUR DE COULEUR	
M	(moist)	(húmedo)	humide	(feucht)
D	(dry)	(seco)	sec	(trocken)
MM	mottled (moist)	manchas (húmedo)	tacheté (mouillé)	marmoriert/gesprenkelt (feucht)
MD	mottled (dry)	manchas (seco)	tacheté (sec)	marmoriert/gesprenkelt (trocken)

CODE	MOTTLES ABUNDANCE	CANTIDAD DE MANCHAS	ABONDANCE DES TACHES	VORKOMMEN VON FLECKEN
0	none	sin	néant	keine
V	very few	muy poca	très peu	sehr viele
F	few	poca	peu	wenige
C	common	frecuente	fréquentes	einige
M	many	mucha	nombreuses	viele
A	abundant	abundante	abondante	

MODE	MOTTLES SIZE	TAMAÑO DE MANCHAS	DIMENSION DES TACHES	GRÖßE DER FLECKEN
V	very fine	muy fino	très fines	sehr klein
F	fine	pequeño	petites	klein
M	medium	mediano	moyennes	mittel
C	coarse	grande	grandes	grob

CODE	MOTTLES CONTRAST	NATURALEZA DE LAS MANCHAS	NATURE DES TACHES	FLECKENKONTRAST
F	faint	indistinta	faible	verschwommen
D	distinct	definida	distinct	
P	prominent	destacada	prononcé	ausgeprägt

CODE	MOTTLES BOUNDARY	LÍMITE DE MANCHAS	LIMITE DES TACHES	FLECKENBEGRENZUNG
S	sharp	brusco	brusque	scharf
C	clear	neto	nette	klar
D	diffuse	difuso	diffuse	verschwommen

CODE	MOTTLES COLOUR	COLOR DE LAS MANCHAS	COULEUR DES TACHES	FARBE DER FLECKEN
BL	black	negro	noires	schwarz
BB	bluish-black	negro azulado	noir-bleuâtre	bläulich-schwarz
BR	brown	pardo	brune	braun

BS	brownish	pardusco	brunâtres	bräunlich
GR	gray	gris	grises	grau
GS	grayish	grisáceo	grisâtres	gräulich
GE	green	verde	vertes	grün
RE	red	rojo	rouges	rot
RS	reddish	rojizo	rougeâtres	rötlich
RB	reddish-brown	pardo rojizo	brun-rougeâtre	rötlich-braun
RY	reddish-yellow	amarillo rojizo	jaune-rougeâtre	rötlich-gelb
WH	white	blanco	blanches	weiß
YE	yellow	amarillo	jaunes	gelb
YB	yellowish-brown	pardo amarillento	brun-jaunâtre	gelblich-braun
YR	yellowish-red	rojo amarillento	rouge-jaunâtre	gelblich-rot
BA	yellowish-white	blanco amarillento	blanc jaunatre	gelblich-weiß

2.3. Primary constituents

CODE	TEXTURE	TEXTURA	TEXTURE	KÖRNUNG
C	clay	arcillosa	argile	Ton
CL	clayloam	franco arcillosa	limon argileux	toniger Lehm
CS	coarse sand	arenoso gruesa	sable grossier	Grobsand
CSL	coarse sandy loam	franco arenoso gruesa	limon sableux grossier	grobsandiger Lehm
FS	fine sand	arenoso fina	sable fin	Feinsand
FSL	fine sandy loam	franco arenoso fina	limon sableux fin	feinsandiger Lehm
L	loam	franca	limon	Lehm
LCS	loamy coarse sand	areno francoso gruesa	sable limoneux grossier	lehmiger Grobsand
LFS	loamy fine sand	areno francoso fina	sable limoneux fin	lehmiger Feinsand
LS	loamy sand	areno francosa	sable limoneux	lehmiger Sand
LVFS	loamy very fine sand	areno francoso muy fina	sable limoneux très fin	lehmiger sehr feiner Sand

MS	medium sand	arena media	sable moyen	Mittelsand
S	sand	arenosa	sable	Sand
SC	sandy clay	arcillo arenosa	argile sableux	sandiger Ton
SCL	sandy clayloam	franco arcillo arenosa	limon argilo-sableux	sandig-toniger Lehm
SL	sandy loam	franco arenosa	limon sableux	sandiger Lehm
SI	silt	limosa	limon	Schluff
SIL	siltloam	franco limosa	limon fin	schluffiger Lehm
SIC	silty clay	arcillo limosa	argile limoneuse	schluffiger Ton
SICL	silty clayloam	franco arcillo limosa	limon argileux fin	schluffig-toniger Lehm
US	unsorted sand	arena sin clasificar	sable sans classer	unsortierter Sand
VFS	very fine sand	arenoso muy fina	sable très fin	sehr feiner Sand
VFSL	very fine sandy loam	franco arenoso muy fina	limon sableux très fin	sehr feinsandiger Lehm

CODE	ROCK FRAGMENTS ABUNDANCE	CANTIDAD DE FRAGMENTOS DE ROCAS	ABONDANCE DES FRAGMENTS ROCHEUX	VORKOMMEN VON GESTEINSRESTEN
0	none	ningunas	néant	keine
V	very few	muy pocas	très peu nombreux	sehr wenige
F	few	pocas	peu nombreux	wenige
C	common	frecuentes	nombreux	einige
M	many	muchas	très nombreux	viele
A	abundant	abundantes	abondants	reichlich
D	dominant	dominantes	dominantes	dominant

CODE	ROCK FRAGMENTS SIZE	TAMAÑO DE FRAGMENTOS DE ROCAS	DIMENSION DES FRAGMENTS ROCHEUX	GRÖßE DER GESTEINSRESTE
FI	fine	pequeñas	fins	klein
FM	fine and medium	pequeñas y medianas	fins et moyens	klein und mittel
ME	medium	medianas	moyens	mittel
MC	medium and coarse	medio y gruesas	moyens et grossiers	mittel und grob
CO	coarse	gruesas	grossiers	grob
CV	coarse and very coarse	gruesas y muy gruesas	grossiers et très grossiers	grob und sehr grob
VC	very coarse	muy gruesas	très grossiers	sehr grob
EC	extremely coarse	extremadamente gruesas	extrêmement grossiers	extrem grob
SB	stones and boulders	piedras y cantos rodados	pierres et cailloux roulés	Steine und Geröll

CODE	ROCK FRAGMENTS SHAPE	FORMA DE LOS FRAGMENTOS DE ROCAS	FORME DES FRAGMENTS ROCHEUX	GESTEINSFORM
R	rounded	redondeadas	ronds	abgerundet
F	flat	planas	plats	glatt
A	angular	angulares	angulaires	eckig
S	subrounded	subredondeadas	irréguliers	

CODE	ROCK FRAGMENTS WEATHERING	METEORIZACIÓN DE LOS FRAGMENTOS DE ROCAS	ALTÉRATION DES FRAGMENTS ROCHEUX	VERWITTERUNGSZUSTAND DER GESTEINE
F	fresh-slightly weathered	poco ó nada meteorizadas	peu ou non-altérés	leicht verwittert
W	weathered	meteorizadas	altérés	verwittert
S	strongly weathered	fuertemente meteorizadas	très altérés	stark verwittert

CODE	ROCK FRAGMENTS NATURE	NATURALEZA DE LOS FRAGMENTOS DE ROCAS	NATURE DES FRAGMENTS ROCHEUX	GESTEINSMATERIAL
BT	basalt	basalto	basalte	Basalt
CH	chert	sílex	chert	Hornstein
DI	diorite	diorita	diorite	Diorith
DO	dolerite	dolerita	dolérite	Dolerith
DM	dolomite	dolomita	dolomite	Dolomit
FE	feldspar	feldespato	feldspathe	Feldspat
GA	gabbro	gabro	gabbro	Gabbro
GN	gneiss	gneiss	gneiss	Gneis
GR	granite	granito	granite	Granit
LI	limestone	caliza	calcaire	Kalkstein
MI	mica	mica	mica	Glimmer
PU	pumice	pumita	ponce	
QU	quartz	cuarzo	quartz	Quartz
QZ	quartzite	cuarcita	quartzite	Quarzit
SA	sandstone	arenisca	grès	Sandstein
SC	schist	esquisto	schiste	Schiefer
SH	shale	lutita	shale	Schiefer
SI	siltstone	limonita	limon	
TU	tuff	toba volcánica	tuf	Tuff

2.4. Organisation and constituents

CODE	STRUCTURE GRADE	GRADO DE ESTRUCTURA	DEGRÉ DE STRUCTURE	KRÜMELUNGSGRAD (?)
VW	very weak	muy débil	très faible	sehr schwach
WE	weak	débil	faible	schwach
MO	moderate	moderado	moyenne	mäßig
ST	strong	fuerte	forte	stark
VS	very strong	muy fuerte	très forte	sehr stark
WM	weak to moderate	de débil a moderado	de faible à moyenne	schwach bis mäßig
MS	moderate to strong	de moderado a fuerte	de moyenne à forte	mäßig bis stark
SG	single grain	de grano suelto	particulaire	Einzelkörner
MA	massive	masivo	massive	massiv
MP	porous massive	masivo poroso	massive poreuse	porös und massiv

CODE	STRUCTURE SIZE	TAMAÑO DE ESTRUCTURA	CLASSE DE STRUCTURE	STRUKTURGRÖßE
VF	very fine	muy fino	très fine	sehr fein
FI	fine	fino	fine	fein
ME	medium	medio	moyenne	mittel
CO	coarse	grueso	grossière	grob
VC	very coarse	muy grueso	très grossière	sehr grob
FM	fine and medium	fino y medio	fine et moyenne	fein und mittel
MC	medium and coarse	medio y grueso	moyenne et grossière	mittel und grob
CV	coarse and very coarse	grueso y muy grueso	grossière et très grossière	grob und sehr grob
FC	fine to coarse	fino a grueso	de fine à grossière	fein bis grob
MV	medium to very coarse	medio a muy grueso	de moyenne à très grossière	mittel bis sehr grob
FF	fine and very fine	fino y muy fino	fine et très fine	fein und sehr fein

CODE	STRUCTURE TIPE	TIPO DE ESTRUCTURA	TYPE DE STRUCTURE	STRUKTURART
GR	granular	granular	granulaire	körnig
CR	crumb	migajoso	grumeleuse	klumpig/krümelig
PR	prismatic	prismático	prismatique	prismenartig
SB	subangular blocky	en bloques subangulares	polyédrique sub-angulaire	subpolyedrisch
AB	angular blocky	en bloques angulares	polyédrique angulaire	polyedrisch
AW	wedge shaped angular blocky	en bloques angulares cuneiformes	polyédrique angulaire en fuseaux	keilförmig polyedrisch
CO	columnar	columnar	en colonnes	säulenförmig
PL	platy	laminar	feuilletée	plattig
SA	subangular and angular blocky	en bloques angulares y subangulares	polyédrique angulaire et sub-angulaire	subpolyedrisch und polyedrisch
AS	angular and subangular blocky	en bloques subangulares y angulares	polyédrique sub-angulaire et angulaire	polyedrisch und subpolyedrisch
PS	subangular prismatic	prismático subangular	prismatique subangulaire	subpolyedrische Prismen
SN	nutty subangular blocky	bloques en forma de nuez	bloc en forme de noix	
RS	rocky structure	estructura rocosa	structure rocheuse	steinige Struktur
SS	stratified structure	estructura estratificada	structure stratifiée	Schichtstruktur

CODE	STRUCTURE RELATION	RELACIÓN DE ESTRUCTURA	RELATION DE STRUCTURE	
*	parting into	que se deshace en	se séparant en	
+	and	y	et	und
/	to	a	à	zu

CODE	DRY CONSISTENCE	CONSISTENCIA EN SECO	CONSISTANCE EN SEC	KONSISTENZ BEI TROCKENHEIT
LO	loose	suelta	meuble	locker
SO	soft	blanda	tendre	weich
SHA	slightly hard	ligeramente dura	peu dur	leicht hart
HA	hard	dura	dur	hart
VHA	very hard	muy dura	très dur	sehr hart
EHA	extremely hard	extremadamente dura	extrêmement dur	extrem hart
SS	soft to slightly hard	blanda a ligeramente dura	tendre à peu dur	weich bis leicht hart
SH	slightly hard to hard	ligeramente dura a dura	peu dur à dur	leicht hart bis hart
HV	hard to very hard	dura a muy dura	dur à très dur	hart bis sehr hart

