
**EC LIFE+ PROJECT “FURTHER DEVELOPMENT AND IMPLEMENTATION OF AN
EU-LEVEL FOREST MONITORING SYSTEM” (FUTMON)**

and

**UN/ECE INTERNATIONAL CO-OPERATIVE PROGRAMME ON ASSESSMENT AND
MONITORING OF AIR POLLUTION EFFECTS ON FOREST**

16th Meeting of the Expert Panel on Soil and Soil Solution

Brussels, 14 – 16 December 2009

Minutes

Nathalie Cools (FSCC) and Bruno De Vos (Chair FSEP)

Agenda: SEE ANNEX I

Participants: SEE ANNEX II

Opening, welcome, adoption of the agenda

The meeting was attended by 36 delegates from 20 countries (see Annex II). Prof. Dr. *Maurice Hoffmann*, head of the Department of Biodiversity and Natural Environment of the Research Institute for Nature and Forest (INBO), welcomed the participants. He portrayed the mission, vision, aims and structure of the host institute. The chair, *Bruno De Vos*, welcomed the participants and opened the meeting. The chair apologized for *John Derome*, the vice-chair of the Expert Panel, who could not attend the meeting. The chair presented the agenda for adoption and highlighted the main issues of the meeting. The agenda (see Annex I) was adopted without amendments.

Adoption of the minutes of the 14th and 15th FSEPM

Nathalie Cools (FSCC) presented the minutes of the 14th FSEPM in Florence (April '08) and of the 15th FSEPM in Hamburg (January '09). The latter meeting was partly combined with the Meeting of the Expert Panel on Meteorology (Joint FutMon Kick-off meeting). The minutes of both meetings were adopted by the Expert Panel.

Status of the current activities of the FSEP

Bruno De Vos presented the status of the current activities and structure of the FSEP in relation to the BioSoil, FutMon and ForEU projects and the ICP Forests programme.

Within the FutMon action C1-Soil-3(BE), the most challenging task is the writing of the second forest soil condition report. The main constraint however is the unavailability at present of the data of the BioSoil project from EC DG JRC. As agreed on the 15th FSEPM a 2-way pragmatic approach is followed:

PLAN A:

Official request from ICP-forests/PCC to DG Env and DG JRC for the BioSoil soil and biodiversity data which includes:

- all validated Level I & II BioSoil point data
- all central lab data (10% benchmark sites)
- all reanalysis results of historical soil samples

This request will be launched by the end of 2009. The chairman invited the EP members to support further concerted actions if plan A does not work out.

PLAN B (runs in parallel):

- All BioSoil partners were asked to send their validated BioSoil soil data to FSCC and PCC/vTI Hamburg and the BioSoil biodiversity data to PCC/vTI Hamburg.
- The status of received (validated) files are listed further in these minutes.
- The assembled database will be exclusively used for running the FutMon project: actions D2, D3 and C1-Soil-3(BE) which is the evaluation for the 2nd forest soil condition report.
- Only when the BioSoil database is officially transferred to ICP-forests (PCC/vTI Hamburg), the report can make proper reference to the official BioSoil database hosted by the JRC.

An overview is given of all soil related tasks within FutMon and their current status. The soil and soil solution ring tests and other QA/QC tasks (manual) are running according to schedule. For the soil solution manual specific actions and assistance from the EP are required (see further).

The chair also presented briefly the new ForEU proposal (2011-2013) submitted to Life⁺ where the main soil related tasks are: (i) to elaborate a report on 'Evaluation of temporal changes in European forest soils' and (ii) to conduct action D4 on Forest Soil Biodiversity Indicators.

QA/QC in the laboratory

6th FSCC Interlaboratory comparison 2009: results and follow-up

Nathalie Cools presented the results and the follow-up of the ring test by the qualification and requalification procedure as proposed by the Working Group on QAQC in the labs. After requalification 16 of the 51 laboratories qualified for all their reported parameters but 35 labs did not qualify for at least one mandatory parameter. Note that some countries decided to have certain analyses conducted by specialised laboratories but this cooperation (and the specific parameters) is not always known by the FSCC.

It has been agreed that this qualification and requalification procedure is not only MANDATORY for the FutMon labs but also for the ICP Forests labs not participating in the EU funded project. This decision will need to be adopted by the Task Force in June 2010 and becomes applicable from the 7th FSCC Interlaboratory Comparison 2011 onwards.

