

Pan-European Programme for the Intensive Monitoring of Forest Ecosystems (EU/ICP Forests)
Expert Panels on Meteorology and Phenology

Meeting of Core Group of ICP Forests/EU Expert Panels
workshop 21 to 22 February 2002 in Freising, Germany

Minutes

1. The core group meeting of ICP Forests/EU - Expert Panels was invited by the Expert Panel on Meteorology and Phenology, and was attended by 8 chairmen, co-chairmen and experts of the intensive monitoring programme, 3 invited scientists of forest meteorology and phenology, the chairman of ICP Forests and the representative of FIMCI:

Egbert Beuker, co-chairman Expert Panel Phenology
Matthias Dobbertin, chairman Expert Panel Growth
Geert Draaijers, co-chairman Expert Panel Deposition
Georg Gietl, Expert Panels Meteorology and Phenology
Niels Otto Jensen, meeting co-chairman Expert Panel Meteorology
Markus Neumann, Expert Panels Meteo/ Pheno, Growth, Crown Condition
Teja Preuhsler, chairman Expert Panel Meteorology and Phenology
Peter Roskams, chairman Expert Panel Working Group Biotic Damage
Heikki Hanninen, Finland, scientist in modelling Meteo/Pheno
Annette Menzel, Germany, scientist in modelling Pheno/ Meteo
Stefan Raspe, Germany, scientist in integrated use of Level II data, incl. Meteo/Pheno
Thomas Haussmann, chairman ICP Forests
Evert Vel, FIMCI

2. The 17th Task Force meeting of ICP Forests mandated the Expert Panel on Meteorology and Phenology to update Parts VII (Meteorological Monitoring) and IX (Phenological Observations) of the ICP Forests Manual and to open the web page on Phenology.

The mandate is based mainly on the results of the combined workshop of the Expert Panels on Meteorology and Phenology, held in October 2000 in Lousã, Portugal, and will get progress at the planned Expert Panel meeting in early spring of 2003.

To prepare this planned meeting, the workshop of the joint ICP Forests/EU - Expert Panels core group had the aims of:

- Integrating phenology and meteorology with other assessments in Level II
- Discuss possibilities of co-operation with groups/networks outside ICP Forests
- Improve the Quality Assurance of phenology and meteorology data
- Prepare proposals for the review of the manuals at the Expert Panel meeting in 2003

3. The workshop started with the half day seminar 1/2002 of the Bavarian State Institute of Forestry: “*Integrated use of Level II data with emphasis on Meteo and Pheno data*” by Mr. Raspe (Bavarian State Institute of Forestry). It included the data management, determination of physiological times and of meteorological stress parameters, examples of evaluating soil water availability and water budget, and examples of evaluating element budget. Feasible application possibilities of the present concept on an European scale were discussed. (The seminar based on a 3 years project of the Bavarian State Forest Commission (Project Number V46), supported by the European Commission (Project Number 989.60.DL.018.0), and on the publication of the outcome of this project: *Stephan Raspe 2001: Konzepte für eine integrierende Standardauswertung der Messergebnisse von den Bayerischen Waldklimastationen. Forstliche Forschungsberichte München, Nr. 184/2001, 179p, ISSN 0174-1810*).

Included in the seminar was also the presentation and discussion of the phenological survey as carried out at the Bavarian Level II plots, including phenological gardens according to the IPG (by Mr. Kroll, LWF), and of some techniques of meteo-sensor quality control, developed at Bavarian Level II plots (by Mr. Gietl and the technical staff, LWF).

4. Next Mr. Vel reported about the requirements of FIMCI on the integrated use of Level II data: He distinguished the aspects of monitoring and research, explained the need of the mandatory meteo data for the control of parameters and for the modelling with parameters of other surveys by FIMCI, and pointed lacking information on soil humidity, soil temperature and canopy temperature. Up until now only few pheno data are transmitted to FIMCI, their use is not included in any work or working plan.