CODE	MOIST CONSISTENCE	CONSISTENCIA EN HÚMEDO	CONSISTANCE À L'ÉTAT FRAIS	KONSISTENZ BEI FEUCHTIGKEIT
LO	loose	suelta	meuble	locker
VFR	very friable	muy friable	très friable	sehr bröckelig
FR	friable	friable	friable	bröckelig
FI	firm	firme	ferme	fest
VFI	very firm	muy firme	très ferme	sehr fest
EFI	extremely firm	extremadamente firme	extrêmement ferme	extrem fest
VF	very friable to friable	muy friable a friable	très friable à friable	sehr bröckelig bis bröckelig
FRF	friable to firm	friable a firme	friable à ferme	bröckelig bis fest
FV	firm to very firm	firme a muy firme	ferme à très ferme	fest bis sehr fest

CODE	STICKINESS	ADHESIVIDAD	ADHÉSIVITÉ	BINDIGKEIT
NST	non sticky	no adherente	non-adhèsif	nicht bindig
SST	slightly sticky	ligeramente adherente	peu-	leicht bindig
ST	sticky	adherente	adhèsif	bindig
VST	very sticky	muy adherente	très collant	sehr bindig
SS	slightly sticky to sticky	ligeramente adherente a adherente	peu collant à collant	leicht bindig bis bindig
SV	sticky to very sticky	adherente a muy adherente	collant à très collant	bindig bis sehr bindig

CODE	PLASTICITY	PLASTICIDAD	PLASTICITÉ	PLASTIZITÄT
NPL	non plastic	no plástico	non-plastique	nicht plastisch
SPL	slightly plastic	ligeramente plástico	peu plastique	leicht plastisch
PL	plastic	plástico	plastique	plastisch
VPL	very plastic	muy plástico	très plastique	sehr plastisch

2.5. Voids (porosity)

CODE	VOIDS ABUNDANCE	CANTIDAD DE HUECOS	ABONDANCE DES VIDES	PORENVORKOMMEN
0	nil	ningunos	néant	keine
V	very few	muy pocos	très peu nombreux	sehr wenige
F	few	pocos	peu nombreux	wenige
C	common	frecuentes	nombreux	einige
M	many	muchos	très nombreux	viele
A	abundant	abundantes	abondants	reichlich

CODE	VOIDS SIZE	TAMAÑO DE HUECOS	DIMENSION DES VIDES	PORENGRÖßE
VF	very fine	muy finos	très fins	sehr fein
FI	fine	finos	fins	fein
FM	fine-medium	de finos a medios	fins et moyens	fein bis mitel
FF	fine and very fine	fino y muy finos	fins et très fins	fein und sehr fein
ME	medium	medios	moyens	mittel
MC	medium-coarse	de medios a gruesos	moyens et grossiers	mittel bis grob
CO	coarse	gruesos	grossiers	grob
VC	very coarse	muy gruesos	très grossiers	sehr grob

CODE	VOIDS TYPE	TIPO DE HUECOS	TYPE DES VIDES	PORENART
I	interstitial pores	poros intersticiales	pores interstitiels	
B	vesicles	poros vesículares	vésicules	Bläschen
V	vughs	cavidades	cavités	
C	channels	canales	chenaux	Kanäle
P	planes	poros planos		

CODE	POROSITY	POROSIDAD	POROSITÉ	POROSITÄT
0	very low porosity	muy baja	porosité très basse	sehr niedrige Porosität
L	low porosity	baja	porosité basse	niedrige Porosität
M	medium porosity	media	porosité moyenne	mittlere Porosität
H	high porosity	elevada	porosité élevée	hohe Porosität
V	very high porosity	muy elevada	porosité très élevée	sehr hohe Porosität

2.6. Concentrations

CODE	CUTANTS QUANTITY	CANTIDAD DE CUTANES	ABONDANCE DE CUTANES	
0	none	ninguna	néant	keine
V	very few	muy poca	très peu	sehr wenige
F	few	poca	peu	wenige
C	common	frecuente	fréquents	einige
M	many	mucha	nombreux	viele
A	abundant	abundante	abondantes	
D	dominant	dominante	dominant	dominant

CODE	CUTANTS CONTRAST	CONTRASTE DE CUTANES	NETTETÉ DES CUTANES	KONTRAST DER KUTANE
F	faint	indiferenciado	faibles	schwach
D	distinct	definido	distincts	klar/ausgeprägt
P	prominent	destacado	prononcés	sehr ausgeprägt

CODE	CUTANTS NATURE	NATURALEZA DE CUTANES	NATURE DES CUTANES	MATERIAL DER KUTANE
CL	clay	arcillosas	argileux purs	Ton
CS	clay-sesquioxides cutans	sesquióxido-arcillosas	argileux-sesquioxydes	Ton-Sesquioxid-Kutane
CH	clay-humus cutans	arcillo-húmicas	argileux- humiques	Ton-Humus-Kutane
PF	pressure faces	caras de presión	faces de pression	
SL	slickensides	slickensides	faces de glissement	Slickensides
SP	partly intersecting slickensides	slickensides parcialmente disectadas	faces de glissement partiellement entrecoupées	sich kreuzende Slickensides
SI	predominantly intersecting slickensides	slickensides predominantemente disectadas	faces de glissement entrecoupées	sich teilweise kreuzende Slickensides

CODE	CUTANTS LOCATION	UBICACIÓN DE CUTANES	LOCALISATION DES CUTANES	FUNDORT DER KUTANE
PF	on pedfaces	en las caras de los agregados	en surface des agrégats	an natürlichen Aggregaten
PV	on vertical pedfaces	en las caras verticales de los agregados	sur les faces verticales des agrégats	an natürlichen vertikal gelagerten Aggregaten
PH	on horizontal pedfaces	en las caras horizontales de los agregados	sur les faces horizontales des agrégats	na natürlichen horizontal gelagerten Aggregaten
PO	in pores	en los poros	dans les pores	in den Poren
LA	lamellae	formando lamelas	en lamelles	blättrig/lamellenartig
CF	coarse fragments	fragmentos gruesos	fragments grossiers	grobe Bruchstücke
NS	not specified	no especificado	no especifiée	nicht bestimmt

CODE	CEMENTATION CONTINUITY	CONTINUIDAD DE CEMENTACIONES	CONTINUITÉ DES CIMENTATIONS	KONTINUITÄT DER ZEMENTIERUNG
0	no	no	néant	nein
D	discontinuous	discontinua	discontinue	nicht zusammenhängend
C	continuous	continua	continue	zusammenhängend
B	broken	quebrada	cassée	unterbrochen

CODE	CEMENTATION STRUCTURE	ESTRUCTURA DE CEMENTACIONES	STRUCTURE DES CIMENTATIONS	STRUKTUR DER ZEMENTIERUNG
M	massive	masiva	massive	massiv
V	vesiculair	vesicular	vésiculaire	blasenförmig
P	platy	laminar	lamellaire	plattig
N	nodular	nodular	noduleuse	klumpig/knollenförmig

CODE	CEMENTATION GRADE	GRADO DE CEMENTACION	DEGRÉ DE CIMENTATION	GRAD DER ZEMENTIERUNG
W	weakly cemented	débil	peu cimenté	schwach zementiert
M	moderately cement	moderada	peu cémentée	mäßig zementiert
C	cemented	cementada	cimenté	verdichtet
S	strongly cemented	fuerte	fortement cimenté	stark zementiert
I	indurated	endurecida	endurci	
N	not cemented nor compacted	no cementada ni compactada	ni cimenté ni compact.	nicht zementiert, nicht verdichtet
Y	compactes but not cemented	compactada pero no cementada	compact. mois non peu cimenté	kompakt, aber nicht zementiert

CODE	CEMENTATION NATURE	NATURALEZA DE LA CEMENTACION	NATURE DE LA CIMENTATION	MATERIAL DER ZEMENTIERUNGEN
K	carbonates	carbonatos	carbonates	Karbonate
Q	quartz	sílice	silice	Quartz
S	sesquioxides	sesquióxidos	sesquioxydes	Sesquioxide
F	iron	hierro	fer	Eisen
M	iron-manganese	hierro manganeso	fer-manganèse	Eisen-Mangan
O	iron-organic matt	hierro-mat. orgánica	fer-matière organique	Eisen-organisches Material
Y	gypsum	yeso	gypse	Gips
C	clay	arcilla	argile	Ton
N	not known	desconocida	inconnue	nicht bekannt

CODE	NODULES ABUNDANCE	CANTIDAD DE NÓDULOS	ABONDANCE DES NODULES	
0	nil	ninguna	néant	keine
V	very few	muy poca	très peu nombreux	sehr wenige
F	few	poca	peu nombreux	wenige
C	common	frecuente	nombreux	einige
M	many	mucha	très nombreux	viele
A	abundant	abundante	abondants	reichlich
D	dominant	dominante	dominants	dominierend

CODE	NODULES KIND	TIPO DE NÓDULOS	TYPE DES NODULES	
C	concretions	nódulos(concreciones)	concrétions	Konkretionen
T	crystals	cristales	cristaux	Kristalle
S	soft segregation	nódulos (segregaciones blandas)	nodules (ségrégations tendres)	weiche Ablgerungen
N	nodules	nódulos	nodules	Knöllchen/Klumpen
R	residual fock fragments	fragmentos de rocas residuales	fragments de roches residuelles	residuelle Steinfragmente

CODE	NODULE SIZE	TAMAÑO DE NÓDULOS	DIMENSION DES NODULES	GRÖßE DER
V	very fine	muy fino	très fines	sehr fein
F	fine	pequeño	petits	fein
M	medium	mediano	moyens	mittel
C	coarse	grande	grossiers	grob

CODE	NODULES SHAPE	FORMA DE LOS NÓDULOS	FORME DES NODULES	FORM DER
S	spherical	esférica	sphérique	
I	irregular	irregular	irrégulier	unregelmäßig
A	angular	angular	angulaires	polyedrisch
F	flat	plana	plain	flach
E	elongated	alargada	allongée	ausgestreckt/ausgedehnt

CODE	NODULES HARDNESS	DUREZA DE LOS NÓDULOS	DURETÉ DES NODULES	HÄRTE DER
H	hard	dura	durs	hart
S	soft	blanda	tendres	weich
B	hard and soft	dura y blanda	durs et tendres	hart und weich

CODE	NODULES NATURE	NATURALEZA DE LOS NÓDULOS	NATURE DES NODULES	BESCHAFFENHEIT DER
K	calcareous	calcárea	calcaires	kalkhaltig
G	gypsiferous	yesífera	gypsifères	gipshaltig
Q	siliceous	silícea	siliceux	silikathaltig
S	iron-manganese	de hierro-manganeso	ferro-manganeux	Eisen-Mangan-haltig
F	ferrigenous	ferruginosa	ferrugineux	eisenhaltig
M	manganiferous	manganífera	manganifère	manganhaltig
C	argilleous	arcillosa	argileux	tonhaltig
X	carbonate-silic	carbonato-sílice	carbonate-silic	Carbonat-Silikat-haltig
T	clay-sesquioxid	arcilla-sesquióxido	argile-sesquiox	Ton-Sesquioxid-haltig
L	salt	sal	sels	Salz
U	sulphur	sulfurosa	sulfure	Schwefel
N	not known	desconocida	inconnus	unbekannt

CODE	NODULES COLOUR	COLOR DE LOS NÓDULOS	COULEUR DES NODULES	FARBE DER
WH	white	blanco	blancs	weiß
RE	red	rojo	rouges	rot
BR	brown	pardo	bruns	braun
GR	grey	gris	gris	grau

