UN/ECE International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forest

14th Meeting of the Expert Panel on Soil and Soil Solution

Florence, Italy, 16 – 18 April '08

Minutes

Nathalie Cools, Jari Mikkelsen (FSCC), and Bruno De Vos (Chair FSEP)

Agenda: SEE ANNEX 1

Participants: SEE ANNEX 2

Wednesday 16 April 2008

Opening, welcome, adoption of the agenda

The meeting was attended by 42 delegates from 22 countries and the DG Joint Research Centre in Ispra. The participants were welcomed by Prof. Fiorenzo Mancini, president of the Accademia Italiana di Scienze Forestali. He explained the history of the hosting institute, their scientific achievements and recent activities. After these words, Bruno Petriccione NFC of Italy, stressed the importance of monitoring, but also of publications of data. According to Bruno Petriccione the two most important issues for future research are biodiversity and the impact of climatic change on the biota. Prof. Stefano Carnicelli welcomed all and expressed his hope that Italy will be able to live up to the standard set at the previous Expert Panel Meetings.

The co-chair, Bruno De Vos, welcomed the participants and thanked the Italian colleagues for hosting the meeting. He explained that due to the resignation of Since Prof Eric Van Ranst in October 2007, a new chairman should be elected during this meeting. The letter of resignation can be consulted in Annex III. Bruno De Vos forwarded a message from Eric Van Ranst who wishes all the best to the Expert Panel members and a very fruitful meeting. The co-chair apologized for László Kolozs, deputy director of the Forestry Directorate of Hungary and for Aigars Indriksons (Latvia) who could not attend the meeting. The co-chair presented the agenda for adoption and highlighted the main issues of the meeting. The agenda was adopted.

LIFE+ and FutMon proposals: state of the art

Since Martin Lorenz (PCC) could not attend the meeting, John Derome read out his letter addressed to the Forest Soil Expert Panel. In addition, Bruno De Vos presented the slides prepared by Martin Lorenz on the state of the proposal for the EU-level Forest Monitoring System (FutMon project) under the LIFE+ regulation. In the presentation the previous achievements made by PCC and the cooperation

with EU was explained. For the future, the beneficiaries and applied budget within FutMon and the expected period of execution (1/1/2009 until 31/12/2013) are outlined. Furthermore, the ICP Forests and FutMon relationship was clearly explained. From 2009-2010 the project will be in a demonstration phase and from 2011-2013 in the implementation phase.

John Derome (Finland) remarked that in the application a proposal for a new database is made, which is included only because JRC can possibly not be financially compensated within FutMon. Otherwise obviously the data (for the EU countries) should be stored there.

Nils König, chairman of the QA/QC working group of the labs, presented the quality component of FutMon. The total budget for the FutMon application is about 83 million euro, with a co-financing from EU of about 40.5 million euro. FutMon will be composed of many small projects. The C1 projects concerns mostly QA/QC related research. One of the 12 proposed projects is the QA/QC for laboratories. Ring tests would be the core of the project, with ring tests on soils foreseen for every 2 years, and for foliar and water each year. The meetings of the Working Group on QA/QC should take place on an annual basis, a meeting of the heads of the laboratories every two years with a pre-meeting already in June 2008. Nils hereby invites all heads of laboratories to participate in this meeting where ringtest performance, procedures and methods will be discussed. Finally, in the project proposal a supporting programme for laboratories is included. This will allow 22 supporting visits by specialists to laboratories with general or specific problems.

Adoption of the minutes of the 13th FSEPM

Nathalie Cools (FSCC) presented the minutes of the 13th FSEPM of the Alton, UK meeting, which were adopted by the Expert Panel (EP).

Chairmanship and structure of the Expert Panel on Soil and Soil Solution

John Derome, chairman of the Working Group on Soil Solution, opened the discussion by explaining that the ad hoc soil solution working group would like to be merged into the Expert Panel on Soils; the new name would be Expert Panel on Soil and Soil Solution. The acronym 'FSEP' will remain the same.

Bruno De Vos explained the mission of the FSEP and showed the present panel structure and proposed a new structure. The Expert Panel discussed this proposal and after amendments, agreed on the EP structure outlined below.

Chairman and a vice-chairman will have clear responsibilities. FSCC will give support to both chairman and vice-chairman and will act as central contact for MS and EP members. Furthermore the EP proposed to install five expert groups (EG), namely "EG I on forest floor, soil profile description and classification", "EG II on soil physical analyses" in preparation for FutMon, "EG III on soil biological assessments" which could be very important for future research, "EG IV on soil solution" which will be the continuation of the existing WG and "EG V on soil chemical analyses". Experts volunteering to participate in these EGs are listed in Table 1, **some of these names still have to be confirmed through the experts present at this meeting**. The members of each expert group will

have to agree on one leading person who will report to the chair, vice-chair, FSCC and the expert panel members.