5. Mr. Dobbertin presented the importance of meteo/pheno data for forest growth studies at level II plots: a) Meteorology as factor for tree growth and tree mortality, underlined with results from Level II plot observation in Switzerland at different tree species and different meteorological conditions and events. b) The use of meteorology data in various tree growth models and the importance of scale and resolution of both meteo and growth data, demonstrated on girth band high resolution measurement results, and some ideas of measured versus estimated meteorological data. c) The possibilities to determine e.g. vegetation periods by phenological observation in combination with meteorology and growth measurement and the importance of observing phenology events.

6. Mr. Roskams answered the question: Is there a need for data on biotic damage? a) Biotic agents influence tree condition, are driving forces on the ecosystem level and show the relationship with other site/stress factors and response parameters; a lack of data is a limit for cause/effect studies. b) A harmonised approach is needed and improvement of the manual as well as the link to other programmes (e.g. phenology and meteorology). c) An assessment should include occurrence, extend and diagnosis. He explained the proposals of the WG Biotic Damage and underlined it by examples of observed damage in pine and oak stands.

7. Ms. Menzel (Department of Ecology, Technical University Munich) informed about shifts in plant phenological phases and saw phenology as an indicator for climate change: In Germany the 1974-1996 growing season was up to 5 days longer than in the 1951-1973 period, in general the growing season has been lengthened by up to -0.2 days/year within the last 4 to 5 decades. There are not any substantial regional differences, but trends of succeeding phenological phases seem to be stable. The analysis of phenological observations seem to be a very effective tool in detecting climatic changes.

8. Mr. Hänninen (Department of Ecology and Systematics, University of Helsinki) referred on data requirements for modelling the relation between phenology and climate, while the goals of modelling phenology are understanding the environmental regulation of phenological development and predicting phenological development. Essential for the data requirements on modelling purpose is besides practical aspects the springtime development, mainly for temperature response of rate of development, and for rest completion. Required are long term field observation ("classical" phenological events, microscopic observations and air temperature) and short term experimental data (incl. growth chamber experiments).

9. Mr. Draaijers discussed requirements on meteorological and phenological data for the deposition survey: Deposition is estimated by means of throughfall, stemflow and bulk precipitation measurements. Following meteorological and phenological data are required for

the estimation of canopy exchange using canopy budget models, and also for explaining unusual values of chemical parameters of throughfall, stemflow and/or bulk precipitation:

<u>Meteorological data</u>	<u>Phenological / forest data</u>
Global radiation	Vitality / defoliation
Surface temperature	Age distribution of needles
Surface wetness duration	Length of growing season
Drought	Biotic stresses (insect plagues)
Temperature extremes	

As an alternative to direct deposition measurements, inferential deposition monitoring may be done for deposition estimates on grid basis and for estimate deposition for specific sites where no direct measurements are made. For inferential modelling following data are required:

<u>Meteorological data</u>	<u>Phenological / forest data</u>
Precipitation amount	Tree species
Wind speed	Tree height
Air temperature	Canopy closure / LAI
Relative humidity	
Cloud cover	

10. Mr. Markus Neumann stressed the question: Is the Level II Meteo- and Pheno-Programme adequate and realistic? – based on Austrian experience in a country with a great variation of ecological parameters within forest areas. Limiting factors are the costs and the necessary help of local plot attendants with sufficient knowledge and experience, especially for the intensive phenological observation. The meteo programme is carried out on two plots, where also soil moisture and temperature in different depths are assessed, providing valuable information, especially in combination with near by stations with long term data. The pheno programme is not started yet, because up to now there was no way to organise the periodical observation in a feasible manner providing data with the necessary resolution in time and space and needed accuracy at reasonable costs, also being aware of the importance of biotic/abiotic stress factors on forest condition.

11. Mr. Gietl presented aspects of meteo quality assurance in sense of accuracy in physical measurements and getting representative data for the station and the surroundings, and according to national and international standards.