YE	yellow	amarillo	jaunes	gelb
BB	bluish-black	negro azulado	noir-bleuâtre	blau-schwarz
BL	black	negro	noirs	schwarz
RB	reddish black	negro rojizo	noir-rougeâtre	rötlich-schwarz
RS	reddish	rojizo	rougeâtres	rötlich
YR	yellowish red	rojo amarillen.	rouge jaunâtre	gelblich-rot
BS	brownish	parduzco	brunâtres	bräunlich
YB	yellowish brown	pardo amarille.	brun jaunâtre	gelblich-braun
RY	reddish yellow	amarillo rojizo	jaune rougeâtre	rötlich-gelb
GE	green	verde	vert	grün
GS	greyish	grisáceo	grisâtres	gräulich
BU	blue	azul	bleus	blau

2.7. Biological activity

CODE	ROOTS ABUNDANCE	CANTIDAD DE RAÍCES	ABONDANCE DES RACINES	WURZELVORKOMMEN
0	nil	ninguna	néant	keine
V	very few	muy poca	très peu nombreuses	sehr wenige
F	few	poca	peu nombreuses	wenige
C	common	frecuente	nombreuses	einige
M	many	mucha	très nombreuses	viele
A	abundant	abundante	abondantes	reichlich

CODE	ROOTS SIZE	TAMAÑO DE RAÍCES	DIAMETRE DES RACINES	GRÖßE DER WURZELN
VF	very fine	muy fino	très fines	sehr fein
FI	fine	fino	fines	fein
FM	fine-medium	de fino a medio	fines et moyennes	fein bis mittel
FF	fine and very fine	fino y muy fino	fins et très fines	fein und sehr fein
ME	medium	medio	moyennes	mittel
MC	medium-coarse	de medio a grueso	moyennes et grossières	mittel bis grob
CO	coarse	grueso	grossières	grob
VC	very coarse	muy grueso	très grossières	sehr grob

CODE	BIOLOGICAL FEATURES ABUNDANCE	CANTIDAD DE RASGOS BIOLÓGICOS	CARÁCTÈRES D'ORIGINE BIOLOGIQUE	
0	nil	ninguna	néant/e	keine
V	very few	muy poca	très peu	sehr wenige
F	few	poca	peu	wenige
C	common	frecuente	fréquent/es	einige
M	many	mucha	beaucoup	viele

CODE	BIOLOGICAL FEATURES KIND	TIPOS DE RASGOS BIOLÓGICOS	TYPES DE CARÁCTÈRES D'ORIGINE BIOLOGIQUE	
AR	artefacts	artefactos	engin	
AB	biological activity	actividad biológica	activité biologique	biologische Aktivität
BU	burrows	madrigueras	galeries d'animaux	
CC	charcoal	carbón vegetal	charbon de bois	

EW	earthworms	lombrices	vers	Erdwürmer
BI	infilled burrows	madrigueras rellenadas	galeries remplies	
IA	insect activity	actividad de insectos	activité d'insectes	Insektenaktivität
BO	open burrows	madrigueras abiertas	galeries ouvertes	
PT	pedotubules	pedotúbulos	pedotubules	
TC	termite channels	termiteras	galeries de termites	Termitenkanäle

2.8. Soil reaction

CODE	CARBONATES	CARBONATOS	CARBONATES	KARBONATE
0	non calcareous	no calcáreo	non-calcarifère	nicht kalkhaltig
SL	slightly calcareous	ligeramente calcáreo	peu calcarifère	leicht kalkhaltig
MO	moderately calcareous	moderadamente calcáreo	moyennement calcarifère	mäßig kalkhaltig
ST	strongly calcareous	fuertemente calcáreo	très calcarifère	stark kalkhaltig
EX	extremely calcareous	extremadamente calcáreo	extrêmement calcarifère	extrem kalkhaltig

2.9. Horizon boundary

CODE	BOUNDARY WIDTH	ANCHURA DEL LÍMITE ENTRE HORIZONTES	NETTETÉ DE LA TRANSITION VERS L'HORIZON SOUS-JACENT	BREITE DER GRENZE
A	abrupt	brusco	abrupte	abrupt
C	clear	neto	distincte	klar
G	gradual	gradual	graduelle	
D	diffuse	difuso	diffuse	verschwommen

CODE	BOUNDARY TOPOGRAPHY	TOPOGRAFÍA DEL LÍMITE ENTRE HORIZONTES	REGULARITÉ DE LA TRANSITION VERS L'HORIZON SOUS-JACENT	
S	smooth	y plano	régulière	glatt
W	wavy	y ondulado	ondulée	
I	irregular	e irregular	irrégulière	unregelmäßig
B	broken	e interrumpido	interrompue	unterbrochen

Coding system: Translation tables of coded analytical metadata
(in English, Spanish, French and German)

Standard reference books for the coded soil analytical methods are: Procedures for Collecting Soil Samples and Methods of Analysis for Soil Survey (USDA, 1984);   Australian Laboratory Handbook of Soil and Water Chemical Methods (Rayment and Higginson, 1992); and Methods of Soil Analysis: Part 1, Physical and Mineralogical Properties; Part 2, Chemical and Microbiological Properties, ASA (Black, 1965; Page et al., 1982).

Block 3. STANDARD ANALYSES

CODE	pH WATER	pH EN AGUA	pH EN EAU	pH IN WASSER
A	1:1 soil/water suspension	1:1 suspensión suelo/agua	1:1 suspension sol/eau	1:1 Boden/Wasser Suspension
B	1:2.5 soil/water suspension	1:2.5 suspensión suelo/agua	1:2.5 suspension sol/eau	1:2,5 Boden/Wasser Suspension
C	1:5 soil/water suspension	1:5 suspensión suelo/agua	1:5 suspension sol/eau	1:5 Boden/Wasser Suspension
D	1:10 soil/water suspension	1:10 suspensión suelo/agua	1:10 suspension sol/eau	1:10 Boden/Wasser Suspension
E	Saturated paste	Pasta saturada	Pâte saturée	gesättigte Paste

CODE	pH (X)	pH (X)	pH (X)	pH (X)
A	KCl solution of	Solución de KCl	Solution de KCl	KCl-Lösung
B	Saturated paste in $CaCO_3$	Pasta saturada en $CaCo_3$	Pâte saturée en $CaCo_3$	gesättigte Paste in $CaCO_3$
C	$CaCl_2$ solution	Solución de $CaCl_2$	Solution de $CaCl_2$	$CaCl_2$-Lösung

CODE	ELECTRICAL CONDUCTIVITY, EC	CONDUCTIVIDAD ELÉCTRICA, CE	CONDUCTIVITÉ ÉLECTRIQUE, CE	ELEKTRISCHE LEITFÄHIGKEIT
	(See Soluble Salts)	(Ver Sales Solubles)	(Voir Sels Solubles)	(siehe lösliche Salze)

CODE	PHOSPHORUS, P	FÓSFORO, P:	PHOSPHORE, P:	PHOSPHOR, P
A	P_2O_5	P_2O_5	P_2O_5	P_2O_5
B	Total – X-ray fluorescence	Fluorescencia total de rayos-X	Fluorescence totale des rayons-X	Gesamte Fluoreszenz der Röntgenstrahlen
C	Olsen-extractable	Olsen-extraíble	Olsen-extraible	OLSEN-Extraktion
D	Bray	Bray	Bray	Bray
E	Acid-extractable extract	Ácido-extraíble	Acide-extraible	
F	Phosphate retention	Retención de fosfatos	Retention de phosphates	Phosphathaltevermögen
G	Phosphate sorption	Absorción de fosfatos	Absorption de phosphates	Phosphatabsorption

CODE	ORGANIC CARBON, OC	CARBONO ORGÁNICO, CO	CARBONO ORGANIQUE, CO	ORGANISCHES CARBONAT, C_{org}
A	Walkley & Black	Walkley & Black	Walkley & Black	Walkley & Black
B	Dry combustion	Combustión seca	Combustion séche	Trockene Verbrennung

CODE	NITROGEN, N	NITRÓGENO, N	AZOTE, N	STICKSTOFF, N
A	Total – Kjeldahl	Total – Kjeldahl	Totale – Kjeldahl	Gesamt – Kjeldahl
B	Total – steam distillation	Total – destilación	Totale – distillation	Gesamt - Wasserdampfdestillation

CODE	CATION EXCHANGE CAPACITY, CEC	CAPACIDAD DE INTERCAMBIO CATIÓNICO	CAPACITÉ D'ÉCHANGE CATIONIQUE	KATIONENAUSTAUSCH-KAPAZITÄT, KAK
A	NH_4OAc at pH 7.0	NH_4OAc a pH 7.0	NH_4OAc à pH 7.0	NH_4OAc bei pH 7.0
B	$BaCl_2$ at pH 8.2	$BaCl_2$ a pH 8.2	$BaCl_2$ à pH 8.2	$BaCl_2$ bei pH 8.2
C	NaOAc at pH 8.2	NaOAc a pH 8.2	NaOAc à pH 8.2	NaOAc bei pH 8.2
D	TEA	TEA	TEA	
E	Ca absorption	Absorción de Ca	Absorption de Ca	Ca Absorption
F	NH_4OAc at pH 8.2	NH_4OAc a pH 8.2	NH_4OAc à pH 8.2	NH_4OAc at pH 8.2
G	$CaCl_2$	$CaCl_2$	$CaCl_2$	$CaCl_2$
H	Li-ETDA	Li-ETDA	Li-ETDA	
I	Sum of cations	Suma de cationes	Somme de cations	Summe der Kationen

CODE	EXCHANGEABLE CATIONS	CATIONES INTERCAMBIABLES	CAPACITÉ D'ÉCHANGE CATIONIQUE	AUSTAUSCHBARE KATIONEN
A	NH_4OAc	NH_4OAc	NH_4OAc	NH_4OAc
B	HCl N/20	HCl N/20	HCl N/20	HCl N/20
C	ETDA	ETDA	ETDA	
D	Base saturation	Saturación base	Saturation base	Basensättigung
E	Sodium saturation	Saturación en sodio	Saturation en sodium	Natriumsättigung
F	Sodium absorption	Absorción de sodio	Absorption de sodium	Natriumabsorption

CODE	POTASSIUM, K FIXED	POTASIO, K FIJADO	POTASSIUM, K FIXÉ	KALIUM, gebundenes K
A	Total – X-ray fluorescence	Flourescencia total de rayos-X	Fluorescence totale des rayons-X	Gesamt – Fluoreszenz der Röntgenstrahlung
B	Acid-extractable	Ácido-extraíble	Acide- extraible	

CODE	PARTICLE SIZE	GRANULOMETRÍA	GRANULOMÈTRIE	TEILCHENGRÖßE
A	Pipette	Pipeta	Pipette	Pipette
B	Hydrometer	Hidrómetro	Hydromètre	Hydrometer

CODE	CALCIUM CARBONATE, CaCO₃	CARBONATO CÁLCICO, CaCO₃	CARBONATE CALCIQUE, CaCO₃	CALCIUMCARBONAT, CaCO₃
A	Calcimeter with HCl	Calcímetro con HCl	Calcimètre avec HCl	Calcimeter mit HCl
B	Hydrochloric acid	Ácido clorhídrico	Acide chloridrique	Salzsäure

CODE	GYPSUM, CaSO₄	YESO, CaSO₄	GYPSE, CaSO₄	GIPS, CaSO₄
A	Acetone precipitation	Precipitación de acetona	Précipitacion d'acetone	Fällung in Essig
B	Na₃-ETDA solution	Solución de Na₃-ETDA	Solution deNa₃-ETDA	
C	NH₄OAc	NH₄OAc	NH₄OAc	NH₄OAc

Block 4. SOLUBLE SALTS/HEAVY METALS

CODE	SOLUBLE SALTS	SALES SOLUBLES	SELS SOLUBLES	LÖSLICHE SALZE
A	1:5 soil/water suspension	1:5 suspensión suelo/agua	1:5 suspension sol/eau	1:5 Boden/Wasser Suspension
B	1:10 soil/water suspension	1:10 suspensión suelo/agua	1:10 suspension sol/eau	1:10 Boden/Wasser Suspension
C	Saturated paste	Pasta saturada	Pâte saturée	gesättigte Paste (?)
D	$CaCl_4$	$CaCl_4$	$CaCl_4$	$CaCl_4$
E	1:1 soil/water suspension	1:1 suspensión suelo/agua	1:1 suspension sol/eau	1:1 Boden/Wasser Suspension
F	1:1.5 soil/water suspension	1:1.5 suspensión suelo/agua	1:1.5 suspension sol/eau	1:1,5 Boden/Wasser Suspension
G	1:2 soil/water suspension	1:2 suspensión suelo/agua	1:2 suspension sol/eau	1:2 Boden/Wasser Suspension
H	1:2.5 soil/water suspension	1:2.5 suspensión suelo/agua	1:2.5 suspension sol/eau	1:2,5 Boden/Wasser Suspension