The EP suggested to include in the next soil ring test 1) a sample rich in organic matter and relatively low bulk density (in stead of a forest floor sample) and 2) a sample with an amount of CaCO₃

between 10 and 20 %. For the next soil RT in 2011, the countries will be asked by the FSCC to provide such test samples.

QA/QC in the labs: 1st Soil Physical Ring Test 2009

Nathalie Cools presented the results of the 1st soil physical ring test which were quite satisfactory, especially in the lower pressure ranges. For the higher pressure heads, higher between laboratory variability was found. FSCC will further analyse and publish these data as suggested by Andy Moffat (UK).

The Expert Panel decided that no 2nd Soil Physical Ring Test is desirable unless a new project would benefit from it. *Stephane Raspe*, chair of the EP on Meteorology, thanked FSCC for conducting this interesting ring test in the framework of the FutMon project.

FSCC will provide lab contact information to those NFCs and Soil experts that need to select a well-performing laboratory for analysis of their D3 samples within FutMon.

Report of the meeting of the heads of the labs and of the meeting of the working group on QAQC in the labs

Nils König, chair of the WG on QAQC reported the outcome of the meeting of the heads of the labs which was held in Warsaw on 12 – 13 October 2009. At the meeting the results of the four laboratory ring tests that ran in 2009 (deposition, soil, foliar and soil water) were presented. Generally the same or better results were obtained than in previous ring tests. The 1st soil physical ring test gave very good results. Especially the FutMon labs have analysed most of the mandatory parameters. In order to be qualified for a certain parameter i) 50% or more of the results should fall within the tolerable range, ii) the within lab variation for a parameter should be lower than 20 % and iii) the quantification limit for a parameter should be lower than half of the lower observation range. Each laboratory receives a qualification report. When the lab is not qualified for a certain parameter, it can requalify following the requalification procedure (see minutes 15th FSEPM). Towards the future (after the FutMon project) the WG on QAQC in the labs would like (1) to set the requirement for (re)qualification to at least 50% of the results within the tolerable limits and (2) to set the minimum samples which should be evaluated in a ring test to five. The list of the lab codes will be distributed to the heads of the labs together with the final ring test reports.

Oliver Granke (vTI) presented the new data quality forms. The ring test organisers will send the laboratories by the end of the year a new qualification/requalification report including all information that the NFCs need to fill in.

Prior to the meeting, the participants were asked to complete a questionnaire on the analytical problems in their labs. Many laboratories faced problems with the aqua regia extract. Seven laboratories faced problems with the BaCl₂ extract. For the CN analyses no serious problems have been reported. For CaCO₃, 4 labs reported problems. Further, 24 participants made use of the opportunity to present particular problems and possible solutions in their labs. All presentations can be downloaded as pdf files from the ICP Forests website. After discussion, following important decisions have been taken related to the soil chemical analysis:

1. Aqua regia extract: Based on amongst other two presentations from France and Germany, it was shown that the results of microwave systems and open reflux systems are not comparable. So it was decided that the microwave systems should not be used in the future.
2. Particle size fractionation: The results of the pipet method and the laser method are not comparable. So it was decided that only the pipet method is the reference method.
3. Total elements: The tolerable limits for some elements in ring tests are 5 % which is too low. It was decided to increase the tolerable limits to 10 % of the mean.
4. Use of reference methods: If a lab does not use the reference method it cannot be qualified (e.g. NH_4NO_3 instead of BaCl_2 for exchangeable cations is not acceptable).

The assistance programme for the labs is running. One Italian lab is giving support to a Romanian lab. Two other labs have requested for help.

The ICP Forests submanual on QA/QC in the labs will be based on the FutMon protocol on QA/QC in the labs. The manual will follow the recommended structure by the QA Committee and will be prepared for adoption at the Task Force Meeting on June, 1st 2010 in Garmisch-Partenkirchen.

The next meeting of the heads of the labs will be held in 2011. The next meeting will be held back-to-back with the Task Force Meeting in 2010.

QA/QC in the field

Marco Ferretti noted that it is time now to focus on the QA/QC in the field. FSCC agreed that more efforts can be done regards the QA/QC in the field although this is not easy. FSCC hopes to learn from the BioSoil evaluation how the quality in the field may be further be improved. *Franz Mutsch* noted that Austria in cooperation with Switzerland and Germany made some studies on the quality of sampling in agricultural soils. Sampling along a slope remains where one needs to cope with additional spatial variability remains an important issue.