To make the level II meteo stations comparable with (normal) standard weather stations, a dynamic description of its deviation from the normal, incl. surrounding horizon, is needed. Besides that, the status of the station should be controlled daily by remote connection, if possible, but at least once a week by an observer, performing a simple station service. The accuracy of sensors and data logger needs controlling, testing and calibration of the whole meteo station at Level II plots once or better twice a year. All incoming data should be examined by visualisation in a graphic way and by checking the limits by internal station comparison. Last, but not least quality assurance is not complete without full documentation.

12. Mr. Jensen referred on some aspects of using external meteo data for the intensive monitoring programme, in case that there is no Level II plot meteo station. Extrapolation of wind speed and direction is fairly well developed with the wind energy assessment programme WaSP, at least up to terrain forms of 30 degrees slope. Extrapolation of temperature needs first of all to take altitude into consideration (- 1° C per 100 meter) but the orientation of the slope relative to the sun is also very important as the katabatic flows is generated under low external wind conditions, especially during night. In fact, to extrapolate

temperature it is probably more important to choose a station in a similar setting rather than one in the nearest distance.

Katabatic flows can be both positive and negative: They collect cold pools of air in the valleys which can be harmful, but on the other hand the flows prevent excessive cooling by radiation on the slopes. Much more research in this area is needed, involving the heat capacity, conductivity, wetness of the soil etc. Regarding precipitation it is so local, even on flat terrain, that sufficiently short term values need to be collected on location.

Unfortunately Ms. Kennedy (Ispra, Italy) was not able to attend the workshop, so Mr. Jensen reported on some meteorological aspects of the brochure "Analysis of European Forest Condition Data Base" by N. Jewell and P. Kennedy, Space Application Institute (SAI), Ispra, 2001. After a long and intensive discussion it was in general concluded, that it seems not easy, to use meteorological data like the employed data from the MARS (Monitoring Agriculture with Remote sensing) project of the SAI, spatially interpolated on a 50 km x 50 km grid net, for the determination of cause-effect relationships on the intensive monitoring plots Level II. Nevertheless the need for using external meteo data still exists and is to treat in the Expert Panel.

13. Mr. Beuker gave an overview of problems with the existing manual on Phenological Observations. A major problem is still the assessment of flowering. Because for several tree species flower intensity varies per year, it is difficult to set a standard. A solution may be to assess only the occurrence of flowering and estimate its intensity later through the fruiting parts in litterfall. DAR-Q forms for both extensive and intensive phenology are under preparation. The web page on Level II Phenology will be developed further, but pictures of especially broad-leaved species are missing. There was an active discussion on the role of phenology in the Level II monitoring program. There is a concern about the little interest the optional phenology has amongst the participating countries. Originally phenology was taken up to expand the ecological dimensions of the program, but now only a few countries are active assessing phenology. It was decided that Mr. Beuker will send a request to the NFC's to send him the available phenology data of 2000 and 2001. Mr. Beuker will, probably in co-operation with some other active participants, make a pilot study of this data to show how phenology can essentially contribute to the programme. Also more intensive co-operation with especially the WG Biotic Damage, chaired by Peter Roskams, is foreseen.

14. Mr. Preuhsler reported on the main outcome of the last Meteo/Pheno workshop 2000 in Portugal in respect of Level II-Meteorology, mainly the need for

- a greater number of Level II Meteo-stations in under-represented areas
- more complete meteo-data series
- use of external meteo-data
- possibilities for monitoring soil humidity and snow
- quality assurance and quality control
- harmonised definitions for derived parameter and standardised functions/models
- to encourage the other EP for integrated use of data/information from the Meteo and Pheno survey

He also explained some necessary points for review and updating of the manual on Meteorological Monitoring, e.g.

- better guide lines for how to select / describe sites for the meteo station
- guide lines for spatial extrapolation of data
- to ask better technical description of instruments
- for what type of investigation are "in situ" or "near by" data necessary
- to correct factual errors in the manual, e.g.

- the completeness of forms and their content
- prevailing wind direction:
- 12 sections of 30 deg (instead of 8 sections 45 deg)
- meaning of “daily values”(0-23 or 6-5 o'clock?)