CODE	HEAVY METALS	METALES PESADOS	METÀUX LOURDS	SCHWERMETALLE
A	HNO_3-$HClO_4$-HF	HNO_3-$HClO_4$-HF	HNO_3-$HClO_4$-HF	HNO_3-$HClO_4$-HF
B	HNO_3-$HClO_4$	HNO_3-$HClO_4$	HNO_3-$HClO_4$	HNO_3-$HClO_4$
C	HNO_3-HCl (aqua regia)	HNO_3-HCl (agua regia)	HNO_3-HCl (eau règale)	HNO_3-HCl
D	HNO_3	HNO_3	HNO_3	HNO_3
E	Dry ashing + HCl or HNO_3	Ceniza en seco+ HCl o HNO_3	Cendre sèche+ HCl or HNO_3	Trockenveraschung + HCl oder HNO_3
F	Na_2CO_3 fusion	Fusión de Na_2CO_3	Fusión de Na_2CO_3	
G	HNO_3-$HClO_4$- H_2SO_4	HNO_3-$HClO_4$- H_2SO_4	HNO_3-$HClO_4$- H_2SO_4	HNO_3-$HClO_4$- H_2SO_4
H	$K_2S_2O_8$-HCl	$K_2S_2O_8$-HCl	$K_2S_2O_8$-HCl	$K_2S_2O_8$-HCl
I	HNO_3- H_2SO_4-$KMnO_4$	HNO_3- H_2SO_4-$KMnO_4$	HNO_3- H_2SO_4-$KMnO_4$	HNO_3- H_2SO_4-$KMnO_4$
J	X-ray fluorescence	Fluorescencia de rayos-X	Fluorescence des rayons-X	Fluoreszenz der Röntgenstrahlen
K	Neutron activation	Activación de neutrones	Activation des neutrons	Neutronenaktivität

Block 5. PHYSICAL ANALYSES

CODE	ACTUAL WATER CONTENT	CONTENIDO EN AGUA REAL	CONTENEU D'EAU RÉELLE	AKTUELLER WASSERGEHALT
A	Gravimetry	Gravimetría	Gravimètrie	Gravimetrisch
B	Neutron probe	Sonda de neutrones	Sonde de neutrons	Neutronenprobe
C	TDR (Time Domain Reflectometry)	TDR (Time Domain Reflectometry)	TDR (Time Domain Reflectometry)	TDR (Time Domain Reflectometry)

CODE	BULK DENSITY	DENSIDAD APARENTE	DENSITÉ APPARENTE	LAGERUNGSDICHTE
A	1/3 bar	1/3 bar	1/3 bar	1/3 bar
B	Oven dry	Horno de secado	Four sec	ofentrocken
C	Field humidity	Humedad de campo	Humidité de champ	feldfeucht
D	Air dry	Aire seco	Air sec	lufttrocken
E	Absorption 3 cm	Absorción 3cm	Absorption 3cm	Absorption 3cm

CODE	RESISTANCE TO PENETRATION	RESISTENCIA A LA PENETRACIÓN	RÉSISTANCE À LA PÉNÉTRATION	
A	Core penetrometer	Penetrómetro	Pénetromètre	Penetrometer

CODE	PARTICLE DENSITY	DENSIDAD DE LAS PARTÍCULAS	DENSITÉ DE PARTICULES	TEILCHENDICHTE
A	Helium-air pycnometer	Picnómetro helio-aire	Pycnomètre hèlium-air	Helium-Luft
B	Pycnometry	Picnometría	Pycnometrie	

CODE	STABILITY INDEX	ÍNDICE DE ESTABILIDAD ESTRUCTURAL	INDICE DE STABILITÉ STRUCTURALE	STABILITÄTSINDEX
A	Dry sieving	Tamizado en seco	Tamisage à sec	Trockensiebung
B	Moist sieving	Tamizado en húmedo	Tamisage en humide	Naßsiebung

CODE	TOTAL POROSITY	POROSIDAD TOTAL	POROSITÉ TOTAL	GESAMTPOROSITÄT
A	From bulk density and particle density	De la densidad aparente y densidad de las partículas	De la densité apparente et densité des particules	Von Lagerungsdichte und Dichte der Partikel
B	From water content at saturation	De humedad a saturación	D'humidité à saturation	Vom Wassergehalt bei Sättigung

CODE	SATURATED HYDRAULIC CONDUCTIVITY	CONDUCTIVIDAD HIDRÁULICA A SATURACIÓN	CONDUCTIVITÉ HYDRAULIQUE SATURÉE	GESÄTTIGTE WASSERLEITFÄHIGKEIT
A	Constant head permeameter	Permeámetro a presión constante	Perméametre à pression constante	

Block 6. WATER RETENTION / HYDRAULIC CONDUCTIVITY

CODE				
A	Suction in fretted-glass plates	Succión en placas de vidrio-poroso	Succion en plaques de verres poreux	
B	Pressure in ceramic plates	Presión en placas de cerámica	Presion en plaques ceramiques	Druck in keramischen Platten
C	Tension disc permeameter in the field	Permeámetro de disco en el campo	Perméamètre de disque au champ	
D	Internal drainage in the field	Drenaje interno en el campo	Drainage interne au champ	Interne Entwässerung im Feld

Language change: Translation tables of user interface labels (in English, Spanish, French and German)

Main menu

ENGLISH	SPANISH	FRENCH	GERMAN
Multilingual Soil Profile Database	Base de datos Multilingüe de Perfiles de Suelo	Base de données Multilingue des profiles du sol	Mehrsprachige Bodenprofil-Datenbank
File	Archivo	Fichier	Datei
Content	Contenido	Contenu	Inhalt (?)
Search	Búsqueda	Recherche	Suche
Evaluation	Evaluación	Évaluation	Berechnung
Customize	Personalizar	Personnaliser	Customize
Languages	Idiomas	Langues	Sprache
Help	Ayuda	Aide	Hilfe
Input data	Introducir datos	Entrée de données	Dateneingabe
Import	Importar	Import	Einfügen
Export	Exportar	Export	Exportieren
Exit	Salir	Sortir	Beenden
From SDBm Plus	Desde SDBm Plus	Depuis SDBm Plus	Von SDBm Plus
From SDBm	Desde SDBm	Depuis SDBm	Von SDBm
Fast search	Búsqueda rápida	Recherche rapide	Schnelle Suche
Detailed search	Búsqueda detallada	Recherche détaillée	Detaillierte Suche
Change language	Cambiar idioma	Changer langue	Sprache wechseln
Edit / New language	Editar / Nuevo idioma	Éditer / Nouvelle langue	Neue Sprache
Delete language	Eliminar idioma	Effacer langue	Sprache löschen

Codes	Códigos	Codes	Codes
Data	Datos	Données	Data
Metadata	Metadatos	Metadata	Metadata
Definition	Definición	Définition	Definition
View	Visualización	Voir	Ansicht
Derived variables	Variables derivadas	Variables dérivées	abgeleitete Variablen
File generator	Generador de archivos	Génerateur de fichier	Datei Erzeuger

Input data

ENGLISH	SPANISH	FRENCH	GERMAN
Input data	Entrada de datos	Entreé de Données	Daten einfügen
Double click or press F1 to see the coding system	Haga doble click o pulse F1 para ver el sistema de códigos	Double clic ou presser F1 pour voir le système de codages	Doppelklick oder F1, um das Kodiersystem zu sehen
General information	Información general	Information générale	Allgemeine Informationen
Horizon description	Descripción de horizonte	Description de l'horizon	Horizontbeschreibung
Standard analysis	Análisis general	Analyse normale	Standardanalysen
Salts/Heavy metals	Sales/Metales pesados	Sels/Metaux lourds	Salze/Schwermetalle
Physical analysis	Análisis físico	Analyse physique	Physikalische Analysen
Water retention	Retención de agua	Retention d'eau	Wasserspeicherung
Hydraulic conductivity	Conductividad hidráulica	Conductivité hydraulique	Hydraulische Leitfähigkeit
Additional variables	Variables adicionales	Variables additionnelles	Ergänzende Variablen
Profile code	Código del perfil	Code du profil	Profilcode
Content	Contenido	Contenu	Inhalt
Page	Página	Page	Seite
Status	Status	Status	Status
Date	Fecha	Date	Datum
Authors	Autores	Auteurs	Autoren
Soil unit	Unidad de suelo	Unité de sol	Bodeneinheit
Location	Localización	Local	Lage
Survey area	Área de estudio	Surface prospectée	Unters.gebiet
Administrative unit	Unidad admininstrativa	Unité administrative	Verw.bezirk

Latitude	Latitud	Latitude	Breite
Longitude	Longitud	Longueur	Länge
Elevation	Elevación	Altitude	Höhe
Sheet	Hoja	Couche	Arb.blatt
Grid	Cuadrícula	Grille	Gitter
FAO 90 soil unit	Unidad de suelo FAO 90	Unité de sol FAO 90	FAO 90 Bodeneinheiten
FAO 90 third level	Tercer nivel FAO 90	Trosième niveau FAO 90	FAO 90 dritte Stufe
FAO 74 soil unit	Unidad de suelo FAO 74	Unité de sol FAO 74	FAO 74 Bodeneinheiten
Phase	Fase	Phase	Phase
group	grupo	groupe	Gruppe
unit	unidad	unité	Einheit
specifier	especificador	specifier	Spezifizierung
Soil climate	Clima del suelo	Climat du sol	Bodenklima
Local soil classification (serie)	Clasificación local del suelo (serie)	Classification locale du sol (série)	Lokale Bodenklassifikation (Serien)
Topography	Topografía	Topographie	Topographie
Land form	Geomorfología	Géomorphologie	Geomorphologie
Land element	Posición fisiográfica	Position physiographique	Landschaftselement
Position	Emplazamiento del perfil	Situation du profile	Lage
Slope	Pendiente	Pente	Hang
class	clase	classe	Klasse
form	forma	forme	Form
Micro topography	Microtopografía	Microtopographie	Mikrotopographie
Flood	Inundación	Inondation	Überflutung
frequency	frecuencia	fréquence	Frequenz
duration	duración	Durée	Dauer
Land use	Uso del terreno	Usage du sol	Landnutzung
type	tipo	type	Typ
Crops	Cultivos	Cultures	Kultur
Vegetation	Vegetación	Végétation	Vegetation
Species	Especies	Espèces	Arten
Grass cover	Cobertura de herbáceas	Couverture herbacée	Grasbedeckung
Parent material	Material original	Materiel d'origine	Ausgangsmaterial
over	sobre	sur	über
derived from	derivado de	dérivé de	hertransportiert aus
Parent rock	Roca original	Roche mère	Ausgangsgestein
Stones	Piedras	Pierres	Steine