The Update of the ICP Forests Manual 2010

Manual IIIa: Sampling and analysis of soil

Nathalie Cools presented the draft update of the Manual IIIa, version 6.1. Besides the updated structure, following changes and/or specifications have been agreed:

Sampling design on the level II plots for sampling at fixed depths

1. "Sampling sites should be located within the plot area or if not feasible, in the buffer zone of the plot."
2. "For every layer, mandatory a MINIMUM of 24 subsamples has to be taken, to be combined in at least three composite samples (i.e. at least 3 composites of each 8 subsamples or 4 composite samples of each 6 subsamples). Mandatory at least 3 values have to be reported (1 from each composite), to obtain information on the spatial sampling variability. The samples should be representative for the whole plot area. The distance between sampling clusters should be at least 5 meter in order to avoid autocorrelation."

Changes to the method descriptions and measurements

Physical measurements

1. The texture class 'heavy clay' when clay content is > 60% will be added to the textural triangle and so updated according to FAO (2006). This means that one additional code 'HC' for 'heavy clay' will have to be added to the table with explanatory items in the reporting forms and that Figure 1 of the manual and Figure 5 in Annex 2 will be updated to FAO (2006).
2. The subdivisions of the textural class 'Sand' becomes mandatory for plots where soil moisture measurements are being conducted. This requires additional laboratory analysis, namely dry sieving at 0.2 and 0.63 mm.
3. The pF value of 0.0 does not exist. It should be read as 'infinitely small.'
4. As the reporting obligations for the Kyoto protocol require OC stock measurements till the depth of 30 cm and since the monitoring plots (Level I and II) want to form an important reference at the European level, the current status as optional parameters for BULK DENSITY OF THE FINE EARTH (BD) and the TOTAL ORGANIC CARBON measurements on the 10-20 cm and the 20-40 cm layer will become MANDATORY to report on all Level I and II plots.
5. In the current manual the BD is only to be measured once. In France experience has shown however that changes in BD after 10 years are possible. Therefore it is strongly recommended to repeat the BD measurements in each new survey.

Chemical measurements (see Annex 1 of Manual IIIa, version 6.1)

SA01: Pretreatment of samples

The phrase "The fresh mass (kg/m²) of each organic sublayer, together with the thickness, is measured in the field" needs to be rephrased. It is only mandatory to report the dry mass (kg/m²) of the organic layer. The thickness and the fresh mass can optionally be measured but cannot be reported. The fresh mass can be of help to calculate the dry mass per area when taking a subsample to the lab. The measurement of thickness is meant as a quality check.

SA02: Determination of Soil Moisture Content

Be careful when reporting the moisture content using the manuals formula's of the manual are used since differences between national and ISO methods have sometimes been overlooked in the last ring test.

SA03: Determination of Particle Size Distribution

The method sheet needs to be updated in order to include the subdivisions of the particle size class 'sand' to allow the application of the sand textural classes as agreed above.

SA06: Determination of Soil pH

The pH in soils is measured volumetrically in a 1:5 ratio according to ISO standard 10390 of 1994. This ISO standard has been updated in 2005 with a few differences:

1. shaking of suspension for 60 min +/- 10 min in stead of 5 minutes
2. waiting at least 1 hour but not longer than 3 hrs
3. only one reading is done
4. pH is measured at the temperature 20 +/- 2 °C immediately or whilst being stirred.
5. Stabilization is considered when in 5 s the difference in pH is less than 0,02 units.

As the ISO standard kept the same number, the FSEP assumes that for most samples the results will be comparable. The FSEP agreed to update the method description according to the ISO 10390 (2005).

SA07: Determination of Carbonate Content

The measurement is done using the calcimeter according to ISO 10693 (1995). Nowadays many labs however can measure the carbonate content using the TOC analyser. This possibility should be looked at for the manual update in 2013. Laboratories and the FSCC through its ring tests, are invited to conduct comparative studies.

SA10: Determination of Exchangeable Cations, free H⁺ and free acidity

The 6th FSCC Interlaboratory Comparison showed that the method is not described well enough in manual IIIa. Franz Mutsch (Austria) presented a possible solution. It was agreed that Franz Mutsch and Nils König will formulate the necessary amendments to the method description sheet SA10 so that the improved description can be included in the manual update of 2010.

