
Content

WRB translations

Reports on meetings

WRB Training Course, Poland
Conference and Field Trip Paleosols, Italy
2nd Summer School: soil survey and WRB
WRB Trans-Ural Polar Tour and the
International Conference on Soil
Classification 2004, Russia

WRB and the IUSS Congress in 2006

Upcoming WRB Meetings

The road map for the WRB 2006

WRB Forum and Discussion site

Web-sites referring to WRB

WRB translations:

The Chinese WRB draft translation of the lecture notes is available directly from Zhao Yuguo: ygzhao@issas.ac.cn.

A draft version of the Lecture notes in Spanish is available from: Francisco Javier Manriquez: francisco.manriquez@inegi.gob.mx, or Guadalupe Durón Ruiz-Esparza: guadalupe.duron@inegi.gob.mx

For the draft version of WRB in Russian please contact Victor Targulian: targul@centro.ru

Reports on meetings

TRAINING COURSE: WORLD REFERENCE BASE FOR SOIL RESOURCES

From: <http://www.ibw.vlaanderen.be/fsc/baseSoilRes.html>

From 19 till 23 January 2004, the PROFOREST Centre of Excellence organised in co-operation with FSCC, a training course in forest soil classification in Warsaw, Poland. In this course, 10 soil scientists from four countries (Lithuania, Croatia, Czech Republic and Poland) improved on their knowledge of the World Reference Base for Soil Resources and discussed the application of the WRB classification system on European forest soils.



WRB Training in the field (Warsaw, Poland)

**Report on Conference and Field Trip Paleosols:
memory of ancient landscapes and living body of present ecosystems**

by Erika Micheli

The meeting took place in Florence, Italy, 7-11 June 2004. It was a joint meeting of the Commission of Soil Genesis and the Commission of Paleopedology of IUSS, the International Union of Quaternary Research and the Working Group of the World Reference Base for Soil Resources. Papers and posters were presented following sessions:

1. Recognizing paleopedological processes;
2. Classification of paleosols and soils of reclaimed anthropic areas in World Reference Base and Soil Taxonomy and comparison between the different systems
3. Evaluating soilscape dynamics on paleosols and anthropic soils
4. Building soil typological units on paleosols and anthropic soils
5. Mapping techniques for paleosols and anthropic soils
6. Managing the old and anthropic surfaces

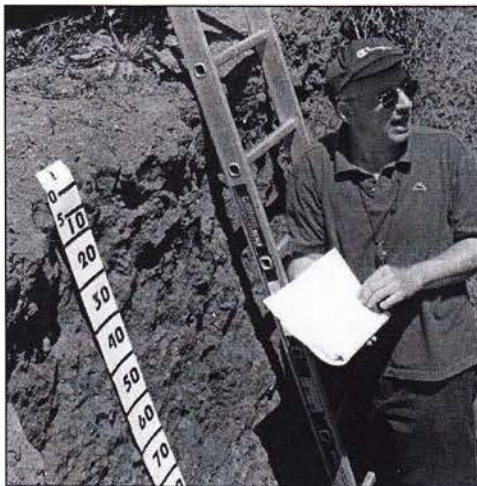
The conference was followed by a 3-day fieldtrip in Tuscany. The observed soils (including Nitisols, Luvisols, Vertisols, Albeluvisols, Regosols, Calcisols) were very well prepared and documented, and provided a good opportunity for intensive discussions, in particular on genesis and classification

The major conclusions of the meeting:

- Nomenclature of horizon designation needs to be extended to indicate certain processes (ferric, stagnic)
- Field identification of current hydrological properties needs to be developed
- Indication of processes that are not active any more (e.g. cryogenic, argic when there is no more clay translocation) on the qualifier level is needed.
- Harmonization with Soil Taxonomy is needed (in many cases even the concept is different : e.g. Fragipan and Fragic horizon)

Thanks to the Organizing Committee for the great meeting!

(The Organizing Committee: E.A.C. Costantini, R. Napoli, M. Finioia, M. Morandi, G.L'Abate, R. Barbetti, F. Urbano, S. Magini, G.D'Egidio, – Experimental Institute for Soil Study and Conservation, Florence. S.Carnicelli - Dept. of Soil Science and Plant Nutrition - Faculty of Agronomy, University of Florence, E. Capezzuoli, P. Pieruccini, F. Sandrelli - Dept. of Earth Sciences, University of Siena, L.Gardin, A.Vinci - Regione Toscana)



Left: Edoardo Constantini, Chair of the Organizing Committee
Right: Relic stagnic properties in one of the Paleosols observed.