English	Spanish	French	German
abundance	abundancia	abondance	Vorkommen
size	tamaño	dimension	Größe
Rocks	Rocas	Roches	Felsen
distance	distancia	distance	Distanz
height	altura	hauteur	Höhe
Erosion	Erosión	Érosion	Erosion
deposition	deposición	déposition	Akkumulation
intensity	intensidad	intensité	Intensität
Sealing	Cementación	Cimentation	Versiegelung
crusts	costras	croûte	Krusten
Drainage	Drenaje	Drainage	Entwässerung
internal	interno	interne	intern
external	externo	externe	extern
Water table	Capa freática	Nappe phréatique	Grundwasserspiegel
maximum	máximo	maximum	Maximum
minimum	mínimo	minimum	Minimum
observed	observado	observé	beobachtet
Moisture conditions	Condiciones de humedad	État hydrique	Feuchtigkeit
Effective soil depth	Profundidad útil	Profondeur utile	effektive Bodentiefe
Human influence	Influencia humana	Action anthropologique	anthrop. Verändrg.
Remarks	Observaciones	Remarques	Anmerkungen
Photographs	Fotografías	Photografies	Fotografien
Profile site	Emplazamiento del perfil	Position du profil	Lage des Profils
Soil profile	Perfil de suelo	Profil du sol	Bodenprofil
Other	Otra	Autre	Andere
Load image	Cargar imagen	Charger image	Bild laden
Delete	Eliminar	Effacer	Löschen
Save image	Guardar imagen	Sauvegarder image	Bild speichern
Horizon number	Número de horizonte	Nombre d'horizons	Horizontnummer
Designation	Denominación	Désignation	Bezeichnung
Depth	Profundidad	Profondeur	Tiefe
Upper	Superior	Supérieur	Höher
Lower	Inferior	Inférieur	Tiefer
Colours	Colores	Couleurs	Farben
Mottles	Manchas	Taches	Farbflecken
abundance	abundancia	abondance	Vorkommen

size	tamaño	dimension	Größe
contrast	contraste	contraste	Kontrast
boundary	límite	limite	Grenze
colour	color	couleur	Farbe
Texture	Textura	Texture	Körnung
Structure	Estructura	Structure	Struktur
relationship	relación	Relation	Verhältnis
grade	grado	degré	Grad
Consistency	Consistencia	Consistance	Konsistenz
dry	seco	sec	trocken
moist	húmedo	humide	feucht
Stickiness	Adhesividad	Adhésivité	Bindigkeit
Plasticity	Plasticidad	Plasticité	Plastizität
Cutans	Cutanes	Cutanes	Kutane
quantity	cantidad	quantité	Quantität
contrast	contraste	contraste	Kontrast
nature	naturaleza	nature	Natur
location	localización	Local	Lage
Cementation	Cementación	Cimentation	Zementierung
Compaction	Compactación	Compactation	Verdichtung
continuity	continuidad	continuité	Kontiniutät
Voids	Poros	Pores	Poren
Porosity	Porosidad	Porosité	Porosität
Rocks	Rocas	Roches	Felsen
shape	forma	forme	Form
weathering	meteorización	degré d'altération	Verwitterung
Nodules	Nódulos	Nodules	Knollen / Klumpen
hardness	dureza	dureté	Härte
Carbonates	Carbonatos	Carbonates	Carbonate
Biological features	Características biológicas	Caractèristiques biologiques	Biolog. Eigenschaften
Roots	Raíces	Racines	Wurzeln
Boundary	Límite	Limite	Grenze
width	anchura	largeur	Weite
Method	Método	Méthode	Methode
Sample code	Código de la muestra	Code de l'échantillon	Probennummer
fixed	fijado	fixé	gebunden

English	Spanish	French	German
Method used	Método usado	Méthode utilisée	verw. Methode
Particle size	Granulometría	Granulométrie	Teilchengröße
vcS (very coarse Sand)	Amg (Arena muy gruesa)	Stg (Sable très grossier)	ggS (grober Grobsand)
cS (coarse Sand)	Ag (Arena gruesa)	Sg (Sable grossier)	gS (Grobsand)
mS (medium Sand)	Am (Arena media)	Sm (Sable moyen)	mS (Mittelsand)
fS (fine Sand)	Af (Arena fina)	Sf (Sable fin)	fS (Feinsand)
vfS (very fine Sand)	Amf (Arena muy fina)	Stf (Sable très fin)	ffS (feiner Feinsand)
Sand	Arena	Sable	Sand
cSi (coarse Silt)	Lg (Limo grueso)	Lg (Limon grossier)	gU (Grobschlufft)
fSi (fine Silt)	Lf (Limo fino)	Lf (Limon fin)	fU (Feinschluff)
Silt	Limo	Limon	Schluff
Clay	Arcilla	Argile	Ton
CECc	CICa	CECc	KAK
Total	Total	Total	Gesamt
Active	Activo	Actif	Aktiv
Soluble cations	Cationes solubles	Cations solubles	Lösliche Kationen
Soluble anions	Aniones solubles	Anions solubles	Lösliche Anionen
Heavy metals	Metales pesados	Métaux Lourds	Schwermetalle
Saturated hydraulic conductivity	Conductividad hidráulica a saturación	Conductivité hydraulique saturée	Gesättigte Wasserleitfähigkeit
Actual water content	Contenido de agua real	Contenu d'eau réel	Aktueller Wassergehalt
Stability index	Índice de estabilidad estructural	Indice de stabilité structurale	Stabilitätsindex
Bulk density	Densidad aparente	Densité apparente	Lagerungsdichte
Resistance to penetration	Resistencia a la penetración	Résistance à la pénétration	Resistance to Penetration
Particles density	Densidad de las partículas	Densité des particules	Teilchendichte
Total porosity	Porosidad total	Porosité totale	Gesamtporosität
Kind of measurement	Tipo de medida	Type de mesure	Art der Messung
Number of measurements	Número de medidas	Nombre de mesures	Anzahl der Messungen
laboratory	laboratorio	laboratoire	Labor
field	campo	champ	Feld
Suction	Succión	Succion	Suction
Water content	Cont. de agua	Cont. d'eau	Wassergehalt
Reference variable	Variable de referencia	Variable de référence	Referenzvariable
Hydr. cond.	Cond. hidr.	Cond. hydr.	Wasserleitfähigkeit
Additional variable #1	Variable adicional #1	Variable additionnelle #1	Ergänzende Variable #1
Additional variable #2	Variable adicional #2	Variable additionnelle #2	Ergänzende Variable #2
Additional variable #3	Variable adicional #3	Variable additionnelle #3	Ergänzende Variable #3

Additional variable #4	Variable adicional #4	Variable additionnelle #4	Ergänzende Variable #4
Additional variable #5	Variable adicional #5	Variable additionnelle #5	Ergänzende Variable #5
Additional variable #6	Variable adicional #6	Variable additionnelle #6	Ergänzende Variable #6
Additional variable #7	Variable adicional #7	Variable additionnelle #7	Ergänzende Variable #7
Additional variable #8	Variable adicional #8	Variable additionnelle #8	Ergänzende Variable #8
Additional variable #9	Variable adicional #9	Variable additionnelle #9	Ergänzende Variable #9
Additional variable #10	Variable adicional #10	Variable additionnelle #10	Ergänzende Variable #10
Double click to see the coding system	Haga doble click para ver el sistema de códigos	Double clic pour voir le système de codage	Doppelklick, um das Kodiersystem zu sehen
Right mouse button to see the menu	Pulse el botón derecho del ratón para ver el menú	Cliquer le bouton droit de la souris pour voir le menu	rechte Maustaste, um das Menü zu sehen
Activate/deacivate fields	Activar/desactivar campos	Activer/désactiver champs	aktivierte/deaktivierte Felder
Select the visible fields	Seleccionar los campos visibles	Sélectionner les champs visibles	Wahl der sichtbaren Felder
Accept	Aceptar	Accepter	Akzeptieren
Cancel	Cancelar	Annuler	Abbrechen
Invalid code	Código no válido	Code non valable	Ungültiger Code
Image format not valid	Formato de imagen no válido	Format d'image non valable	Bildformat nicht gültig

Code forms

ENGLISH	SPANISH	FRENCH	GERMAN
Coding system	Sistema de códigos	Système de codages	Codierungssystem
Data blocks	Bloques de datos	Blocs de données	Datensätze
Variables	Variables	Variables	Variablen
Generalization levels	Niveles de generalización	Niveaux de généralisation	verallgemeinerte Stufen
Analytical methods	Métodos analíticos	Méthodes analytiques	analytische Methoden
Code	Código	Code	Codes
Description	Descripción	Description	Beschreibung
Rock type	Tipo de roca	Type de roche	Gesteinstyp
Permeability	Permeabilidad	Pérméabilité	Durchlässigkeit
third level	tercer nivel	trosième niveau	dritte Stufe
great group	gran grupo	grand groupe	Hauptgruppe
subgroup	subgrupo	sous-groupe	Untergruppe

mineralogy	mineralogía	minéralogie	Mineralogie
reaction	reacción	réaction	Reaktion
Soil temperature	Temperatura del suelo	Température du sol	Bodentemperatur
Soil Humidity	Humedad del suelo	Humidité du sol	Bodenfeuchte
Colour modifier	Modificador del color	Modificateur de couleur	Farbmodifikator
Electrical conductivity	Conductividad eléctrica	Conductivité électrique	Elektrische Leitfähigkeit
Phosphorus	Fósforo	Phosphore	Phosphor
Nitrogen	Nitrógeno	Azote	Stickstoff
Carbon	Carbono	Carbone	Carbonat
Total calcic carbonate	Carbonato cálcico total	Carbonate calcique total	Gesamtes Calciumcarbonat
Effective calcic carbonate	Carbonato cálcico efectivo	Carbonate calcique effectif	Effektives Calciumcarbonat
Calcic sulphate	Sulfato cálcico	Sulfate calcique	Calciumsulfat
Cation exchange capacity	Capacidad de intercambio catiónico	Capacité d'échange cationique	Kationenaustauschkapazität
Exchangeable calcium	Calcio cambiable	Calcium échangeable	Austauschbares Calcium
Exchangeable magnesium	Magnesio cambiable	Magnésium échangeable	Austauschbares Magnesium
Exchangeable potassium	Potasio cambiable	Potassium échangeable	Austauschbares Kalium
Exchangeable sodium	Sodio cambiable	Sodium échangeable	Austauschbares Natrium
Hydrogen	Hidrógeno	Hydrogène	Wasserstoff
Aluminium	Aluminio	Aluminium	Aluminium
Fixed potassium	Potasio fijado	Potassium fixé	Gebundenes Kalium
Very coarse sand	Arena muy gruesa	Sable très grossier	Sehr grober Sand
Coarse sand	Arena gruesa	Sable grossier	Grobsand
Medium sand	Arena media	Sable moyen	Mittelsand
Fine sand	Arena fina	Sable fin	Feinsand
Very fine sand	Arena muy fina	Sable très fin	feiner Feinsand
Coarse silt	Limo grueso	Limon grossier	Grobschluff
Fine silt	Limo fino	Limon fin	Feinschluff
Sand	Arena	Sable	Sand
Silt	Limo	Limon	Schluff
Clay	Arcilla	Argile	Ton
CEC of the clay	CIC de la arcilla	CEC de l'argile	KAK von Ton
Calcium	Calcio	Calcium	Calcium
Magnesium	Magnesio	Magnésium	Magnesium
Potassium	Potasio	Potassium	Kalium
Sodium	Sodio	Sodium	Natrium
Boron	Boro	Bore	Bor

Carbonates	Carbonatos	Carbonates	Carbonate
Bicarbonates	Bicarbonatos	Bicarbonates	Bicarbonate
Chlorine	Cloro	Chlore	Chlor
Sulphates	Sulfatos	Sulfates	Sulfat
Nitrates	Nitratos	Nitrates	Nitrat
Na/Ca/Mg relationship	Relación Na/Ca/Mg	Relation Na/Ca/Mg	Verhältnis Na/Ca/Mg
Arsenic	Arsénico	Arsenic	Arsen
Cadmium	Cadmio	Cadmium	Cadmium
Cobalt	Cobalto	Cobalte	Kobalt
Chrome	Cromo	Chrome	Chrom
Copper	Cobre	Cuivre	Kupfer
Mercury	Mercurio	Mercure	Quecksilber
Manganese	Manganeso	Manganése	Mangan
Molybdenum	Molibdeno	Molybdène	Molybdän
Nickel	Níquel	Nickel	Nickel
Lead	Plomo	Plomb	Blei
Antimony	Antimonio	Antimoine	Antimon
Selenium	Selenio	Sélénium	Selen
Zinc	Zinc	Zinc	Zink
Hydraulic conductivity	Conductividad hidráulica	Conductivité hydraulique	Wasserleitfähigkeit
Water content	Contenido de agua	Contenu d'eau	Wassergehalt
Structural stability index	Índice de estabilidad estructural	Indice de stabilité structurale	Struktueller Stabilitätsindex
Bulk density	Densidad aparente	Densité apparente	Lagerungsdichte
Total porosity	Porosidad total	Porosité totale	Gesamtporosität
Water content/suction relationship	Relación contenido de humedad/succión	Relation contenu d'eau/succion	Verhältnis Wassergehalt/-spannung
Hydraulic conductivities	Conductividades hidráulicas	Conductivités hydrauliques	Wasserleitfähigkeiten