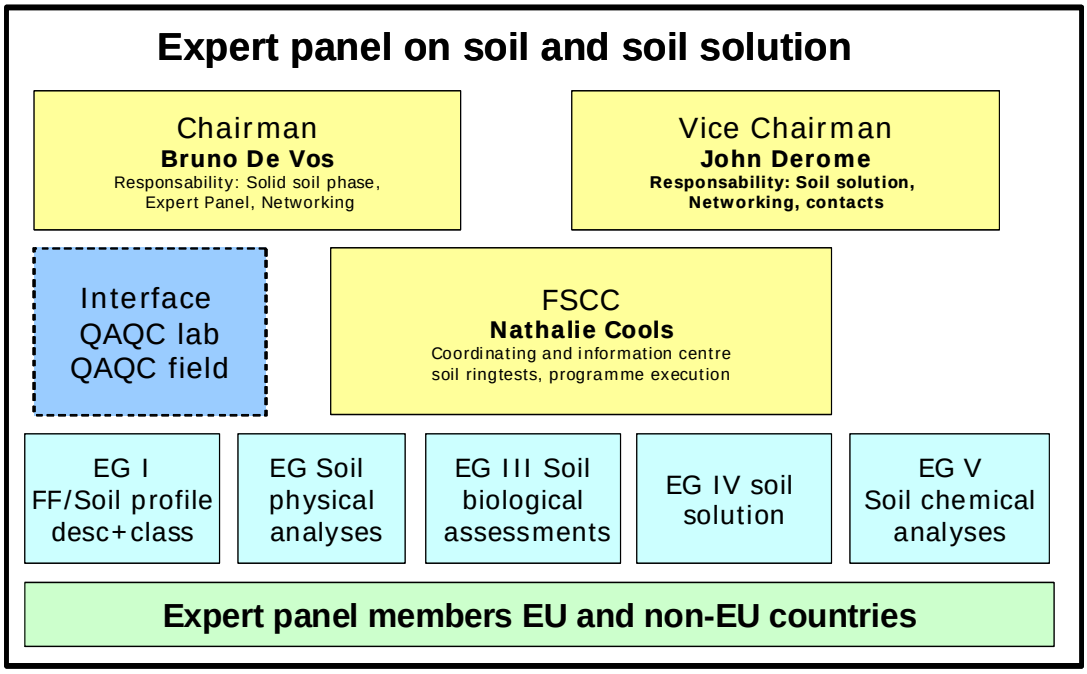

Table 1: Members of the proposed expert groups. Names indicated in grey still need confirmation.

EG1: FF/Soil profile description+ classification	EG2: Soil Physical analysis	EG3: Soil Biological analysis	EG4: Soil Solution	EG5: Soil Chemical analysis
Mats Olsson, SE	Lars Lundin, SE	Elena Vanguelova, GB	John Derome, FI	Erik Karltan, SE
Lars Lundin, SE	Henning Meesenburg, DE	Paolo Nannipieri, IT	(Lars Lundin, SE)	Nils König, DE
Günther Aust, AT	Bourletsikas, GR	Nicole Wellbrock, DE	Henning Meesenburg, DE	Panagiotis Michopoulos, GR
Rainer Reiter, AT	Milan Kobal, SI	Lars Vesterdal, DK	Panagiotis Michopoulos, GR	Anna Stancikova, SK
Stefano Carnicelli, IT	NN, DE	Bruno De Vos, BE	Guia Cecchini, IT	Elena Vanguelova, GB
Milan Kobal, SI	Erwin Murer, AT	NN, FR	Anna Stancikova, SK	Daniel Zlindra, SI
Nathalie Cools, FSCC, BE	Bruno De Vos, BE	Dagnija Lazdina LV	Elena Vanguelova, GB	Lars Vesterdal, DK
Gerhard Milbert, DE	Elena Vanguelova, GB		Daniel Zlindra, SI	Grazia Masciandaro, IT
Hannes Pock, AT			Lars Vesterdal, DK	Nathalie Cools, FSCC, BE
Aldis Kārklinš LV			Nils König, DE	Franz Mutsch, AT
			Erwin Murer, AT	Stefano Carnicelli, IT
				Guia Cecchini, IT
				Arta Komorovska LV

After the adoption of the structure, the chairman and vice-chairman were elected. Jari Mikkelsen (FSCC) asked the EP whether there were any candidates for the position of chair and vice-chair.

Bruno De Vos and John Derome both expressed their interest for the chair and vice-chair respectively. In absence of any opponents, the FSEP agreed to put forward this team for adoption to the Task Force Meeting to be held in Cyprus next month.

Suggested tasks for each of the EGs are:

- **EG I on Humus & Profile description and typology**
  - Exchange with European Humus Research Group
  - WRB soil classification problems and reporting to the IUSS WRB Working Group
  - Guidelines for forest soil profile description (implementation in manual)
  - Integration forest floor & mineral soil profile description
  - Special attention to description and classification of peat soils

- **EG II on physical soil analyses**
  - Methods for sampling undisturbed soil samples and analyses of soil water retention curves (pF) and hydraulic conductivity (Ksat) for future addition in the manual
  - Organisation of a pre-ringtest and 6th RT partim physical
  - Special attention to sampling and analysis of peat soils (e.g. sampling for bulk density measurements)
  - Is bound to strict time table of the LIFE+ FutMon project
  - Use/development of pedotransfer functions (PTFs)

- **EG III on biological forest soil assessment**
  - Topics to be selected in the future

- **EG IV on soil solution**
  - Aluminium fractionation
  - Dissolved organic carbon (DOC) fractionation/properties – role of DOC
  - Data submission – raw data or aggregated data?
  - Relation physical soil and soil solution analyses
  - Amendments needed to list mandatory/optional?
  - Use of zero tension lysimeters versus suction cup lysimeters (impact of type of lysimeter on results)

- **EGV on chemical soil analyses**
  - Exchangeable elements (such as direct measurement of effective cation exchange capacity…)
  - Special attention to peat soils (problems related to $BaCl_2$ extraction, aqua regia,...)
  - updated ISO standard for pH?
  - updated reactive Fe and Al (FSCC shall take care of this)
  - Available phosphorus measurements (on request from Germnay)
  - Amendments needed to list mandatory/optional?

- Special attention to peat soils
- Development of pedotransferfunctions
- Rules of application - "smart analysis" (see further)
- Aqua regia extractable elements: reflux versus microwave digestion

The Manual IIIa: Sampling and analysis of soil

State of the art, relationship ICP forest and BioSoil manual, suggested modifications and clarifications

Nathalie Cools (FSCC) suggested some small amendments and modifications to the current manual (version 2006). The major issue at the moment is whether, how and when the Expert Panel can make use of the experience gained within the BioSoil project to further improve the manual. **FSCC will put the following questions to the JRC by email:**

1. Will BioSoil produce a final manual of procedures based on BioSoil experience as an end product of the project and based on:
   - ICP Forests manual (version 2006)
   - Guidelines for forest soil descriptions (reworked by FSCC)
   - Data reporting forms (produced by INRA/JRC)
   - Data accompanying report – questionnaire (produced by INRA/JRC)?