Report on the 2nd European Summer School on Soil Survey

by Erika Micheli

The 2nd European Summer School on Soil Survey was organized by the Institute for Environment and Sustainability of JRC, EC in Ispra -19-24 July 2004.

The objective of the Summer School was deliver specific training required for the development of the European Soil Information System (EUSIS) and information linked to the implementation of the new EU Thematic Strategy for Soil Protection.

The participants (25) of the course were mainly from newly acceded countries (12) coming from national soil surveys, universities and regulatory authorities.



Participants of the 2nd Summer School

Several members of the WRB Working Group were actively participating in the training activities of the Summer School. The history, the structure and the 30 Reference Groups of the WRB with many examples were covered in 2 days in classroom lectures followed by a one-day fieldtrip to Emilia-Romagna region.

Other topics of the Summer School included “Soil survey - From landscape and profile description to digital cartography and pedometrics” and “Functions of soils and the threats to soils (as identified in the Communication on the Thematic Strategy for Soil Protection). The conclusions of the Summer School were:

- Feedback from participants were very positive
- Most topics are not in the the curricula of most Universities. Need is there!!
- The available teaching materials (Lecture notes and the CD) are excellent tools.
- Future Summer Schools should be university based!

**Report on the Trans-Ural Polar Tour
and the International Conference on Soil Classification 2004**

By Otto Spaargaren

The WRB Trans-Ural Polar Tour

In the framework of testing the Cryosol criteria in the World Reference Base for Soil Resources (WRB) and prior to its upcoming Revised Edition in 2006, the Institute of Biology of the Russian Academy of Sciences at Syktyvkar organized a 6-day tour in the tundra of North-eastern European Russia, the Polar Ural Mountains and North-western Siberia. Three days were spent in the Vorkuta region and two days in Labytnangi, before flying out from Salekhard to Moscow to be transferred to Petrozavodsk.

The Syktyvkar team, headed by Galina Mazhitova and Elena Leptava, very well organized the tour. A comprehensive field tour guide had been prepared with information on the geographical, climatological and geological setting of the region, full profile descriptions accompanied by analytical data according to WRB standards (ISRIC methods), and mineralogical and micromorphological analysis. Profile pits were well prepared, which is quite difficult in view of the environmental conditions. Logistics (transport by bus, tundra-mobile, helicopters and train) was flawless.