Data base

ENGLISH	SPANISH	FRENCH	GERMAN
Profile code already exists	El código del perfil ya existe	Code du profil déjà existant	Profilcode existiert bereits
Horizon code already exists	El código del horizonte ya existe	Code d'horizon déjà existant	Horizontcode existiert bereits

ENGLISH	SPANISH	FRENCH	GERMAN
Sample code already exists	El código de la muestra ya existe	Code d'échantillon déjà existant	Probencode existiert bereits
Null code	Código nulo	Code nul	ungültiger Code
Profile code can not be null	El código del perfil no puede ser nulo	Code du profil ne peut pas être annulé	Profilcode ist nicht ungültig (?)
Horizon code can not be null	El código del horizonte no puede ser nulo	Code d'horizon ne peut pas être annulé	Horizontcode can not be null
Sample code can not be null	El código de la muestra no puede ser nulo	Code d'échantillon ne peut pas être annulé	Probencode can not be null
This code is being used in some database record, if continue you will lose that information	El código se está usando en algún registro de la base de datos, si continúa perderá esa información	Ce code est en usage dans un enregistrement de base de données, si vous continuez vous allez perdre cette information	Dieser Code wird bereits in einer Datenbank verwendet, wenn Sie fortfahren, können die Daten verloren gehen

Import

ENGLISH	SPANISH	FRENCH	GERMAN
Profiles list	Lista de perfiles	Liste des profils	Liste der Profile
Data type	Tipo de datos	Type de données	Datentyp
Chemical determinations	Determinaciones químicas	Déterminations chimiques	Chemische Bestimmung
Soil variables	Variables de suelo	Variables du sol	Bodenvariablen
Directory	Directorio	Repertoire	Auflistung
Select source directory	Seleccionar directorio origen	Choisir repertoire de source	Select source directory
First record	Primer registro	Premier enregistrement	Erste Aufzeichnung
Last record	Último registro	Dernier enregistrement	Letzte Aufzeichnung
Language in which they were codified	Idioma en el que fueron codificados	Langage oú ils ont été codifiés	Sprache in der sie codiert wurden
English	Inglés	Anglais	Englisch
Spanish	Español	Espagnol	Spanisch
French	Francés	Français	Französisch
Import successful	Importación con éxito	Import réussi	Import erfolgreich

Export

ENGLISH	SPANISH	FRENCH	GERMAN
Replace	Reemplazar	Remplacer	Ersetzen
Add to file	Añadir al archivo	Ajouter au fichier	In die Datei einfügen
Export successful	Exportación con éxito	Export réussi	Export erfolgreich
You can see the results into	Puede ver los resultados en	Vous pouvez voir les résultats dedans	Sie können die Ergebnisse sehen in,

Codes view

ENGLISH	SPANISH	FRENCH	GERMAN
Select block	Seleccionar bloque	Choisir bloc	Ausgewählter Block

Content

ENGLISH	SPANISH	FRENCH	GERMAN
Database content	Contenido de la base de datos	Contenu de base de données	Inhalt der Datenbank
Number of profiles	Número de perfiles	Nombres de profils	Anzahl der Profile
Morphological data	Datos morfológicos	Données morphologiques	MorphologischeDaten
Analytical data	Datos analíticos	Données analytiques	Analytische Daten
Physical data	Datos físicos	Donnés physiques	Physikalische Daten
Hydraulical data	Datos hidráulicos	Données hydrauliques	Hydraulische Daten
Print	Imprimir	Imprimer	Drucken
View	Visualizar	Voir	Ansehen
FAO 90 classification	Clasificación FAO 90	classification de la FAO 90	FAO 90 Klassifikation
WRB 98 classification	Clasificación WRB 98	classification de WRB 98	WRB 98 Klassifikation
USDA 87 classification	Clasificación USDA 87	classification de l'USDA 87	USDA 87 Klassifikation
Profile	Perfil	Profil	Profil

ENGLISH	SPANISH	FRENCH	GERMAN
Soil profile description	Descripción del perfil de suelo	Description du profil du sol	Beschreibung des Bodenprofil
Coordinates	Coordenadas	Coordonnées	Koordinaten
Rock outcrops	Afloramientos rocosos	Roche affleurante	Rock outcrops (Skelettanteil?)
Surface stoniness	Pedregosidad superficial	Gravellosité de la surface	Steingehalt an der Oberfläche
Horizon	Horizonte	Horizon	Horizont
Morphological description	Descripción morfológica	Description morphologique	Morphologische Beschreibung
Multicoloured	Abigarrado	Multicoloré	vielfarbig
and	y	Et	und
in dry	en seco	A sec	trocken
in moist	en húmedo	A humide	feucht
in wet	en mojado	A mouillé	naß
by	por	Par	von
in	en	En	in
Sample	Muestra	Echantillon	Probe
Soluble salts	Sales solubles	Sels solubles	lösliche Salze
Graphical presentation	Representación gráfica	Présentations graphiques	graphische Darstellung
Determinations	Determinaciones	Determinations	Bestimmungen
Vertical variability	Variabilidad vertical	Variabilité verticale	vertical variability

Searchs

ENGLISH	SPANISH	FRENCH	GERMAN
Search fields	Campos de búsqueda	Chercher champs	gesuchte Felder
Key	Clave	Clé	Schlüssel
FAO 74 classification	Clasificación FAO 74	classification de la FAO 74	FAO 74 Klassifikation
None	Ninguno	Aucun(e)	keine
You must select a field to the key	Debe seleccionar un campo para la clave	Vous devez choisir un champ pour la clé	Sie müssen ein Feld zu dem Schlüssel auswählen
You must fill in the first key value	Debe rellenar el valor de la primera clave	Vous devez remplir la valeur de la première clé	Sie müssen den ersten Wert des Schlüssels eingeben
You must fill in the second key value	Debe rellenar el valor de la segunda	Vous devez remplir la valeur de la	Sie müssen den zweiten Wert des

ENGLISH	SPANISH	FRENCH	GERMAN
	clave	deuxième clé	Schlüssel eingeben
Sorry, the result is an empty set	Lo siento, el resultado es un conjunto vacío	Désolé, le résultat est une série vide	Das Ergebnis ist ein leerer Datensatz
Comparison operators	Operadores de comparación	Opérateurs de comparaison	Bedienervergleich (?)
Selected profiles	Perfiles seleccionados	Profils choisis	ausgewählte Profile
Maximum watertable depth	Profundidad máxima de la capa freática	profondeur maximale du bassin	maximaler Grundwasserspiegel
Minimum watertable depth	Profundidad mínima de la capa freática	Profondeur minimale du bassin	minimaler Grundwasserspiegel
Field estimated clay	Arcilla estimada en el campo	Argile estimée du champ	geschätzter Tongehalt (Feld)

Languages

ENGLISH	SPANISH	FRENCH	GERMAN
Available languages	Idiomas disponibles	Langages en vigueur	verfügbare Sprachen
Name of the language	Nombre del idioma	Nom du langage	Name der Sprache
Select language	Seleccionar idioma	Choisir langage	Sprache wählen
Language group	Grupo de idiomas	Groupe de langage	Sprachgruppe
Romance	Romance	Romance	romanisch
Germanic	Germánico	Germanique	germanisch

Derived variables

ENGLISH	SPANISH	FRENCH	GERMAN
Dependent variable	Variable dependiente	Variable dépendante	abhängige Variablen
Name	Nombre	Nom	Name
Independent variable	Variable independiente	variable indépendente	unabhängige Variablen
Base saturation percentage	Porcentaje de saturación en base	Pourcentage de la saturation de base	Basensättigung (%)
Syntax error	Error de sintaxis	Erreur de syntaxe	Syntax error
Field not valid	Campo no válido	Champ non valable	Feld nicht gültig
Format number not valid	Formato de número no válido	Nombre de format non valable	Formatnummer nicht gültig

Evaluation

ENGLISH	SPANISH	FRENCH	GERMAN
You must select the fields to export	Debe seleccionar los campos a exportar	Vous devez choisir les champs pour l'export	Sie müssen die Felder, die Sie exportieren wollen, auswählen
Depth must be an integer value	Las profundidades deben ser valores enteros	La profondeur doit être un nombre entier	Tiefe muß eine unabhängige Variable sein
Evaluation interface: LES/GIS file generator	Interfaz de evaluación: generador de archivos LES/GIS	Interface d'evaluation :génerateur d'archive LES/GIS	
Layer thickness	Espesor de la capa	Epaisseur de la couche	Dicke der Schicht
Way of calculation	Forma de cálculo	Mode de calcul	Art der Berechnung
Weighted average	Media ponderada	Moyenne pondérée	
Dominant value	Valor dominante	Valeur dominante	dominanter Wert
General information fields	Campos de información general	Champs d'information génerale	Felder für allgemeine Informationen
Registration	Registro	Registre	Registrierung
Soil classification	Clasificación de suelo	Classification du sol	Bodenklassifikation
Surface characteristics	Características de la superficie	Caractéristiques de surface	Eigenschaften der Oberfläche
Soil-water relationship	Relación suelo-agua	Relation Sol/Eau	Verhältnis Boden-Wasser
Soil horizon description fields	Campos de descripción de horizontes de suelo	Champs de description de l'horizon du sol	Felder zur Beschreibung der Bodenhorizonte
Soil colour	Color del suelo	couleur du sol	Bodenfarbe
Primary constituents	Constituyentes principales	Constituants primaires	
Organisation and constituents	Organización y constituyentes	Organisationet constituants	
Voids and porosity	Huecos y porosidad	Pores et porosité	Poren und Porosität
Concentrations	Concentraciones	Concentrations	Konzentrationen
Biological activity	Actividad biológica	Activité biologique	Biologische Aktivität
Soil reaction	Reacción del suelo	Réaction du sol	Bodenreaktion
Horizon boundary	Límite del horizonte	Limite d'horizon	Horizontbegrenzung
Matrix colour	Matriz de colores	Couleur de matrice	Farbe der Matrix
Rock fragments	Fragmentos rocosos	Fragments de roches	Gesteinsreste
Cutanic features	Caract. de los cutanes	Cartactéristiques tranchantes	
Field pH	pH de campo	pH du champ	pH im Feld

Standard analyses fields	Campos de datos analíticos generales	Champ d'analyses standards	Felder für Standardanalysen
General data	Datos generales	Données génerales	Allgemeine Daten
Very Coarse	Muy gruesa	très grossier	sehr grob
Coarse	Gruesa	Grossier	grob
Medium	Media	Moyen	mittel
Fine	Fina	Fin	fein
Very fine	Muy fina	Très fin	sehr fein
Soluble salts / heavy metals fields	Campos de datos de sales solubles / metales pesados	Sels solubles/champs de métaux lourds	lösliche Salze / Schwermetalle
Select directory and type of output file	Seleccionar directorio y tipo de archivo de salida	Choisir répertoire et type d'archive output	Wählen Sie directory und den Typ des output files
Type of output file	Tipo de archivo de salida	type d'archive d'output	Typ des output files
Separator	Separador	Separateur	Seperator

Technical information and data dictionary

DATA FILES

FILE NAME	CONTENTS
SBBSITE.DB	General information data
SDBHORIZ.DB	Horizon description data
SDBANA1.DB	Standard analytical data
SDBANA2.DB	Soluble salts/heavy metals data
PHYSICS.DB	Soil physical data
WAT_RET.DB	Water retention data
KUNSAT.DB	Hydraulic conductivity data
ADDVARS.DB	Additional analytical data

INDEX FILES

FILE NAME	CONTENTS
SDBSITE.PX	General information index
SDBHORIZ.PX	Horizont description index
SDBHORIZ.XG0	
SDBHORIZ.YG0	Horizont description secundary indexes
SDBANA1.PX	Standar analitical index
SDBANA2.PX	Soluble salts/heavy metals index
PHYSICS.PX	Soil physical index
WAT_RET.PX	Water retention index
KUNSAT.PX	Hydraulic conductivity index
ADDVARS.PX	Additional analytical index

CONVERSION FILES

FILE NAME	CONTENTS
SITECODES.DB	
SITECODES.PX	
SITECODES.XG0	
SITECODES.YG0	Profile description codes
HORIZCODES.DB	
HORIZCODES.PX	
HORIZCODES.XG0	
HORIZCODES.YG0	Horizont description codes

ANAMETCODES.DB
ANAMETCODES.PX   Analytical data description codes

PHYSMETCODES.DB
PHYSMETCODES.PX   Physical data description codes

COLOR.DB
COLOR.PX   Color code and equivalence files.