When it comes to reporting the exchangeable acidity based on the sum of the acid cations when one of the constituents are below the Limit of Quantification (code -1), the code '-2' should be used.

SA11: Aqua Regia Extractant Determinations

The FSEP agreed that the digestion should be done using the reflux method and that the microwave digestion is not allowed any longer. Improved methods exist for Hg measurements. An update of this method can not be done for 2010 but should be considered in the manual update of 2013. The same is valid for the measurement of plant available phosphorus.

SA12: Determination of Total Elements

The methods sheet SA12B on the determination of total elements by fusion with lithiummetaborate (ISO 14869) will remain in the manual. The total analysis by X-Ray Fluorescence is being put in a testing phase with possible inclusion in the update of the manual in 2013.

SA14: Determination of the Soil Water Retention Characteristic

This method sheet includes the integration of the FutMon field protocol SA14 in the manual IIIa.

A **procedure for update of methods or introduction of new methods** has been agreed. Suggestions for new methods should be sent to FSCC and FSCC will forward these to the Working Group on QAQC in the labs. The Working Group will discuss the method a prepare and proposal for adoption by the Expert Panel on Soil and Soil Solution. This means that the methods for total elements, aqua regia analysis for Hg are being put now in a testing phase to be included in the manual update round of 2013.

Annex 2: Guidelines for forest soil description and humus classification

Few amendments will be made to Annex 2 in version 6.1 of the manual based on the written comments from Austria, Germany and France which were sent to FSCC prior to and presented at the meeting. Concerning the European Reference Base for Humus Forms. Since the European humus research group is still working on the update of its proposal (to be published in 2010), it was decided to wait for including and using this reference till the next update of the manual in 2013.

Reporting of the soil profile and soil horizon description

The data on the soil profile description and soil horizon description will have to be reported according to the formats of the PRF and PFH file. Whether a parameter is optional or mandatory to report is based on the requirements specified in the BioSoil project, which on its turn was based on the data requirements in the Soil Geographical Database for Eurasia and the Mediterranean (Lambert et al. 2002). Following amendments, with reference to the BioSoil reporting requirements, have been agreed:

PRF file:

- The mean highest, mean lowest ground water table and the type of water table become OPTIONAL to report because this is often difficult to assess in the field.
- Concerning the description of the land use, the categories defined in Version 4 (presented at the FSEPM in Alton, 2006) will be used.

PFH file:

- The HORIZON DISTINCTNESS and HORIZON TOPOGRAPHY have been added as OPTIONAL parameters.
- All laboratory analysis on the samples taken according to genetic horizons are OPTIONAL to report. If they are reported, they should be analysed according to the methods prescribed by WRB. Full descriptions can be found in Procedures for soil analysis (Van Reeuwijk, 2002) and the USDA Soil Survey Laboratory Methods Manual (Burt, 2004).
- The BioSoil project did not ask to report the ROOT DISTRIBUTION although this is important on the plots where soil moisture measurements are done (referred to as D3 plots in FutMon). The PFH file includes the possibility to report the ABUNDANCE CLASS for each size class of roots (very fine, fine, medium and coarse) as defined in Annex 2 of the manual IIIa. On all plots where soil moisture measurements are done, it is MANDATORY to report the root distribution of the very fine and fine roots.

SWC and SWA file reporting the soil moisture sampling and analysis:

- On all plots where soil moisture measurements are done (D3 plots in FutMon) both files with all their specified fields are MANDATORY to report.
- FSCC will develop the data quality file for the soil moisture data including the information on the applied method, whether the lab participated in the ring test and a measure for its success/failure in this ring test.

The Manual IIIb: Soil Solution Collection and Analysis

Marco Ferretti, Chair of the QA Committee, presented a revised draft structure of the soil solution manual starting from the version of June 2002. The EP decided to set up an Expert Group that can prepare a first revised draft. *Susanne Iost* will coordinate and centralise the activities of the EG making use of the Google discussion group on Soil Solution. Members of the group are 1) *Henning Meeseburg* (DE), 2) *Nils Köning* (DE) for the analytical part and the integration with the deposition manual, 3) *Manuel Nicolas* (FR), 4) *Primož Simončič* (SI) for the field part, 5) *Guia Cecchini* (IT), 6) *Arne Verstraeten* (BE), 7) *Panos Michopoulos* (GR), 8) *Ana De La Cruz* (ES) and 9) *Marco Ferretti*. When more people are interested to join the group they should contact *Susanne Iost*.