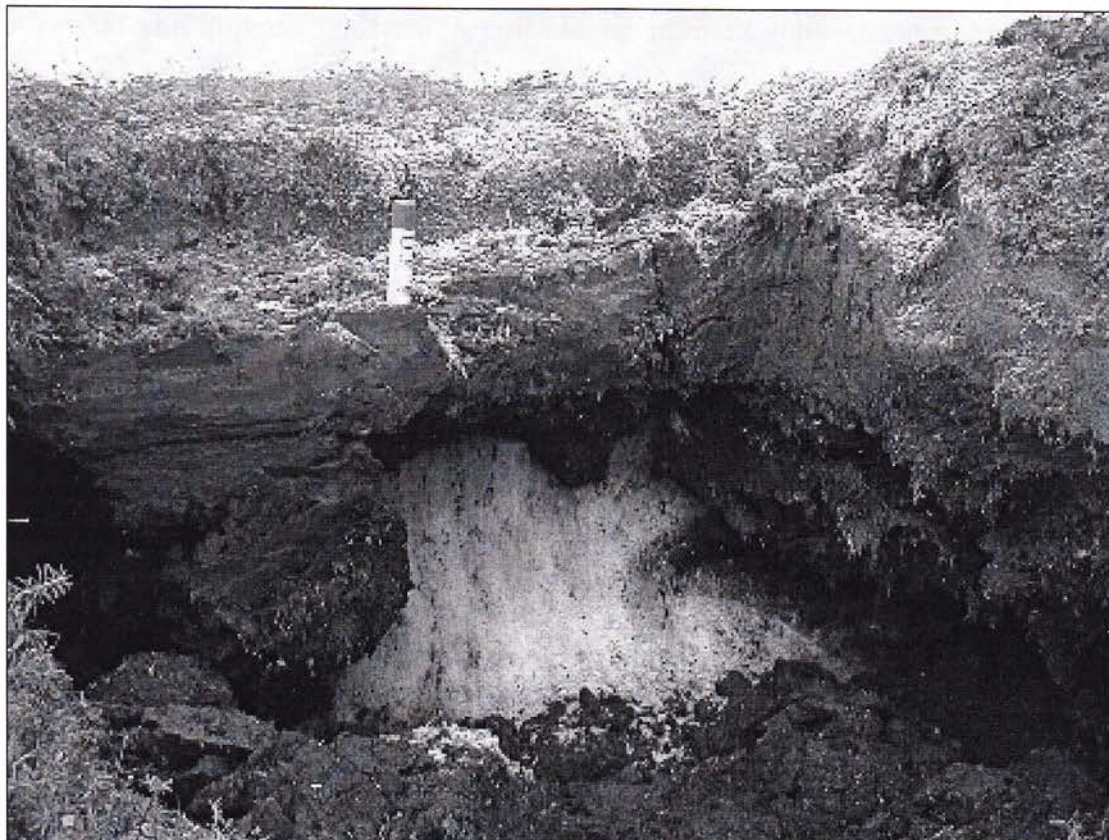
The group comprised 25 participants from Austria, Belgium, Canada, Germany, Hungary, Italy, Latvia, Netherlands, Poland, Russia, South Africa and the USA, most of them active members of the WRB working group. Weather conditions were fine throughout the tour, with temperatures between 20 and 25°C, wind (which kept the mosquitoes away) and clear skies (which permitted extensive photographing, especially from the air).



WRB above the Arctic Circle at Vorkuta (photo Stanislaw Brozek)

The soils studied during the tour classified as Histosols (Glacic, Turbic), Cryosols (Turbic), Leptosols, Luvisols and Cambisols. The classification of Cryosols was generally satisfactory, but a need was registered to adapt the definition of Cryosols to include soils with permafrost between 1 and 2m depth, in which cryoturbation affects the surface. Another difficulty encountered was to establish the prevalence of either gleyic or stagnic conditions;

due to cryoturbation gleyic or stagnic colour patterns cannot be separated. It has therefore been decided to delete the two qualifiers from the list, and to replace them with “reductaquic” (indicating reductive wet conditions, giving a positive reaction with α,α , dipyridyl) and “oxyaquic” (indicating oxidative wet conditions, no reaction with α,α , dipyridyl). Furthermore, the gypsic qualifier has been dropped and replaced by “gypsic”, to cater for Cryosols on gypsum deposits. Similarly, a “calcaric” qualifier has been added to cover the Cryosols over calcareous deposits.



Glacic Histosol near Labytnangi, West Siberia (photo Galina Mazhitova)

It has been discussed extensively if the andic, vitric and spodic qualifiers should be retained, or that soils showing these features should belong to the Major Reference Groups of Andosols and Podzols, respectively. So far, no Andosols with permafrost within 1m have been found (see also the new book on Cryosols, edited by John Kimble), whereas cryoturbated Podzols are quite extensive in Central Siberia, linking up geographically with the Podzol belt. A decision on this has been postponed until sufficient data are collected to justify a final choice.

The classification of boreal Histosols worked fine, providing enough information to be able to interpret their properties and required management. No adjustments will be needed.

Discussion on Cryosols – Leptosols focussed on whether the present sequence of the Key (Cryosols keying out before the Leptosols) is practical. A similar discussion took place in 1996 with the introduction of the Cryosols in the present Key. On advice of the Canadians, Leptosols then were placed after the Cryosols, as a compromise to their wish to have Cryosols key out first, as is done in Soil Taxonomy with the Gelisols. However, such placement requires surveyors and researchers to establish the occurrence of permafrost within 1m in, for example, mountain scree deposits, which is quite cumbersome and not very useful. It is therefore proposed to place the Cryosols after the Leptosols in the new Key, and not to use “cryic”, “turbic” or “gelic” qualifiers in the Leptosols.

Both Cambisols and Luvisols need a “turbic” qualifier to indicate active cryoturbation without the presence of permafrost within 2m. A similar observation was made during the Iceland tour in relation to the Andosols.