If yes to question 1:

2. Who will compile this final BioSoil manual?
3. When will it be finished/published?

If no manual as such will be compiled (see question 1):

4. Can the FSEP/FSCC incorporate the (modified) field guidelines in the ICP Forests manual while these guidelines were developed within the BioSoil project?
5. And in the case ICP Forests wants to do it, can it refer to the data submission formats and data accompanying forms developed by JRC-INRA within the BioSoil project and incorporate these forms in its manual? (as in the current ICP Forests manual, the data reporting forms use still fixed ASCII-formats)

Addition of new methods for physical soil analysis for application in a FutMon demonstration project (Bruno De Vos)

In view of the possible upcoming FutMon project, Demonstration Action D3 on water budgets, new amendments will have to be made to the manual especially related to soil physical measurements such as soil water retention (SWR) and hydraulic conductivity (Ksat). Both are existing ISO methods and in situ measurements (in addition to or instead of laboratory measurements) will have to be explored and tested. The EP accepts the approach to review, discuss and select appropriate methods in the EG for Physical analysis, to conduct a pre-ringtest with a small group of laboratories to fine-tune the methods and to organise an official ringtest (6th RT), mandatory for all countries participating in Action D3, if

FutMon is granted as is. A proposal for these physical methods will be presented by the EG for insertion in the manual at the next FSEPM.

Guidelines for forest profile description with standards for data submission. A suggested addition to the manual based on the working version tested during the BioSoil project

In the beginning of 2008 a questionnaire on experience with the Guidelines for Forest Soil Description - applied within the BioSoil project -was sent to all National Focal Centres of ICP Forests. Jari Mikkelsen's presentation (FSCC) the outcome of this questionnaire (N° countries responded = 19, N° included in the presentation = 17). The general experience with the guidelines was reasonable to good: variables were mostly well explained, and most parameters were considered relevant to include also in a future version of the guidelines. Variables where more countries questioned the relevance are mostly those being very specific such as presence of salt or gypsum, surface cracks etc. Although very marginal for European forest soils, if present it is extremely important to include them in the soil description. Exclusion of the guidelines is therefore not an option. To the question if an adapted version of the guidelines should be included in the ICP Forests Manual no less than 16 countries answered yes, and one country did not know. This was interpreted as a very strong signal in favour that field guidelines are needed. Some variables were found more difficult to describe such as porosity, cutanic features and nodules as well as the abundance of roots. Furthermore, most countries are in favour of a better integration of the forest floor description with the field guidelines.
Based on the comments that FSCC received in previous meetings, workshops, training courses and the questionnaire, the field guidelines were revised. The layout follows the format of the ICP Forests manual on Sampling and Analysis of Soil. Any direct link to the WRB is excluded, few parameters not relevant for forest soils are omitted and variables not related to field work were confined to a new chapter (e.g. climatic data). The revised field guidelines were distributed during the meeting.
Jari Mikkelsen asked the EP how the guidelines could be further implemented. It was agreed that Expert Group I on humus description, profile description and soil classification should finalize the guidelines, by preference so that a definitive version is ready if needed for the FutMon project in 2009.

QA/QC: 5th FSCC Interlaboratory comparison 2007

Nathalie Cools (FSCC) presented the results of the 5th FSCC Interlaboratory Comparison. A total of 48 laboratories reported their results in the 5th FSCC Interlaboratory Comparison 2007. Nine laboratories reported outliers and stragglers for more than 20 % of the total: five based on the between-laboratory variability, and eight laboratories based on the within-laboratory variability. Problem parameters are (1) exchangeable elements, especially Na, Ca, free H^+, Mg, Acidity and Fe, (2) the heavy metals Hg and Cd extracted by Aqua Regia, Extractable Al and Mg, (3) carbon content in sample D with low organic carbon content and (4) the pH($CaCl_2$) determination in a peat sample. In general there are more problems when the concentration of the concerning element is relatively low. Compared to the 4th FSCC interlaboratory comparison in 2005, the coefficients of variation of all groups of analysis have improved or remained at a similar level. The CV of the blind sample B improved by 20% mainly because of a large improvement of the Aqua Regia extractable elements.

The application of the data integrity expert rules could have been better. Several laboratories reported data which violated the rules. The rules need further refinement, especially concerning the peat layers e.g. for pH.
FSCC will present these results at the first meeting of the heads of the laboratories on 9 – 10 June 2008 in Hamburg. Methods which keep on giving bad results will have to be discussed in the expert groups (such as the exchangeable elements).
Nils König (WG QAQC labs) remarked that very low concentrations generally lead to high coefficients of variation, an issue that the future planned ring tests should take into consideration by differentiating tolerable limits for higher and lower concentration ranges.

QA/QC: Introducing tolerable limits for analysis in soil ring tests

Bruno De Vos proposed tolerable limits to be introduced in the analyses of the results in the soil ring tests. In the QA/QC working group it was decided that in accord with the evaluation procedure for ICP foliar and water ringtests, soil ringtests need also tolerable limits for each parameter. Bruno De Vos developed tolerable limits based on the existing ISO evaluation procedure and the results of previous soil ringtests (RT2-RT5). Tolerable limits are suggested for a lower and a higher concentration range, being more tolerant for lower concentrations near the quantification limits. Next to tolerable limits for ringtest performance, limits for intra-lab (within run) repeatability are proposed (annex X).
When applying the suggested tolerable limits to the last ringtest, on average 75% of the laboratories meet these limits and 1 out of 4 labs fail. The EP accepts this result and approved the proposed limits for use in future soil ringtest evaluation. However, for many soil properties the limits are considered too broad and should be narrowed in the future when overall lab performance improves.
At the meeting of the heads of the labs the possible consequences for a lab with bad ringtest results will be further discussed.

QA/QC: The FSCC reference sample: a view on the performance of the participating laboratories relative to the central BioSoil laboratory

Nathalie Cools (FSCC) presented some preliminary results on the FSCC reference sample. So far, FSCC received 4 data submissions. The results have been visualised in dot plots, notched box plots and histograms which, for the first two data submissions, can be downloaded from the FSCC homepage. In these graphs, the laboratories can assess the between and within laboratory variability with reference to the central laboratory of BioSoil (Lab N° 40).