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FIELDS OF DATA FILES

SBBSITE.DB file (Data)

FIELD	TYPE	SIZE	DESCRIPTION
AUT1	CHAR	3	Author 1
AUT2	CHAR	3	Author 2
AUT3	CHAR	3	Author 3
CRO1	CHAR	2	1st crop
CRO2	CHAR	2	2nd crop
DATE	DATE		Date
DEPT	CHAR	2	Effective soil depth
DRAE	CHAR	2	External drainage
DRAI	CHAR	2	Drainage class
ELEV	NUMBER	4	Elevation
ERI1	CHAR	2	1st erosion / deposition intensity
ERI2	CHAR	2	2nd erosion /deposition intensity
ERK1	CHAR	2	1st erosion / deposition type
ERK2	CHAR	2	2nd erosion /deposition type
F3L	CHAR	3	FAO 90 3rd level
FAO	CHAR	3	FAO 74 soil unit
FLOD	CHAR	2	Flooding duration
FLOF	CHAR	2	Flooding frequency
FSU	CHAR	3	FAO 90 soil unit
GRCO	CHAR	1	Grass cover
GRID	CHAR	12	Grid number
GWAB	CHAR	2	Maximum watertable depth
GWAD	CHAR	2	Watertable depth
GWAK	CHAR	2	Watertable kind
GWAT	CHAR	2	Minimum watertable depth
HUM	CHAR	2	Human influence
LAEL	CHAR	2	Land element
LAFO	CHAR	2	Land form
LAT	CHAR	7	Latitude
LOC	CHAR	120	Location
LON	CHAR	8	Longitude
LOSE	CHAR	3	Local soil serie
LUT	CHAR	5	Land use type
MITO	CHAR	2	Micro-topography
MOC1	CHAR	1	1st moisture condition
MOC2	CHAR	1	2nd moisture condition
MOC3	CHAR	1	3rd moisture condition
MOD1	NUMBER	3	1st moisture depth
MOD2	NUMBER	3	2nd moisture depth
MOD3	NUMBER	3	3rd moisture depth
NUT4	CHAR	5	Level 4 NUT
PAM1	CHAR	2	1st parent material

PAM2	CHAR	2	2nd parent material
PERM	CHAR	2	Permeability
PHAS	CHAR	2	FAO phase
PHOTO1	BLOB		Profile site photograph
PHOTO2	BLOB		Profile photograph
PHOTO3	BLOB		Another photograph
PHOTO4	BLOB		Another photograph
POS	CHAR	2	Position of site
PRNO	CHAR	6	Profile
REMARKS	TEXT		Remarks
ROCD	CHAR	2	Rock outcrop distance
ROCQ	CHAR	2	Rock outcrop abundance
ROCH	CHAR	2	Rock outcrop height
ROTY	CHAR	2	Rock type
SCLM	CHAR	3	Soil climate
SEAL	CHAR	2	Surface sealing / crusting
SHNO	CHAR	6	Sheet number
SLFR	CHAR	1	Slope form
SLGR	CHAR	2	Slope gradient class
SMOI	CHAR	2	Soil moisture regime
SPE1	CHAR	3	1st specie
SPE2	CHAR	3	2nd specie
SPE3	CHAR	3	3rd specie
SPE4	CHAR	3	4th specie
SPE5	CHAR	3	5th specie
STAT	CHAR	1	Status
STEM	CHAR	2	Soil temperature
STGG	CHAR	4	USDA 87 great group
STMI	CHAR	2	USDA 87 mineralogy
STOQ	CHAR	1	Surface stones abundance
STOS	CHAR	1	Surface stones size
STRE	CHAR	2	USDA 87 reaction
STSG	CHAR	5	USDA 87 subgroup
STTX	CHAR	3	USDA 87 texture
SURVEYAREA	CHAR	50	Survey area
TOP	CHAR	1	Topography
UNIT	CHAR	5	Soil unit
VEG	CHAR	5	Vegetation type
WRB98GR	CHAR	2	World reference base for soil resources, groups
WRB98SP	CHAR	1	World reference base for soil resources, specifiers
WRB98UN	CHAR	3	World reference base for soil resources, units

SDBHORIZ.DB file (Data)

FIELD	TYPE	SIZE	DESCRIPTION
BIK1	CHAR	2	1st biological features kind
BIK2	CHAR	2	2nd biological features kind
BIQ1	CHAR	1	1st biological features quantity
BIQ2	CHAR	1	2nd biological features quantity
BOUT	CHAR	1	Boundary topography
BOUW	CHAR	1	Boundary width
CARB	CHAR	2	Carbonates
CEMC	CHAR	1	Cementation / Compaction continuity
CEMG	CHAR	1	Cementation / Compaction grade
CEMN	CHAR	1	Cementation / Compaction nature
CEMS	CHAR	1	Cementation / Compaction structure
CLAY	NUMBER	6.2	Field estimated clay

CODD	CHAR	3	Dry consistence
CODM	CHAR	3	Moist consistence
COSP	CHAR	3	Wet consistence: plasticity
COSS	CHAR	3	Wet Consistence: stickiness
CUC1	CHAR	1	1st cutans contrast
CUC2	CHAR	1	2nd cutans contrast
CUL1	CHAR	2	1st cutans location
CUL2	CHAR	2	2nd cutans location
CUN1	CHAR	2	1st cutans nature
CUN2	CHAR	2	2nd cutans nature
CUQ1	CHAR	1	1st cutans quantity
CUQ2	CHAR	1	2nd cutans quantity
CHR1	CHAR	3	1st colour chroma
CHR2	CHAR	3	2nd colour chroma
DESI	CHAR	6	Horizon designation
HRNO	CHAR	2	Horizon number
HUE1	CHAR	5	1st colour hue
HUE2	CHAR	5	2nd colour hue
LOBO	NUMBER	3	Lower boundary depth
METPH	CHAR	2	Method used to measure the field pH
MNC1	CHAR	2	1st nodules colour
MNC2	CHAR	2	2nd nodules colour
MNH1	CHAR	1	1st nodules shape
MNH2	CHAR	1	2nd nodules shape
MNK1	CHAR	1	1st nodules kind
MNK2	CHAR	1	2nd nodules kind
MNN1	CHAR	1	1st nodules nature
MNN2	CHAR	1	2nd nodules nature
MNQ1	CHAR	1	1st nodules quantity
MNQ2	CHAR	1	2nd nodules quantity
MNR1	CHAR	1	1st nodules hardness
MNR2	CHAR	1	2nd nodules hardness
MNS1	CHAR	1	1st nodules size
MNS2	CHAR	1	2nd nodules size
MOD1	CHAR	2	1st colour modifier
MOD2	CHAR	2	2nd colour modifier
MTB1	CHAR	1	1st mottles boundary
MTB2	CHAR	1	2nd mottles boundary
MTC1	CHAR	2	1st mottles colour
MTC2	CHAR	2	2nd mottles colour
MTN1	CHAR	1	1st mottles contrast
MTN2	CHAR	1	2nd mottles contrast
MTQ1	CHAR	1	1st mottles abundance
MTQ2	CHAR	1	2nd mottles abundance
MTS1	CHAR	1	1st mottles size
MTS2	CHAR	1	2nd mottles size
PH	NUMBER	5.2	Field pH
PRNO	CHAR	6	Porfíe code
PRQ1	CHAR	1	1st pores quantity
PRQ2	CHAR	1	2nd pores quantity
PRS1	CHAR	2	1st pores size
PRS2	CHAR	2	2nd pores size
PRTY	CHAR	1	Porosity
PTY1	CHAR	1	1st pores type
PTY2	CHAR	1	2nd pores type
RCN1	CHAR	2	1st rocks nature
RCN2	CHAR	2	2nd rocks nature
RCQ1	CHAR	1	1st rocks quantity
RCQ2	CHAR	1	2nd rocks quantity
RCS1	CHAR	2	1st rocks size

RCS2	CHAR	2	2nd rocks size
RCW1	CHAR	1	1st rocks weathering
RCW2	CHAR	1	2nd rocks weathering
RCH1	CHAR	1	1st rocks shape
RCH2	CHAR	1	2nd rocks shape
RTQ1	CHAR	1	1st roots quantity
RTQ2	CHAR	1	2nd roots quantity
RTS1	CHAR	2	1st roots size
RTS2	CHAR	2	2nd roots size
ST12	CHAR	1	Relation between 1st and 2nd structures
STG1	CHAR	2	1st structure grade
STG2	CHAR	2	2nd structure grade
STS1	CHAR	2	1st structure size
STS2	CHAR	2	2nd structure size
STT1	CHAR	2	1st structure type
STT2	CHAR	2	2nd structure type
TEX1	CHAR	4	1st texture
TEX2	CHAR	4	2nd texture
UPBO	NUMBER	3	Upper boundary depth.
VAL1	CHAR	3	1st colour value
VAL2	CHAR	3	2nd colour value

SDBANA1.DB file (Data and Metadata)

FIELD	TYPE	SIZE	DESCRIPTION
AL	NUMBER	5.2	Exchangeable aluminium
CA	NUMBER	5.2	Exchangeable calcium
CACA	NUMBER	5.2	Effective CaCO3
CACO	NUMBER	5.2	Total CaCO3
CASO	NUMBER	5.2	Total CaSO4
CECC	NUMBER	5.2	CEC clay
CECS	NUMBER	5.2	CEC soil
CL	NUMBER	6.2	Clay
CS	NUMBER	5.2	Coarse sand
CSI	NUMBER	5.2	Coarse silt
EC	NUMBER	5.2	Electro conductivity
FS	NUMBER	5.2	Fine sand
FSI	NUMBER	5.2	Fine silt
H	NUMBER	5.2	Exchangeable hydrogen
K	NUMBER	5.2	Exchangeable potassium
KF	NUMBER	5.2	Fixed potassium
LOBO	NUMBER	3	Lower boundary depth
METAL	CHAR	2	Method used to measure the exchangeable aluminium
METCA	CHAR	2	Method used to measure the exchangeable calcium
METCACA	CHAR	2	Method used to measure the effective CaCO3
METCACO	CHAR	2	Method used to measure the total CaCO3
METCASO	CHAR	2	Method used to measure the total CaSO4
METCECC	CHAR	2	Method used to measure the CEC clay
METCECS	CHAR	2	Method used to measure the CEC soil
METCL	CHAR	2	Method used to measure the clay
METCS	CHAR	2	Method used to measure the coarse sand
METCSI	CHAR	2	Method used to measure the coarse silt
METEC	CHAR	2	Method used to measure the electro conductivity
METFS	CHAR	2	Method used to measure the fine sand
METFSI	CHAR	2	Method used to measure the fine silt
METH	CHAR	2	Method used to measure the exchangeable hydrogen

METK	CHAR	2	Method used to measure the exchangeable potassium
METKF	CHAR	2	Method used to measure the fixed potassium
METMG	CHAR	2	Method used to measure the exchangeable magnesium
METMS	CHAR	2	Method used to measure the medium sand
METN	CHAR	2	Method used to measure the nitrogen
METNA	CHAR	2	Method used to measure the exchangeable sodium
METOC	CHAR	2	Method used to measure the organic carbon
METP	CHAR	2	Method used to measure the phosphorus
METPHC	CHAR	2	Method used to measure the pH CaCl2
METPHW	CHAR	2	Method used to measure the pH water
METSAND	CHAR	2	Method used to measure the sand
METSILT	CHAR	2	Method used to measure the silt
METVCS	CHAR	2	Method used to measure the very coarse sand
METVFS	CHAR	2	Method used to measure the very fine sand
MG	NUMBER	5.2	Exchangeable magnesium
MS	NUMBER	5.2	Medium sand
N	NUMBER	5.3	Nitrogen
NA	NUMBER	5.2	Exchangeable sodium
OC	NUMBER	5.2	Organic carbon
P	NUMBER	5.2	Phosphorus
PBS	NUMBER	6.2	Base saturation percentage
PHC	NUMBER	5.2	pH CaCl2
PHW	NUMBER	5.2	pH water
PRNO	CHAR	6	Profile code
SAND	NUMBER	6.2	Sand
SANO	CHAR	1	Sample code
SILT	NUMBER	6.2	Silt
UPBO	NUMBER	3	Upper boundary depth
VCS	NUMBER	5.2	Very coarse sand
VFS	NUMBER	5.2	Very fine sand