Besides classification issues, we were also introduced to engineering aspects of Cryosols. One morning we were guided around Vorkuta to look at various options for building constructions, hot water supply and appliances to maintain permanently frozen ground. We learned about the instability of “warm” permafrost (temperature of about -0.5°C) and the stability of “cold” permafrost (temperature less than -1°C), and the high variability in depth of the permafrost that interferes with the construction activities. We saw various examples of the necessary non-insulated foundations, and the results of ill-constructed houses and apartment flats. Various devices are used to permanently keep the ground frozen; most refrigeration runs on methane and propane gas.

The International Conference on Soil Classification 2004

The Soil Classification 2004 Conference was held from 3 to 8 August 2004 in Petrozavodsk, Karelia. It was organized by the Institute of Biology, Russian Academy of Sciences in Petrozavodsk, and was attended by some 100 participants from 25 countries. Apart from South America and Antarctica, all continents were represented.

Topics of the 3-day conference were development and use of the World Reference Base for Soil Resources (WRB), developments in national classification systems and their linkages to WRB, anthropogenic soils, indigenous soil classifications, numerical classification systems, and the use of WRB in soil information systems. Keynote speakers reflected on the role soil classification plays in soil science and how this role can best be taken up by WRB. Several presentations highlighted the difficulties in classifying soils using WRB because of lack of appropriate qualifiers, some pointed out existing gaps, in particular in the group of steppe soils, others demonstrated problems in correlation between national classification systems and WRB.

One session was devoted to Anthropogenic soils and the introduction of human-transported and technogenic soils (so-called “Technosols”) into WRB. Nature and properties of such soils were presented, analysis was made how certain soil classifications deal with these kinds of soil, and discussions were held how such soils could be incorporated in WRB.



Participants in front of the Karelia Hotel, Petrozavodsk (photo Chen Zueng-Sang)

During breakout sessions the WRB Major Reference Groups were reviewed and proposals for a better characterization and easier determination have been put forward. Proposals like shifting the Cryosols after the Leptosols and a switch between Arenosols and Cambisols in

the Key (in order to bring the cambic horizon criteria more in line with Soil Taxonomy) were readily accepted. The introduction of Technosols was also accepted, leaving the Anthrosols as they are now. Neither the place of Technosols in the Key, nor what kinds of soil they should comprise, was resolved. A special Working Subgroup, headed by Rossiter and Zhang, will look into this matter.

Apart from setting up this working subgroup, it was decided to review all Major Reference Groups, their diagnostics, and the required qualifiers. For this purpose FAO will set up separate *e-forum* discussion lists, each one being moderated by an expert duo.

Other proposals put forwards concerned the rationale and logic of the Key, and the organization of the WRB qualifiers. The idea to split the qualifiers into prefix and suffix qualifiers (strong expression qualifiers and intergrades on one hand, weak expression qualifiers and extragrades on the other hand) was positively received. It entails a split of each qualifier listing into two groups (instead of the seven or three groups proposed earlier); as a rule, qualifier names of the first group are always used before the Major Reference Group name, qualifiers of the second group always behind the name. It appears that this approach provides a better link to the Soil Map of the World, a more consistent correlation between soils, also when automated, and turns WRB in a more suitable tool for small-scale mapping.

The proposal to abolish the use of diagnostic horizons and materials and work only with diagnostic properties was not accepted.

A 3-day field tour in Karelia concluded the conference, looking at weakly developed soils (Arenosols and Cambisols), soils with albeluvisc tonguing (Albeluvisols), and Technosols in the town of Petrozavodsk.

The tour ended with a boat trip to Kishi Island where we had the opportunity to study "minority soils"¹ with considerable admixture of *Shungite*, which provides the soils with dark colours and high amount of organic carbon (apparent mollic horizon). However, most of the so-called organic carbon is inert (almost graphite), only very little (less than 10%) can be attributed to active, Holocene organic carbon.