Discussion on laboratory performance of solid soil analysis

Franz Mutsch (Austria) asked whether the tolerable limits for ring tests could also be applied for a longer period. This is however not the case because for the ring test it is assumed that the measurements are performed under repeatability conditions (within run variation). On the other hand, the FSCC reference sample tests the reproducibility of the laboratory results over a long period of time. In this situation, less strict within lab tolerable limits could be calculated based on the data from the FSCC reference sample. FSCC will develop these tolerable limits for within lab reproducibility.

Nils König finds it interesting if we can observe any long term trends on the FSCC sample in function of an increasing storage time of the sample (e.g. sodium content, pH). FSCC will take this issue on board when analysing the data of the FSCC reference sample.
Stefano Carnicelli (Italy) suggested to explore more the possibility of excluding certain analyses from the mandatory list based on the type of sample. For example, concerning acidic soil samples, no carbonate content should be measured below certain pH levels. Or that exchangeable Al would not be required for basic samples, so called "smart analyses". This proposal will be tackled in the expert group on chemical analyses. He furthermore remarked that the method on free H^+ and exchangeable acidity has a methodological problem, so a throughout review of these methods is required.
Nils König finds that this issue is very important and suggest to continue the discussion during the head of labs meeting in Hamburg, Germany in June 2008.

Feed-back from the Soil Solution Working Group on QAQC related issues

John Derome gave the status on the manual for soil solution with possible points for improvements. The last update of the manual took place 7 years ago. During the past years QAQC on soil solution has been subject to a major revision. The soil solution sampling techniques need to be updated with better definition of the techniques. Important issues are the Al fractionation and the update of the water flux models ,which will be topics for the Expert Groups on soil solution and soil physical analyses.

Finally John Derome stressed that at this moment there are no exact guidelines on which data have to be submitted: raw data or aggregated data, and in case of the latter: how data can or should be aggregated. This problem should be addressed and coordinated with the Expert Panels on Deposition and Meteorology. Finally, JRC is asked not only to give feed back on the data submission status but also on quality and inconsistencies in the data itself.
Nils König presented the role of DOC in ion balances of soil solutions and explained several problems. For example, the acidity of the soil, especially the Al content, seems to play an important role in the correspondence between measured and calculated electric conductivity. The lower the Al content, the better they seem to correspond. At the end of the presentation John Derome asked why silica is not included, since these data are available. Nils König responded that in the future these data should be included as well as linking the data to the type of forest stand.

The QA Committee of ICP Forests

Marco Ferretti, Chairman of the QA Committee of ICP Forests, presented the concept, the status, the paper, the deadlines and priorities of the QA Committee. The presentation on the background of the Committee is available at the ICP Forests website. The EP supports this initiative and wants to apply the proposed manual structure on the next update of the soils manual on approval by the Task Force. FSCC will then make a first draft of the present manual according to this structure.

The EP agrees on participation of the FSEP in the QA/QC Committee as follows: the Chairman (back-up FSCC) will participate in the QA/QC committee. In the WG QA/QC lab the Chairman and FSCC will participate to deal with solid soil analysis (soil ring tests) and the vice-chairman for soil solution (water ring tests). Issues on QA/QC field will be forwarded to the specific expert groups of the FSEP.

All the presentations on the subjects of the first meeting day of the Expert Panel will be available at the FSCC homepage (http://fscc.inbo.be).

Thursday, 17 April 2008

BioSoil-soil: Tour de Table

Prior to the meeting, the country experts were asked to prepare a country presentation on the state of the art within BioSoil, answering following questions:

1.Please explain the progress concerning **fieldwork**, either as a percentage or by total figures.

2.Please explain the progress concerning **laboratory** analyses.

a.Give an overview of the status of lab analyses. How many samples (report total N° of samples to be analysed) are analysed and for which parameters?

b. Which analyses are still to be done?

c. Are some analyses causing problems, either with the implementation or with the quality of the results?

d. Have you submitted the **Benchmark samples** for the central laboratory? (If yes, when were they submitted; if no, when are you planning to submit the samples; how many sample has or will be submitted? Does the submitted samples concern both first survey samples and BioSoil samples?)

3. a. How is **classification** of the soils progressing?

b.What are the major obstacles for classifying the soils? (e.g. missing field data; lack of correct laboratory data; lack of training in classifying soils…)

4. Have you started to prepare **data for submission**?

a.If yes, how far have you reached? (e.g. all field data have been prepared; 20% of all profiles have been prepared…)

b.Did you face any problems in preparing the data?

5. What will happen with the **extra data** collected in the field and laboratory that is not directly required for submission by JRC?

6.Has your country faced any **particular problems** during the execution of the project that is important to mention at the FSEPM (e.g. in order to warn other countries from facing the same problems)

The answers of the countries are summarised in Annex IV.

BioSoil data: state of the art and future plans

Tracy Houston, who is the official contact person for JRC concerning BioSoil (tracy.durrant@jrc.it), presented the status of sample submission to the central laboratory and gave information on the on-line data submission. Each country can follow the status of its submitted samples to the central laboratory at http://biosoil.jrc.it/authentification/.

Concerning the sample submission, most samples have arrived. Sometimes the samples were too small. The central laboratory made a priority list of analyses according to the availability of sample material. When there is less than 7 g of material, no analyses can be done.
All manuals concerning data formats etc. can be downloaded from http://biosoil.jrc.it/presentation. Tracy Houston demonstrated the website for data submission. In case of problems/questions, the NFCs should contact her directly by email. She will forward the questions to the relevant persons. The JRC recommends to use the on-line data submission to check the data beforehand without actually submitting the data, since quality checks are performed simultaneously.
In the future, JRC wants to make use of the BioSoil data to produce, among other products, digital soil maps using geostatistics in order to improve the SGDB and provide the policy makers information on the soil threats.

Since MS have many specific questions to JRC concerning BIOSOIL data submission, it is advised to organise a special meeting in ISPRA in September/October to deal with these questions. Tracy Houston will inform whether it is possible.