The QA Committee will also decide on a proper reference to the manual and its parts. The correct way of citation will be placed on the ICP Forests website.

Time table for finalisation of the ICP Forest manual

The time table on the update of the ICP Forests manual 2010 will be sent to all EPs directly after the meeting by *Marco Ferretti*. Since there will be no back-to-back FSEPM at Tampere, following time table applies to the Manual IIIa:

- FSCC will make the currently agreed amendments to the manual IIIa and distribute the manual to the EP members and PCC, latest by the 5th of February 2010. PCC will post the manual on the web for discussion at the Tampere meeting. EP members can send their comments by email to FSCC till the 27th of February 2010.
- The EG on Soil Solution will prepare a first revised draft by the 5th (latest by the 10th) of February prior to the Tampere meeting.
- After that the EP chairs will prepare a revised draft by the 15th of March. Subsequently PCC will receive the comments from the NFCs and communicate them to the EP chairs to prepare an updated draft for adoption by the Task Force in June 2010.

Status of the soil solution data

Susanne Iost, vTI Hamburg, presented the status of the soil solution data till 2006, which were collected and validated at the JRC during the duration of the Forest Focus regulation. The database showed however severe gaps and errors. Through direct contact with the countries Susanne tried to fill in the gaps and corrected the errors in a working version of the soil solution database. However, the exchanged information will be requested again but formally in order to fill the gaps in the official database. The main problems were related to:

1. Sampling periods (start date, end date, number of periods) which were not defined in a unique way in the PSS and SSM file inhibiting linking of both files. The problem will be solved now in the 2007 reporting forms where the PSS file contains information on the START date of the FIRST period, the END date of the LAST period and the number (sum) of monitoring periods. In the SSO and SSM file the start and end date and the running number of SINGLE periods are recorded.

2. Numbering of single samplers. In several cases sampler numbers were not unique for each plot. Sometimes the reasons were just typing errors, sometimes double numbering occurred because all samplers of type 1 were given running numbers from 1 on but samplers of type 2 as well. From 2007 onwards the sample number becomes a key parameter. However, if old samplers are substituted and remain of the same type, in the same depth and layer the numbering can remain the same. If samplers are abandoned and others are installed then never use a number that has been used before. Otherwise correct time series for single samplers cannot be created.
3. Some parameters of the samplers (such as sampler type, sampling depth, sampled layer) changed over the years. This was mainly due to typing errors.
4. The code “-1” should be used for measurements below the limit of quantification. The current manual asks to report a blank or a zero value when a measurement is missing. Though this is confusing because real zero’s cannot be distinguished any more from missing values. Reporting a zero value should strongly be discouraged. When an analysis is not done, the field should be left blank.

The 2nd Forest Soil Condition Report

After a summary of the 1st Forest Soil Condition report, *Bruno De Vos* presented the scope, the major research questions and a number of planned evaluations for the 2nd Forest Soil Condition. The report should cover all forest soils in Europe (EU-27) and should be based on all available BioSoil data. The study will exclusively focus on the contemporary STATUS of forest soils and not their temporal evolution which will be the aim of the next report under ForEU. The FutMon evaluation will be based on a strongly extended set of measured and in situ observed soil variables compared to the previous survey as reported in the 1st condition report in 1997..

The main tasks of FSCC in the coming year will be:

- Assembling the (BioSoil/FSCDB) database
- Checking data integrity (again)
- General statistical analysis
- Data evaluation
- Producing draft reports
- Spreading drafts for internal review
- Reworking reports based on EP comments
- Printing and dissemination of the final soil condition report as a FutMon deliverable

The FSEP decided that FSCC should do the main part of the data evaluation but for some specific items (see further) separate working groups will be set up. The Expert Panel was rather in favour of a thematic approach compared to a regional approach.

Availability of the BioSoil data

By the 18th of December 2009, FSCC received from the BioSoil partners, data on 4104 Level I and on 104 Level II plots. The table below shows the status on the 18th of December. The Italian data will be sent soon.