Final notes. The acceptance of WRB throughout the world is still increasing and is beyond expectation. 14 translations have been made up to date, the latest additions being Chinese, Hungarian and Latvian. The request of the USA to assist in the classifications for the field tours during the World Congress of Soil Science in 2006 (see below), the newly issued book on *Australian Soils and Landscapes* (providing a correlation between the Australian system of soil classification and WRB), and the growing demands from Latin America and Africa (see below) to assist in implementation of WRB in their regions, is encouraging. In addition, it should be noted that WRB is increasingly used in soil information systems (examples: the European Soil Geographical Database; the SOTER of the Czech Republic at scale 1:250.000).

It was pleasing to see that the majority of the participants were young soil scientists, who participated actively and showed keen interest in classification issues.

¹ Soils that occupy very small areas and that, whatever classification system you use, always classify unsatisfactory because of their special characteristics.



Technosol along the Lososinka River in Petrozavodsk (photo Chen Zueng-Sang)

Follow-up issues and announcements

- An 8-day WRB field tour will be organized in March 2005 from Mexico City to Oaxaca State on the Pacific coast of Mexico. This will be a pre-conference tour to the International Conference on *Global Soil Change: Time-scales and Rates of Pedogenic Processes*, to be held in Mexico City from 10-18 March 2005
- WRB and Soil Taxonomy will be used simultaneously during all field tours of the World Congress of Soil Science. John Galbraith (organizer of one of the field tours and Chair of ICOMANTH) has asked Erika Micheli, Peter Schad and Otto Spaargaren to come to the USA in advance (preferably April 2006) to classify all field tour soils in WRB.
- Hans-Peter Blume (Germany) has indicated that WRB will very likely become ISO standard within two or three years time.
- China (Zhang Gan-lin) has agreed in principle to organize a soil monolith sampling tour annex WRB field tour to Tibet in 2007. This timeframe permits to search for funds. The tour will be limited to 20 foreign and 10 Chinese participants. Main organizers will be ISS-AS (Nanjing) and ISRIC. It will be no problem to find 20 foreign participants to join this tour; already 12 have indicated during the conference that they will participate. **Follow-up:** to get insight in the financial implications as soon as possible.
- A request will be made to Khadaffi to finance a WRB tour through Libya, also in the light of the much-needed Arabic translation of the documents. **Follow-up:** request to be sent by the WRB Working Group.

WRB and the IUSS Congress in Philadelphia 2006

The proposal of the Working Group for a full symposium of the Congress was accepted.
The description Symposium:

Title: „Developments in the World Reference Base for Soil Resources (WRB)”

World Reference Base for Soil Resources (WRB), the official global correlation scheme of the IUSS, went through substantial developments. The purpose of the symposium is to present the current status, principles and new developments of WRB. Papers on the experiences of applications and comparisons with others systems are also welcome.

Convener: Erika Micheli, Chair WRB

Co-Convener(s): Craig Ditzler

The road map for the WRB 2006

As a result of a WRB Board meeting, which took place prior to the conference Soil Classification 2004 and the discussions held during the conference, the roadmap towards Philadelphia 2006 is as follows:

- November 30, 2004:* closing for suggestions on diagnostics and reference groups following a WRB *e-forum* discussion
- January 31, 2005:* draft diagnostics + key ready
- March 2005:* WRB Board meeting (physical or by e-mail) for decision-making
- September 30, 2005:* closing for suggestions on qualifiers following a WRB *e-forum* discussion
- November 2005:* draft document ready; WRB Board meeting at FAO in Rome for decision-making
- First half 2006:* FAO prints a revised version of World Soil Resources Report **84**
- July 2006:* Presentation of the revised version of the World Reference Base for Soil Resources at the World Congress of Soil Science in Philadelphia

W R B Discussion List and Forum

During the Karelia meeting Working Subgroups were instituted to review the WRB Reference Soil Groups and to make suggestions for improving definitions and diagnostic criteria, and special Working Subgroups were set up to work out additional materials, as follows:

Reference Soil Groups		Lead
Phaeozems, Chernozems, Kastanozems	-	Gerasimova, Schad
Durisol, Calcisol, Gypsisol	-	Berding, Gray
Solonchaks, Solonetz	-	Toth, Loyer
Ferralsols, Plinthosols, Nitisols	-	Thiombiano, Hernandez
Podzols, Andosols	-	Charzynski, Spaargaren
Histosols, Cryosols	-	Goryachkin, Kimble
Soils with argic horizons	-	Deckers, Krasilnikov
Fluvisols, Gleysols, Planosols	-	Blume, Klamt
Cambisols, Umbrisols	-	Hollis, Costantini
Regosols, Leptosols, Arenosols	-	Arnold, Remmelzwaal
Vertisols	-	Wilding, Micheli
Anthropogenic soils	-	Rossiter, Zhang
Special Working Subgroups		
Rationale of the key	-	Deckers, Ibanez
Brief descriptions of reference soil groups	-	Spaargaren, Micheli
Description of methods for field identification	-	Krasilnikov, Langhor
Developing guidelines for application of WRB for soil survey / supporting development of local legends	-	Napoli, Engel