Discussion on the need for a 2nd Forest Soil Condition Report

The Expert Panel on Soil and Soil Solutions expressed uniformly the need for a second forest soil condition report based on BioSoil data, including summary reports of the national inventories. The Expert Panel asked the JRC delegate when the pan-European BioSoil dataset will become available for the ICP Forests community. This would be end of 2009 at the earliest.
Most countries are in favour of a technical report linking the data of the 1st soil inventory with the BioSoil survey. This report should in the first place focus on the approaches and methodology which can be used in comparing the data. It should focus on the feasibility rather than on the monitoring itself. The Expert Panel needs to do this 'exercise' since it is important towards the future. Methods will always keep on changing.
A second soil condition report should also elaborate the forest soil data of the non EU countries.
After elaboration of a report, the Expert Panel and the states should aim for a special issue in a scientific journal (e.g. European Journal of Soil Science) where specific questions can be tackled.

Recently produced FSCC supporting studies, an overview

Jari Mikkelsen (FSCC) presented a list of FSCC documents which have been produced since the last Expert Panel Meeting (besides the report on the 5th FSCC Interlaboratory Comparison and the reports on the FSCC Reference Sample). All the documents can be downloaded from the FSCC homepage (http://fscc.inbo.be):

1. Benchmark site selection
2. Homogenisation and sub-sampling
3. Comparison between WRB-1998 and WRB-2006 and its impact for the BioSoil project
4. Field checklist for classifying forest soil profiles according to the World Reference Base for soil resources (WRB-2006)

5. Case studies on forest soil profile description and classification according to WRB-2006
6. Excursion guide, BioSoil Workshop on WRB-2006
7. Evaluation of the key to the European Humus Classification System
8. Long term storage of soil samples (in preparation)
9. Pedotransfer functions useful for forest soils: an overview (summary presented by Bruno De Vos)
10. A critical review of the humus classification system (summary presented by Nathalie Cools)

Interesting case studies related to forest soils

Responses of forest soils to pollution recovery - evidence from the UK

Elena Vanguelova (UK) presented the long-term trends in rainfall, throughfall, wet deposition and soil solution data from the 10 intensively monitored Level II plots in the UK. The dry deposition, canopy uptake and leaching was calculated by the "Canopy-Budget model" from 1995 until 2006. Fluxes were calculated from measured water. For soil fluxes –'AWS record and Penman Monteith semi processed model' was used. The seasonal Mann-Kendall non-parametric test for long term datasets evaluation was applied.

There was a clearly decreasing trend in the **sulphate** in soil solution and foliar sulphur on the 10 Level II sites between 1995 and 2006. There was a recovery of the pH at Sherwood and Llyn Brianne, but an opposite trend in Coalburn (a peaty site) was observed. The Aluminium in the soil solution and the tree foliage confirms the recovery processes. The changes in the Ca/Al molar ratio in might be a response to recovery from acidification but also be due to Ca depletion and maybe an increase in organic acidity?

The total sulphate and acidity in throughfall significantly declined in most of the Level II sites in the UK. Long-term recordings of air SO_2 (2002-2006) showed a decline in all the sites.

The **desolved organic carbon** (DOC) in the soil solution increased in response to the recovery from acidity and sulphur and an increased microbial activity, which might be a possible temperature change effect. The Nitrogen in the soil solution is variable with a steep increase in two plots.

Interaction between the chemical and the biological components were further investigated in case studies studying the effects of phytophagous insects on the nutrient fluxes through forest stands in the UK Level II network. The case studies showed a clear evidence of how Lepidoptera caterpillar and Aphid attacks affected the growth, litterfall, throughfall and soil fluxes of DOC, DON, NO3-N and K of oak and Sitka spruce.

The **total nitrogen** throughfall deposition shows downwards trend in most of the sites though the NO_2 deposition in agricultural lowlands stabilised or even increased between 2002 and 2006. The DON in the soil solution increased in response to the recovery from acidity and increased microbial activity (possible temperature change effect?). There is a clear signal of DON increase to and through the forest ecosystem. The DON is related to NH_4 but not to NO_3. DON and NH_4 may have similar sources, but to identify this source further investigation is needed.

The monitoring has shown that 1) long-term trends confirm emission reduction policies for S, acidity and to some extent for N, 2) chemical recovery is evident in both waters, soils and tree nutrient uptake,

3) soils responses of increased DOC and DON reflects the reduction in acidity, sulphate and possible increased microbial activity, but also increase in organic N input, 4) concerns over the local effects of excess nitrogen deposition and its reduced form remain and 5) chemical and biological interaction are evident and their importance under future climate needs to be taken into account.

Approaches to describe plant available phosphorus in soils (Nicole Wellbrock, Germany)

A significant number of forest sites have a low foliar P content which might be a sign of low P availability in forest soils. None of the bedrock types or any other site parameter could be identified as specifically related to foliar P-concentrations. The analyses of total P, as was done in the first soil inventory, does not relate to the amount of plant available P in soils. So which fraction do we measure and is there a method to measure plant available P which can be applied on a large scale inventory?

There are a number of issues and requirements, which need careful consideration before an appropriate method can be suggested for future use to assess changes in soil P reflecting the P status of forest ecosystems. One of the most important issues is the short- versus medium- to long-term availability of soil P. It is important to understand that, in contrast to the agricultural systems, where only short term availability of P is of interest, forest ecosystems require both short- term and long-term assessment of availability and the amount of P available. To determine short-term changes it is possible to adapt some of the methods developed in agriculture. But for medium- to long-term changes forest-specific methods will be required.

A repeated desorption of P from soils will provide a capacity factor giving the amount of labile fraction and a desorption rate function which may be related to soil characteristics. Another pretest will be organised where 1) a number of extractants will be tested and 2) to see whether dried samples from the national inventory can be used or new sampling should be done and 3) whether NIR can be used to measure the P content.

Germany asked the other countries whether they face this problem of low P content too and what they think of this proposal. The panel remarked that P availability is strongly influenced by Mycorrhizae associated with tree species. Therefore, using extractant methods (e.g. Bray-P) may have limited value for explaining/predicting P availability. Though, since the acid German forests soils do not contain that many Mycorrhizae, it may not be an argument in this case.

Cation composition in the soil and different fractions of the soil solution

John Derome (Finland) presented the results of a comparison of the chemical composition of soil, soil solution (centrifuged samples) and percolation water from the same layers on the same experimental plots.