Level I		Level II	
BioSoil applicant	N° submitted plots to FSCC	BioSoil applicant	N° submitted plots to FSCC
AT	135	AT	2
BE FL	10	BE FL	11
CY	0	CY	0
CZ	146	CZ	8
DE-BB/BE	52	DE-BB/BE	probably not done
DE-BW	50	DE-BW	2
DE-BY	97	DE-BY	not done
DE-HE	29	DE-HE	2
DE-MV	17	DE-MV	1
DE-NI	42	DE-NI	2
DE-NRW	39	DE-NRW	1
DE-RP	26	DE-RP	probably not done
DE-SAARL	9	DE-SAARL	not done
DE-SH	not done	DE-SH	not done
DE-SN	19	DE-SN	probably not done
DE-ST	19	DE-ST	not done
DE-TH	26	DE-TH	not done
DK	25	DK	3
EE	96	EE	not done
EL	not done	EL	4
ES	272	ES	2
FIN	630	FIN	32
FR	548	FR	10
HU	78	HU	not done
IE	36	IE	3
IT	0	IT	0
LT	62	LT	2
LV	0	LV	0
PL	524	NL	not done
PT AZ	0	PL	6
PT MAIN	0	PT AZ	0
SE	794	PT MAIN	0
SI	44	SE	not done
SK	112	SI	1
UK	167	SK	8
		UK	4
Total	4104	Total	104

The FSCC will keep on contacting all countries in order to further complete this dataset by the end of 2009. The chair thanked all countries for submitting their BioSoil datasets on a voluntary and very constructive basis, reflecting the collaborative and positive spirit in our ICP forests network.

Major research questions and planned evaluations

The FSEP members put a ranking to the different proposed research themes to be tackled in the 2nd Forest Soil Condition Report.

Following themes were found **essential** for the forest soil condition report:

1. Carbon stocks in mineral soil & forest floors
2. Soil nutrient availability
3. Soil acidification status

4. Soil threats: soil compaction, loss of OM, contamination
5. Estimation of drought stress indicators
6. Soil variables for critical loads calculation
7. Discussion on ecosystem services of forest soils.
8. Soil quality indicators
9. Stocks of macronutrients (N, P, K, Ca, Mg) in Mineral soil + FFs

The critical evaluation of soil sampling scenes and analytical methods is seen as an essential part of the documentation of the QAQC in the programme and not as a subject in itself. The ranges of all parameters should be presented in the first part of the result section (descriptive statistics of the data). Further it is very important to address specific policy issues on the importance of forest soils, their transnational monitoring, their current condition and threats.

Following themes **could be evaluated** if time and expertise allows:

10. Validation of existing PTFs
11. Estimation of soil weathering rates
12. Soil contamination (heavy metals)
13. Large scale forest soil mapping
14. Stocks of macronutrients (N, P, K, Ca, Mg) in Mineral soil + Forest Floors
15. Forest soil classification at EU level
16. Humus type classification
17. Soil data requirements for nutrient modelling
18. Relating lab accuracy to soil data evaluation
19. Soil data requirements for hydrological modelling
20. Relationships among soil parameters (correlations)
21. Specific soils (e.g. peat soils, Calcisols, Leptosols, Gleysols)

Following themes were found **irrelevant** for inclusion in the 2nd forest soil condition report:

22. Photo-atlas on forest soil profiles (*if done, this should be a separate report*)
23. Assessment of vertical patterns of soil variables (variation with depth)
24. Relationship WRB RSGs + qualifiers and soil properties
25. Lateral spatial variation of soil variables (within and among plots)
26. Derived soil variables and indexes => it was for many people not clear what was exactly meant by this.

Further discussion on the working approach, the outline and structure of the report, time table and action plan and other publication strategies will be held within a dedicated Google discussion group on the 2nd Forest Soil Condition Report. All soil experts are invited to actively participate in this GG. Draft versions of the report will also be accessible through this GG for review and comments.

Two working groups will elaborate on specific items: (i) on the importance of bulk density in forest soils (links with soil compaction and bulk density temporal changes) under the lead of *Manuel Nicolas* (Fr) and (ii) Soil based drought stress indicators in Mediterranean countries under the lead of *Stephano*

Carnicelli (It). Depending on the approach and the structure of the report, additional working and editorial groups may pop up. Thematic initiatives are welcomed by the FSCC.

Native English speakers of the expert panel (Andy Moffat, Philip O’Dea, John Derome) agreed to help in reviewing the language of the report.