As the road map indicates, a revision of the *World Reference Base for Soil Resources* (FAO World Soil Resources Report **84**) is envisaged by the end of 2005, to include the experiences of six years of testing throughout the world. A first reworking of the Key, diagnostic horizons, properties and materials is ready and will be posted on 1 November 2004 on the WRB Discussion List and Forum:

<http://www.fao.org/waicent/FaoInfo/Agricult/AGL/AGLL/WRB/forum.stm>.

Everyone is invited to sent comments, so that by February 2005 the revised version can be used to further develop the qualifier level of WRB.

UPCOMING WRB MEETINGS

Southern Mexico: the world of unknown soils. WRB field excursion from 28 February – 8 March 2005. The tour will be organized as a pre-conference tour of the **International Conference “Global Soil Change”**.

More information on the WRB tour in attached file, on the conference itself and other tours on: <http://geologia.igeolcu.unam.mx/Paleosuelos/edafologia/programa.htm>.

An updated selection of web sites referring to WRB

<http://home.t-online.de/home/f.bailly/texte/4wrbtxt.htm>

(WRB German site)

<http://www.soils.wisc.edu/soils/courses/325/Lecture13.pdf>

(Soil classification lecture University of Wisconsin)

<http://www.geo.unizh.ch/bodenkunde/> (Soil site University Zurich, Switzerland)

http://home.hiroshima-u.ac.jp/er/Rres_D.html

(WRB in Japanese)

<http://www.ar.wroc.pl/~kabala/online.html>

(Soil Science on line from Poland)

<http://www.fa.gau.hu/~sc21/>

(Proceedings Hungary Soil Classification Workshop)

<http://www.css.cornell.edu/publications/soiltrop/soiltropinfo.html>

(Cornell University Professor Armand van Wambeke's site)

<http://www.elsitioagricola.com/articulos/moscatelli/soils%20of%20argentina%20-%20nature%20and%20use.asp>

(WRB in Argentina Mabel Pazos)

<http://www.itc.nl/~rossiter/teach/lecnotes.html>

(ITC The Netherlands: David Rossiter's lecture notes on soils)

<http://www.fao.org/ag/agl/agll/wrb/>

(FAO's WRB web site)

<http://www.isric.org>

(ISRIC's Home page web site)

<http://www.ersal.lombardia.it/Suolo/home/link2.htm>

(Excellent Soil links)

<http://www.library.rdg.ac.uk/subjects/ir/irsoil.html>

(Excellent soil links from Reading University)

<http://www.rala.is/desert/2-1.html>

(Soils from Iceland)

<http://www.agiweb.org/ies/soil.html>

(American Geological institute)

<http://soils.usda.gov/>

(US Major Soil Site)

http://www.uni-hohenheim.de/soilrus/cd_soils.htm

(World Soils CD)

http://www.ctu.edu.vn/colleges/agri/tlkh/soil/rsrch_ss_class.html

(WRB in Vietnam)

http://www.nijos.no/Publikasjoner/dokumenter/2003/Dok6_03.pdf

(WRB in Norway)

http://www.iiasa.ac.at/Research/FOR/russia_cd/soil.htm

(WRB and Soils of Russia)

http://www.dea.met.gov.na/data/Atlas/html_files/2.20%20Dominant%20soils%20in%20Namibia.html

(Soils in Namibia)

<http://www.clw.csiro.au/publications/technical2002/tr30-02.pdf>

(Vineyard soils in Australia)

http://www.issas.ac.cn/index_English.htm

(Soil Map of China in WRB)

http://nsidc.org/data/docs/fgdc/ggd602_map_cryosols/

(Circumpolar Soils)

<http://www.pedosphere.com/volume02/interview.html>

(WRB in Canada)