The different cations fraction in this study are:

1. Solid phase: exchangeable cations by $BaCl_2$ extraction
2. Soil solution:
    a. Absorbed: drainage samples, centrifuged
    b. In the micropores: measured by suction-cup tension lysimeters
    c. In the macropores: measured by zero-tension lysimeters

As an example, the Ca/Al ratio is given in some Scotch pine stands, which is often used as a criterion for root damage caused by excessive levels of toxic aluminium (Al^{3+}). According to De Vries, the critical level is < 2.0. Results show that the ratio varies with the soil depth and with the fraction. The fractions in the macropores and in the solid soil samples go easily below this critical limit.
But is the Ca/Al ratio a meaningful indicator? In the calculation total Al is used but we do not know the Al^{3+}/totalAl ratio. But in acidic podzolic soils a high proportion of the Al is usually present in an organically complexed form. On 17 Level II plots, both the Al^{3+} and the total Al was measured. It is seen that the proportions are different for the different fractions and soil depths (also different pH values). The study also found differences in Al/Ca ratio depending on the lysimeter technique used. It seems essential to address this problem carefully.

Carbon distribution in Mediterranean forest soils, first results of BioSoil in Italy

Stefano Carnicelli (Italy) presented some first BioSoil inventory results on carbon stocks in Mediterranean forest soils. These stocks range from 8.0 to 19.99 $kg.m^{-2}$. Italy noted some inconsistencies between the definitions applied for humus description and the guidelines on soil profile description (such as the boundary organic – mineral soil based on OC content). Another point of criticism on these guidelines is insufficient attention to biological activity in the A horizon, which is, especially in Mediterranean soils with high OC content in the A horizon, of high importance.

Future tasks of FSCC

- Preparation of the meeting minutes; draft to be circulated by April, 30th
- Preparation of report of the FSEPM to the Task Force Meeting
- Prepare the manual 1) following the structure proposed by the QAQC Committee of ICP Forests and 2) make the necessary amendments and changes, largely based on the work done in the expert groups. The draft of the new update should circulate in 2009 for comments. The update will be discussed at the next Expert Panel Meeting, early 2010.
- Co-ordination of the Expert Groups: 1) make suggestions for tasks 2) follow up of tasks 3) keep track of time table of activities 4) implement results in draft of new manual. The EGs report to chairman(s) and to FSCC.
- Update of the FSCC website with relevant links to important sources of information
- QAQC issues:
    - Finalise report 5th FSCC Interlaboratory Comparison
    - Report on the FSCC reference material
    - Contribute to the meeting of the heads of the labs, 9 – 10 June ’08, Hamburg
    - Organise the 6th FSCC Interlaboratory Comparison 2009, which shall contain 1 peat sample, 1 organic sample and three mineral soil samples coming form different places in Europe.

      Finland is interested to deliver the peat sample. Other countries volunteering in delivering sample material are requested to contact FSCC.
- Finalise its tasks within **BioSoil**. At the EuroSoil congress in Vienna, (25 – 29 August 2008) a workshop “W3 : EU Forest Soil Monitoring – Biosoil” will be organised and

chaired by Eric Van Ranst and Ernst Leitgeb. JRC will present the keynote speech, FSCC will present harmonisation and quality issues and soil profile description and classification issues within BioSoil. Both will take part in the panel discussion. Some countries will present their preliminary results.

- Within FUTMON FSCC will continue its dual role: the support of the EP on Soil and Soil Solution and fulfil its tasks within the EU FUTMON project.

Final conclusions and coming meetings

The FSEP expressed its thanks to Italy for the well organized meeting. The next FSEPM will be organized early spring 2010. The chairman invites MS of Eastern- or Northern Europe to candidate for hosting the next EP, since past meetings were in the West (UK) and South (Italy). However, Greece and Sweden offered the opportunity to host the EP. Practical arrangements of future meetings will be done by FSCC.

UN/ECE ICP FORESTS

14th Forest Soil Expert Panel Meeting

16-18 April 2008, Florence, Italy

Accademia Italiana di Scienze Forestali,
Piazza Edison 11, 50133 Firenze, Italy; www.aisf.it

Annex I: AGENDA

Wednesday 16th April 2008

8:30 – 9:00 Arrival and registration

9:00 – 9:20 Opening and welcome

- Welcome by our hosts (*Prof. Fiorenzo Mancini, President of the Accademia, Bruno Petriccione, NFC Italy and Stefano Carnicelli, D.S.S.N.P.)*
- Welcome and adoption of the agenda (*Bruno De Vos, co-chairman FSEP)*
- Technical announcements (*Guia Cecchini*)

9:20 – 9:50 LIFE+ and FUTMON proposals: state of the art

- The relation between ICP Forests and the FUTMON project (*Martin Lorenz, PCC Hamburg*)
- QA/QC labs programme (*Nils König, Chairperson WG- QAQC)*

9:50 – 10:10 Adoption of the minutes of the 13th FSEPM Alton, UK *(Nathalie Cools, FSCC)*

10:10 – 10:40 Chairmanship and structure of the Expert Panel on Soil and Soil Solution

- EP integration of soil solid phase and soil solution (*John Derome, Chairperson WG Soil Solution*)
- Suggestion for a new Expert Panel structure (*Bruno De Vos*)
- Election

10:40 – 11:00 Coffee break

11:00 – 12:00 The Manual IIIa: Sampling and analysis of soil

- State of the art, relationship ICP forest and BioSoil manual, suggested modifications and clarifications *(Nathalie Cools)*
- Addition of new methods for physical soil analysis for application in a FUTMON demonstration project (*Bruno De Vos*)
- Guidelines for forest profile description with standards for data submission. A suggested addition to the manual based on the working version tested during the BioSoil project (*Jari Mikkelsen, FSCC*)

12:00 – 12:30 The Manual IIIb: Soil solution collection and analysis

- State of the art, suggested modifications and clarifications *(John Derome)*

12:30 – 14:00 Lunch break

14:00 – 15:05 QAQC: 5th FSCC Interlaboratory comparison 2007.