FutMon and ForEU actions

The Importance of Measured Water Retention Characteristics for Water Budget Modelling on Level II Plots

Annette Wagner and *Stephan Raspe* presented their work within the FutMon D1-Met-29(BY) related to the action D3 on the soil water measurements.

The water supply in the soil is one of the key factors affecting tree vitality and forest condition. Moreover, determination of the water budget has been shown to be of major importance in understanding a number of physiological processes like nutrient uptake, growth and response to biotic stress factors.

Water budget modelling requires a description of every component of the water cycle. For the calculation of the soil water budget information on the water retention characteristics is essential. Key parameters for hydrologic modelling are the soil water retention curve (pF-curve) and the hydraulic conductivity function. The measurement of the water retention characteristics is very time and labour consuming. An alternative to the direct measurements is the use of analytical functions (pedotransferfunctions) that use more general soil physical properties (e.g. soil texture and bulk density) for the estimation of the water retention characteristics. However, the applicability of pedotransferfunctions is limited for forestal hydrologic modelling, mainly because they are based on agricultural soil data.

Based on measured soil water retention characteristics, water budget models will be further developed and validated at the plots included in the FutMon D3 action and will then be applied with improved pedotransferfunctions to the other Level II and all the Level I plots.

Weathering rates - case studies in Finland and the aims of the demonstration project

With his presentation *Antti-Jussi Lindroos* (Finnish Forest Research Institute) tried to give an insight into the methods and results of the case studies performed in Finland related to the estimation of weathering rates for upland forest soils (i.e. mineral soil sites). These studies include an estimation of weathering rates for some of the Level II plots using the Zr-enrichment method. In addition to the Zr enrichment method, a regression model based on the Zr method, a PROFILE model, a catchment-scale input/output method and weathering rate estimation based on the bedrock type have also been used in Finland (e.g. Tarvainen 1996, Starr et al. 1998). Lindroos et al. (2003) studied the weathering potential of soil solutions with varying chemical composition (e.g. different DOC concentrations, and soil solution collected under different tree species) to release elements from the mineral soil material in

laboratory dissolution experiments. The methodology used in this study were discussed in the presentation.

In addition to a review of the methods used in case studies performed in Finland, a preliminary outline of the ForEU demonstration project on weathering rates was presented. The aim of this demonstration project is to assess the availability of national data, and to utilize the expertise of the participating countries in determining the weathering rates of forest soils in different parts of Europe. The ultimate aim of the demonstration project is to provide ICP Modelling and Mapping with empirical data on weathering rates for use in the determination of critical loads.

Evaluation of mineral weathering in UK Level II sites

Andy Moffat, Forest Research UK, presented results from the PhD study of Fiona Kennedy (1997) on the soil mineral weathering rates and critical loads of sulphur at six forested sites in the UK. In her PdD research Dr. Kennedy tested and compared several method to estimate the weathering rates: mineral correlation, Zirconium enrichment, Modelled using PROFILE, Profile Mass Balance and Mineral bag burial (Crow, 2008). The most important conclusion from this work was that a combination of several methods is needed to come to a best estimate.

References

- Burt, R., ed. 2004. Soil survey laboratory methods manual. Soil Survey Investigations Report No. 42, Version 4.0. Lincoln, USA, Natural Resources Conservation Service.
- Crow, P. (2008). Mineral weathering in forest soils and its relevance to the preservation of the buried archaeological resource. *J. Archaeological Sci.* 35, 2262-2273.
- Van Reeuwijk, L.P. 2002. Procedures for soil analysis. 6th Edition. Technical Report 9. Wageningen, Netherlands, ISRIC – World Soil Information.
- Lindroos, A.-J., Brügger, T., Derome, J. and Derome, K. 2003. The weathering of mineral soil by natural soil solutions. *Water, Air, and Soil Pollution* 149: 269-279.
- Starr, M., Lindroos, A.-J., Tarvainen, T. and Tanskanen, H. 1998. Weathering rates in the Hietajärvi Integrated Monitoring catchment. *Boreal Environment Research* 3: 275-285.
- Tarvainen, T. 1996. Environmental applications of geochemical databases in Finland. *Geological Survey of Finland, Espoo.* 75 p.