SDBANA2.DB file (Data and Metadata)

FIELD	TYPE	SIZE	DESCRIPTION
ARS	NUMBER	7.2	Arsenic
BO	NUMBER	5.2	Soluble boron
CA	NUMBER	5.2	Soluble calcium
CD	NUMBER	7.2	Cadmium
CL	NUMBER	5.2	Soluble Cl
CO	NUMBER	7.2	Cobalt
CO3	NUMBER	5.2	Soluble CO3
CR	NUMBER	7.2	Chrome
CU	NUMBER	7.2	Copper
DATE	DATE		Sampling date
EC	NUMBER	5.2	Electro conductivity
HCO3	NUMBER	5.2	Soluble HCO3
HG	NUMBER	7.2	Mercury
K	NUMBER	5.2	Soluble potassium
LOBO	NUMBER	3	Lower boundary depth
METARS	CHAR	2	Method used to measure the arsenic
METBO	CHAR	2	Method used to measure the soluble boron
METCA	CHAR	2	Method used to measure the soluble calcium
METCD	CHAR	2	Method used to measure the cadmium
METCL	CHAR	2	Method used to measure the soluble Cl
METCO	CHAR	2	Method used to measure the cobalt

METCO3	CHAR	2	Method used to measure the soluble CO3
METCR	CHAR	2	Method used to measure the chrome
METCU	CHAR	2	Method used to measure the copper
METEC	CHAR	2	Method used to measure the electro conductivity
METHCO3	CHAR	2	Method used to measure the soluble HCO3
METHG	CHAR	2	Method used to measure the mercury
METK	CHAR	2	Method used to measure the soluble potassium
METMG	CHAR	2	Method used to measure the soluble magnesium
METMN	CHAR	2	Method used to measure the manganese
METMO	CHAR	2	Method used to measure the molybdenum
METNA	CHAR	2	Method used to measure the soluble sodium
METNI	CHAR	2	Method used to measure the nickel
METNO3	CHAR	2	Method used to measure the soluble NO3
METPB	CHAR	2	Method used to measure the lead
METPH	CHAR	2	Method used to measure the pH
METSAR	CHAR	2	Method used to measure the sodium / calcium / magnesium relation
METSB	CHAR	2	Method used to measure the antimony
METSE	CHAR	2	Method used to measure the selenium
METSO4	CHAR	2	Method used to measure the soluble SO4
METZN	CHAR	2	Method used to measure the zinc
MG	NUMBER	5.2	Soluble magnesium
MN	NUMBER	7.2	Manganese
MO	NUMBER	7.2	Molybdenum
NA	NUMBER	5.2	Soluble sodium
NI	NUMBER	7.2	Nickel
NO3	NUMBER	5.2	Soluble NO3
PB	NUMBER	7.2	Lead
PH	NUMBER	5.2	pH
PRNO	CHAR	6	Profile code
SANO	CHAR	1	Sample code
SAR	NUMBER	6.2	Sodium / calcium / magnesium relation
SB	NUMBER	7.2	Antimony
SE	NUMBER	7.2	Selenium
SO4	NUMBER	5.2	Soluble SO4
UPBO	NUMBER	3	Upper boundary depth
ZN	NUMBER	7.2	Zinc

PHYSICS.DB file (Data and Metadata)

FIELD	TYPE	SIZE	DESCRIPTION
BULK	NUMBER	5.2	Bulk density
DATE	DATE		Sampling date
KSAT	NUMBER	6.2	Hydraulic conductivity in saturation
LOBO	NUMBER	3	Lower boundary depth
METBULK	CHAR	2	Method used to measure the bulk density
METKSAT	CHAR	2	Method used to measure the hydraulic conductivity in saturation
METPART	CHAR	2	Method used to measure the particles density
METRESIST	CHAR	2	Method used to measure the resistance to penetration
METSATWAT	CHAR	2	Method used to measure the water content in saturation
METSTAB	CHAR	2	Method used to measure the structure stability index
METTPOR	CHAR	2	Method used to measure the total porosity
PART	NUMBER	5.2	Particles density

FIELD	TYPE	SIZE	DESCRIPTION
PRNO	CHAR	6	Profile code
RESIST	NUMBER	5.2	Resistance to penetration
SANO	CHAR	1	Sample code
SATWAT	NUMBER	6.4	Actual water content
STAB	NUMBER	5.2	Structure stability index
TPOR	NUMBER	6.4	Total porosity
UPBO	NUMBER	3	Upper boundary depth

WAT_RET.DB file (Data and Metadata)

FIELD	TYPE	SIZE	DESCRIPTION
PRNO	CHAR	6	Profile code
DATE	DATE		Sampling date
SANO	CHAR	1	Sample code
UPBO	NUMBER	3	Upper boundary depth
LOBO	NUMBER	3	Lower boundary depth
FLAG	CHAR	1	Kind of measurement: Field or laboratory
HEAD1	NUMBER	7.2	Value of the first measurement of the suction
...HEAD25	NUMBER	7.2	Value of the 25th measurement of the suction
THETA1	NUMBER	10.2	Value of the water content for the first suction
...THETA25	NUMBER	10.2	Value of the water content for the 25th suction
METHODS	CHAR	2	Method used to measure the water content / suction relation
HEADUNIT	CHAR	10	Suction measure units
THETAUNIT	CHAR	10	Water content measure units

KUNSAT.DB file (Data and Metadata)

FIELD	TYPE	SIZE	DESCRIPTION
PRNO	CHAR	6	Profile code
DATE	DATE		Sampling date
SANO	CHAR	1	Sample code
UPBO	NUMBER	3	Upper boundary depth.
LOBO	NUMBER	3	Lower boundary depth
FLAG	CHAR	1	Kind of measurement: Field or laboratory
IND_VAR	CHAR	1	It Indicates if the hydraulic conductivity is related to the suction (h) or to the water content (θ).
VAR1	NUMBER	10.2	First value (h o θ)
...VAR25	NUMBER	10.2	25th value (h o θ)
COND1	NUMBER	6.2	Hydraulic conductivity for the first value
...COND25	NUMBER	6.2	Hydraulic conductivity for the 25th value
METHODS	CHAR	2	Method used to measure the hydraulic conductivity
CONDUNIT	CHAR	10	Hydraulic conductivity measure units

ADDVARS.DB file (Data and Metadata)

FIELD	TYPE	SIZE	DESCRIPTION
PRNO	CHAR	6	Profile code
DATE	DATE		Sampling date
SANO	CHAR	1	Sample code

UPBO	NUMBER	Upper boundary depth
LOBO	NUMBER	Lower boundary depth
ADDVAR1	NUMBER	Additional variable #1
ADDVAR2	NUMBER	Additional variable #2
ADDVAR3	NUMBER	Additional variable #3
ADDVAR4	NUMBER	Additional variable #4
ADDVAR5	NUMBER	Additional variable #5
ADDVAR6	NUMBER	Additional variable #6
ADDVAR7	NUMBER	Additional variable #7
ADDVAR8	NUMBER	Additional variable #8
ADDVAR9	NUMBER	Additional variable #9
ADDVAR10	NUMBER	Additional variable #10

SOURCE FILES

(On electronic format)

SDBm Plus
Software version 1.02, and Spanish Manual

<u>Modifications and Improvements #1</u>

        *With relation to the **SDBm Plus**, version 1.00 (December 2000), the following modifications and corrections have been made in the software.*

1. A bug has been fixed in the Code|Data|Definition option and now it is possible to edit the different code sets.
2. A new button in the photographs input screen has been added in order to save the photographs easily.
3. The profile description included wrong information about the FAO 90 classification. It has been fixed.
4. In the new version 1.02 the user is not able to input blank codes into the coding system edition, which is very important for the software's correct working.
5. In the last version 1.00 we forgot the colour modifier importation. Fixed.
6. When the user change the language, the programme change also the language type.
7. In the last version 1.00 when the user deleted a profile description, the associated horizons and samples remained into the database. In the new version 1.02 they are deleted too.
8. The possibility of delete a record from the content screen has been added.
9. The graphical presentation has been improved, representing only the not null values in the vertical variability graphs.
10. A fix size for the photograph in horizon description has been established.
11. A new option to allow export ASCII format files has been developed.
12. All the graphic presentation types have been added, including physical and hydraulic data.
13. A new statistical summary option has been included in the content option screen.
14. The coding system table for the field USDA 87: Great Group has been re-indexed to the description in order to facilitate the location by the user.
15. The FAO 74 and 90 classification field in the input screen have been regrouped in order to save space and improve the use of this fields.
16. The USDA 98 coding system tables have been developed (**Appendix B**), although they have not been still included into the software.

Sevilla, March 2001

SDBm Plus
Software version 2.00 (February, 2002)

Modifications and Improvements #2

With relation to the ***SDBm Plus*** *database, previous versions 1.00, 1.02 and 1.03 (December 2000, March 2001 and April 2001, respectively), the following improvements and corrections have been made in the updated software.*

17. <u>Multiple-document interface</u>. Software re-programming to change from the simple-document procedure of the previous versions to a new working multiple-document procedure.

18. <u>Input/edit data</u>. Modification of the input/edit data procedure in order to maintain closed the database tables during the entrance of new data on the input screens.

19. <u>Working on LAN</u>. Through the Preference option, it is possible to select access path of the database in order to work on local area network (LAN), sharing the software and operating on the same database tables. In this case, the users control file PDOXUSRS.NET, located by default on C:/ directory, must be copied within the shared database directory.

20. <u>New order of the Main Screen options</u>: Files, Codes, Content, Search, Evaluation, Preferences, and Languages.

21. <u>New coded variables</u>: USDA 98 and WRB 98 soil classifications (in English language), and Munsell 98 colours chart (in English, Spanish, French and German languages).

22. <u>Update option in the installation program</u>. In order to update previous versions already installed, this option creates the needed fields for the new coded variables. In this case, it is need to run the INSTALL.EXE file.

23. <u>Testing process</u>. After several test procedures followed on the previous versions in different places, a number of little working problems have been solved.

24. <u>User manuals</u>. The previous English and Spanish manuals have been passed to PDF format and including the new coded variables.

SDBm Plus

Software version 2.01 (June, 2002)*

Modifications and Improvements #3

With relation to the previous version 2 .00 (February 2002), the following improvements and corrections have been made in the updated software.

1. <u>Date form</u>. The soil description and analysis dates have been change to ISO 8601 format (yyyy-mm-dd).

2. <u>Coordinates field</u>. This field has been enlarged until hundreths of second. (e.g.   N-37º45'28''50).

3. <u>Suction unit</u>. A new suction unit, referred to pF, has been included into the hydraulic properties tables.

4. <u>View profile</u>. In view soil profile, it is now possible to see the FAO 90 classification.

5. <u>Remarks</u>. The field remark is printed completely in the soil profile report.

6. <u>Metadata</u>. The metadata report of each soil profile description can be saved.

7. <u>Evaluating results</u>. The format of the files resulting from the evaluation option is now dBASE IV.

8. <u>Help windows</u>. HTML format files have been created, in English and Spanish languages, for all the help windows.

9. <u>New field</u>. A new field has been added in the hydraulic conductivity table in order to store the corresponding suction or water content values.

10. <u>Testing process</u>. A number of little working problems have been solved, e.g. in the field rocks abundance, the coding system did not work properly; some label words were in inappropriate language; etc.

11. <u>Installation program</u>. The update program has been modified to change the hydraulic conductivity table structure to adapt it to the new field.

Sevilla, June 2002

(*) This software can be freely downloaded from the MicroLEIS Website (www.microleis.com), Software section.