- Presentation of the 5th ringtest report and comparison with previous ring test results *(Nathalie Cools*)
- Introducing tolerable limits for analyses in soil ring tests (*Bruno De Vos)*

15:05 – 15:20 QAQC: The FSCC reference sample - a view on the performance of the participating laboratories relative to the central BioSoil laboratory (*Nathalie Cools*)

15:20 – 15:40 Discussion on laboratory performances of solid soil analysis

15:40 – 16:00 Coffee break

16:00 – 17:00 Feed-back from the Soil Solution Working Group on QAQC related issues *(John Derome)*
- Tolerable limits for soil water analysis (*Rosario Mosello*)
- The role of DOC in ion balances of soil solutions *(Nils König)*
- Discussion on laboratory performances (introduction of new evaluation criteria, such as tolerable limits)

17:00 – 17:30 Overall working group on QA/QC in ICP Forests (*Marco Ferretti, Chairman QA committee*)

17:30 – 18:00 Participation of quality working groups related to the Forests Expert Panel on Soil and Soil Solution
- Relationship FSEP - WG QA/QC lab
- Relationship FSEP – QA committee
- Relationship FSEP - QA/QC field

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Evening programme: Social dinner in Florence

Thursday 17 April 2008

9:00 – 10:30 BioSoil-soil: Tour de Table: Progress of the participating countries (max 5 min per country, predefined questions are handled)

- Introduction *(Jari Mikkelsen)*
- Austria, Belgium, Cyprus, Czech Republic, Denmark,
- Estonia, Finland, Germany, Greece, Ireland,
- Italy, Croatia, Latvia, Lithuania, Poland.

10:30 – 10:50 Coffee break

10:50 – 11:20 BioSoil-soil: Tour de Table (continuation)

- Portugal, Slovakia, Slovenia, Spain, Sweden, United Kingdom
- Discussions and conclusions

11:30 – 12:00 BioSoil data: state of the art and future plans *(Tracy Durrant Houston, JRC)*

12.00 – 12.15 Discussion on the need for a 2nd Forest Soil Condition Report

12.15 – 12.30 Recent produced FSCC supporting studies, an overview

- Storage of soil samples and other supporting studies (*Jari Mikkelsen*)

12:30 – 14:00 Lunch break

14.00 – 14:30 Recent produced FSCC supporting studies, an overview (continued)

- State of the art of pedotransfer functions useful for forest soils (*Bruno De Vos*)
- A critical review of the humus classification system (*Nathalie Cools*)

14:30– 15:50 Interesting case studies related to forest soils

- Comparison of the chemical composition of soil, soil solution (centrifuged samples) and percolation water from the same layers on the same experimental plots; some results and conclusions *(John Derome, Finland)*
- Approaches to describe plant available phosphorus in soils (*Nicole Wellbrock, Germany*)
- Carbon distribution in Mediterranean forest soils, first results of BioSoil in Italy (*Stefano Carnicelli, Italy*)
- Responses of forest soils to pollution recovery - evidence from the UK (*Elena Vanguelova, UK*)

15:50 – 16:20 Coffee break + group photo

16:20 – 16:40 Future tasks of FSCC (*Nathalie Cools*)

16:40 – 17:10 Final conclusions and coming meetings

17:10 – 17:15 Technical announcements field excursion (*Stefano Carnicelli*)

17:15 Closing of the meeting

For the participants of the excursion:

±19:00 Departure to a hotel closer to the excursion point

Friday 18 April 2008

9:00 – 18:00 Excursion to the Level II plot LAZ1 characterised by a Quercus cerris forest vegetation. With questions and discussions on Mediterranean forest soils and general problems in management of Level II plots in Mediterranean areas.

http://www2.corpoforestale.it/web/guest/serviziattivita/controlloecosistemiforestali/retidicontrollo/areelaz1

On the return, delivery to the airport of Florence can be organised on request. The return is foreseen for the late afternoon.