**EC LIFE+ PROJECT “FURTHER DEVELOPMENT AND IMPLEMENTATION OF AN
EU-LEVEL FOREST MONITORING SYSTEM” (FUTMON)
AND
UN/ECE ICP FORESTS**

16th Meeting of the Expert Panel on Soil and Soil Solution

14-16 December 2009, Brussels, Belgium

Research Institute for Nature and Forests (INBO)

AGENDA

Monday, 14th of December 2009

13:00 – 13:30 Arrival, coffee and registration

13:30 – 14:00 Opening and welcome

- Welcome by the head of the department Biodiversity and Natural Environment of the Research Institute for Nature and Forest (*Maurice Hoffmann*)
- Welcome and adoption of the agenda (*Bruno De Vos, Chairman FSEP*)
- Technical announcements (*Nathalie Cools, FSCC*)

14:00 – 14:50 Review of past activities and current status of the FSEP

14:00 – 14:20 Adoption of the minutes of the 14th FSEPM in Firenze and of the 15th FSEPM, Hamburg (*Nathalie Cools*)

14:20 – 14:50 Status of the current activities and structure of the FSEP in relation to the BioSoil, FutMon and ForEU projects and the ICP Forests programme (*Bruno De Vos*)

14:50 – 18:00 QA/QC in the laboratories

14:50 – 15:50 Results and follow-up of the 6th FSCC Interlaboratory Comparison (*Nathalie Cools*)

15:50 – 16:10 Coffee break

16:10 – 16:40 Results of the 1st FSCC Soil Physical Ring Test (*Nathalie Cools*)

16:40 – 17:20 Report of the Meeting of the heads of the laboratories and of the WG on QAQC in the labs, 12-13 Oct '09, Warsaw (*Nils König*) (*Nils König*)

17:20 – 18:00 Discussion on follow-up of the ring test results

Tuesday, 15th December 2009

9:00 – 12:00: The Revision of the manual

The Manual IIIa: Sampling and analysis of soil

- Presentation of the Draft update 2010 (Nathalie Cools)
- Discussion and adoption of the manual

10:40 -11:00 Coffee break (+ Group photo)

11:00 – 11:45 Discussion and adoption of the manual (continued)

11:45 – 12:30 The Manual IIIb: Soil solution collection and analysis

- Expectations from the QA Committee regards update manual IIIb, the broad revision concept and envisaged new structure (*Marco Ferretti*)
- Discussion

12:30 – 12:45 Status of the Forest Focus soil solution data and gap filling (*Susanne Iost*, vTI Hamburg)

12:45 – 14:00 Lunch break

14:00 – 18:00 2nd Forest Soil Condition Report (FutMon evaluation)

- Lessons learned from the 1st Forest Soil Condition Report (1997): structure, content and problems (*Bruno De Vos*)
- Scope and challenges of the new report
- Major research questions and planned evaluations
- Possible regional and/or thematic approaches

16:00 – 16:20 Coffee break

- Biosoil soil data availability (presentation of results of the questionnaire) (*Nathalie Cools*)
- Soil and Soil Solution database:
 - Structure, content and long-term strategies
 - Data quality requirements, completeness
 - ICP Forest countries not involved in BioSoil
 - Action plan for missing data
- Delineation of regions/themes and designation of regional/thematic editors

Evening programme: Social dinner in Brussels

Wednesday, 16th December 2009

9:00 – 10:40 2nd Forest Soil Condition Report (continued)

- Discussion by Working Groups per theme/region
- Working approach
- Outline of the report
- Action plan
- Time table
- Data exchange policy
- Other publication strategies

10:40 – 11:00: Coffee break

11:00 – 11:15 Status, evaluations and planned activities of the Google Expert Discussion Groups (*Nathalie Cools*)

11:15 – 12:15 FutMon and ForEU actions (invited speakers)

- Soil water retention characteristics and soil hydrological models (Stephan Raspe and Annette Wagner)

12:15 – 14:00 Lunch break

14:00 – 15:30 FutMon and ForEU actions

- Weathering rates (Antti-Jussi Lindroos, co-ordinator of D8 in the ForEU application)
- Weathering rates in UK (Andy Moffat, Forest Research UK)

15:30 – 15:50 Coffee break

15:50 – 16:10 Future tasks of FSCC/FSEP

16:10 – 16:20 Coming meetings, other business

16:20 - 16:30 Final conclusions and closing of the meeting

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