Country	Surname	First name	Institute	Address	Zipcode	City	Phone	E-mail
Austria	Mutsch	Franz	Federal Research and Training Centre for Forests (BFW)	Seckendorf-Gudent-Weg 8	A-1131	Vienna	+43 187838 1204	franz.mutsch@bfw.gv.at
Belgium	Cools	Nathalie	Research Institute for Nature and Forest, FSCC	Gaverstraat 4	B-9500	Geraardsbergen	+32 54 436 175	nathalie.cools@inbo.be
Belgium	De Vos	Bruno	Research Institute for Nature and Forest	Gaverstraat 4	B-9500	Geraardsbergen	+32 478 281 702	bruno.devos@inbo.be
Belgium	Mikkelsen	Jari	Research Institute for Nature and Forest, FSCC	Gaverstraat 4	B-9500	Geraardsbergen	+32 475 254 053	jari.mikkelsen@inbo.be
Croatia	Vrbek	Boris	Forest Research Institute	Cvjetno naselje 41	10450	Jastrebarsko	+385 1 6273 000	-
Cyprus	Hadjigeorgiou	Panicos	Departement of Agriculture	Louki Akrita 1412	1412	Nicosia	+357 2240 8600	phadjigeorgiou@da.moa.gov.cy
Czech Rep.	Vortelova	Lucie	VULHM - Forestry and Game Management Research Institute	Jiloviste-Strnady 135	190 00	Prague	+420 257 892 252	vortelova@vulhm.cz
Denmark	Vesterdal	Lars	Forest & Landscape Denmark, University of Copenhagen	Kongevej 11	DK-2970	Hørsholm	+45 35331672	lv@life.ku.dk
Estonia	Asi	Endla	Estonian Centre of Forest Protection and Silviculture	Roomu tee 2	51013	Tartu	+372 7339 397	endla.asi@metsad.ee
Estonia	Uri	Mae	Tartu Environmental Research Ltd	Akadeemia 4	51003	Tartu	+372 7341 315	maeuri@tkku.ee
Finland	Derome	Kirsti	Finnish Forest Research Insitute	P.O. Box 16	FI-96301	Rovaniemi	+35 85039 14436	kirsti.derome@metla.fi
Finland	Derome	John	Finnish Forest Research Insitute	P.O. Box 17	FI-96302	Rovaniemi	+35 85039 14552	john.derome@metla.fi
Germany	König	Nils	Institution Nordwestdeutsche Forstliche Versuchsanstalt	Gaetzelstraße 2	D-37079	Goettingen	+49 551 69401 141	nils.koenig@nw-fva.de
Germany	Meesenburg	Henning	Northwest German Forest Research Station	Gaetzelstraße 2	D-37079	Goettingen	+49 551 69401 170	henning.meesenburg@nw-fva.de
Germany	Wellbrock	Nicole	Johan Heinrich von Thünen-Institut (vTI)	Alfred-Möller-Straße 1	16225	Eberswalde	+49 333 465 304	nicole.wellbrock@vti.bund.de
Greece	Michopoulos	Panagiotis	Forest Research Institute of Athens	Terma Alkmanos	115 28	Athens	+30 210 7784 240	mipa@fria.gr
IES - JRC	Durrant Houston	Tracy	Land Management & Natural Hazards Unit - TP 261	Via Fermi s/n	I-21027	Ispra (VA)	+39 033278 9469	tracy.houston@jrc.it
Ireland	O'Dea	Philip	Coillte Laboratories	Church Road		Co. Wicklow	+353 1281 1451	philip.odea@coillte.ie
Italy	Carnicelli	Stefano	Dipartimento di Scienza del Suolo Nutrizione della Pianta	Piazzale delle Cascine 15	50144	Firenze	+39 055328 8398	stefano.carnicelli@unifi.it
Italy	Cecchini	Guia	Dipartimento di Scienza del Suolo Nutrizione della Pianta	Piazzale delle Cascine 15	50144	Firenze	+39 055328 8390	guia.cecchini@unifi.it
Italy	Mancini	Fiorenzo	Accademia Italiana di Scienze Forestali	Piazza Edison 11		Firenze	+39 055 570348	fiorenzo.mancini@aisf.it
Italy	Petriccione	Bruno	National Focal Centre, Italy; CONECOFOR Office	via Carducci 5	00184	Rome	+39 320 4312704	conecofor@corpoforestale.it
Italy	Ferlazzo	Silvia	Corpo forestale dello Stato	via Giosuè Carducci 5	00187	Rome	+39 6 4665 6284	s.ferlazzo@corpoforestale.it
Italy	Ferretti	Marco	Terra Data Environments	Via P.A. Mattioli 4	53100	Siena		ferretti@terradata.it
Italy	Masciandaro	Grazia	CNR - Institute for Ecosystem Studies (ISE)	Area della Ricerca, Via Moruzzi, 1	56124	Pisa	+ 39 050 3152474	grazia.masciandaro@ise.cnr.it
Italy	Matteucci	Giorgio	National Research Council - Institute of Mediterranean Agriculture and Forest Systems	Via Cavour 4-6	87036	Rende (CS)	+39 0984 466036/ +39 06 90672533	giorgio.matteucci@isaform.cs.cnr.it
Italy	Poggio	Giorgio	CNR - Institute for Ecosystem Studies (ISE)	Area della Ricerca, Via Moruzzi, 1	56124	Pisa	+ 39 050 3152474	giorgio.poggio@ise.cnr.it

Country	Surname	First name	Institute	Address	Zipcode	City	Phone	E-mail
Latvia	Komorovska	Arta	Latvian State Forest Research Institute "Saliva"	Riga Street 111	LV-2169	Salaspils	+371 265 9583	arta.komorovska@silava.lv
Latvia	Lazdina	Dagnija	Latvian State Forest Research Institute "Saliva"	Riga Street 111	LV-2169	Salaspils	+371 265 9583	dagnija.lazdina@silava.lv
Lithuania	Beniusis	Ricardas	State Forest Survey Service	Pramones avenue 11A	LT-51327	Kaunas	+37 614 24660	ricardasben@yahoo.com
Poland	Wójcik	Józef	Forest Research Institute		PL-05-090	Sekocin Stary	+48 22715 0510	j.wojcik@ibles.waw.pl
Portugal	Farropas	Lidia	Laboratory of Agricultural Chemistry Rebelo da Silva (LQARS)	Tapada da Ajuda, Apartado 3228	1301-903	Lisboa	+351 9653 7079	lidiafarropas.lqars@mail.telepac.pt
Slovakia	Pavlenda	Pavel	National Forest Centre - Forest Research Instutite	T.G. Masaryka 22	960 92	Zvolen	+421 4553 14202	pavlenda@nlcsk.org
Slovakia	Stancikova	Anna	National Forest Centre - Central Forest laboratory	T.G. Masaryka 22	960 92	Zvolen	+421 4553 14200	stancikova@nlcsk.org
Slovenia	Kobal	Milan	Slovenian Forestry Institute	Večna pot 2	1001	Ljubljana	+386 1200 7800	milan.kobal@gozdis.si
Slovenia	Žlindra	Daniel	Slovenian Forestry Institute	Večna pot 2	1000	Ljubljana	+386 1200 7800	daniel.zlindra@gozdis.si
Spain	Gonzalez	Maria Isabel	Inia Departamento De Proteccion Forestal	Ca Coruña km7	28040	Madrid	+34 913476746	isabelgz@inia.es
Sweden	Lundin	Lars	Swedish University of Agricultural Sciences	P.O. Box 7001	SE-750 07	Uppsala	+46 1867 1070	lars.lundin@sml.slu.se
Turkey	Akbin	Giyasettin	Ministry of Environment and Forestry	Mustafa Kemal Bulvari no 75 Zeytinalani-Urla	35515	Izmir	+90 2327 663495	giyasa@yahoo.com
Turkey	Koray	Ertan Seref	Ministry of Environment and Forestry	Orman Toprak ve Ekoloji Arastirmalari Enstitusu Murdurlugu P.K. 61	26160	Eskisehir	+90 2223 240248	ekoray26@gmail.com
United Kingdom	Vanguelova	Elena	Forest Research	Alice Holt Lodge	GU10 4LH	Farnham	+44 1420 526174	elena.vanguelova@forestry.gsi.gov.uk