15. Mr. Thomas Haußmann (Chairman of ICP Forests) informed the meeting on details of the strategy of ICP Forests with regards to integration of work and co-operation between the Expert Panels. After a period of harmonisation of common methods the focus in the coming years will be put on data evaluation. The Expert Panels will have to play an important role in this context. However, discussions on regrouping of Expert Panels might be again on the agenda when discussing the new strategy of ICP Forests from 2006 onwards. He referred to the situation at the EU level and first ideas of the General Directorate Environment with regards to the new EU legislation

16. After some general discussions on the future of the ICP Forests Intensive Monitoring Programme Level II, the core group agreed that more integrated use of data and more co-operation among the Expert Panels are necessary, as well as e.g. co-operation with and participation at international phenology panels, and more advises for the use of external data, e.g. on Meteorology. The next steps during this year are to formulate the proposals for the review of the both manuals until autumn 2002, and to circulate them within the EP Meteo/Pheno to get sufficient feed back before the planned meeting in early spring 2003.

Mr. Beuker will make a pilot study, in co-operation with other active members of the programme, by using phenology and other Level II data; he will send a request to the NFC's concerning this co-operation and the necessary Level II data.

The minutes will be distributed by e-mail to EU, to ICP Forests, to the NFC's and the other Expert Panels. A report of the work shop, including the minutes and the presentations, will be sent to the participants, to the members of the Expert Panels on Meteorology and Phenology, to EU, ICP Forests and FIMCI.

Freising/Punkaharju/Roskilde, April 18, 2002

Teja Preuhsler
Chairman

Egbert Beuker
co-chairman Phenology

Niels Otto Jensen
workshop co-chairman Meteorology

Annex 2 to Minutes “Core group Meteo-Pheno workshop 2002”

Pan-European Programme for the Intensive Monitoring of Forest Ecosystems (EU/ICP Forests) Meeting of Core Group of ICP Forests/EU Expert Panel on Meteorology and Phenology workshop 21 to 22 February 2002 in Freising

Agenda

Thursday, 21 February 2002

13:00 – 17:45

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| Stephan Raspe | Integrated use of Level II data with emphasis on Meteo and Pheno |
| | - Data management |
| | - Determination of physiological times |
| | - Determination of meteorological stress parameters |
| | - Example of evaluating soil water availability and water budget |
| | - Example of evaluating element budget |
| Frank Kroll | Pheno assesment at Bavarian Level II plots |
| Georg Gietl, Günther Rosanitsch, Hans-Joachim Krause | Meteo-sensor quality control at Bavarian Level II plots |

17:45 – 19:00 joint dinner at Gasthaus Lermer

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| 19:15. | Teja Preuhsler | Intruduction to the workshop, aims and agenda |
| 19:30 | Evert Vel: | Requirements of FIMCI on the integrated use of Level II data |
| 20:15 | Matthias Dobbertin: | Importance of Meteo/Pheno data for growth and increment |
| 21:00 | Peter Roskams: | Some ideas on biotic damage assessment |
| 21:50 | Heikki Hanninen: | Data requirements for modelling relation between phenology and climate |
| 22:25 | Annette Menzel: | Phenology: The indicator for climate change;
About the need of phenological observations at research sites |

Friday, 22 February 2002

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| 08:00 | Teja Preuhsler | Technical announcements |
| 08:15 | Geert Draaijers: | Requirements on Meteo data for the deposition survey |
| 08:35 | Markus Neumann: | Is the Level II Meteo- and Pheno-Programme adequate and realistic? – Based on Austrian experience! |
| 0930 | Georg Gietl: | Experience with Meteo quality assurance at Level II plots |
| 10:15 | Niels Otto Jensen: | External Meteo data and their use in the Level II programme |
| 11:00 | Thomas Haussmann: | Integrated use of Level II data and information |

in view of ICF Forests

1145 Weißwurst-Frühstück at LWF

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| 12:30 | Egbert Beuker: | Overview on problems with the existing Pheno-manual |
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and proposal for DAR-Q

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| 13:30 | Teja Preuhsler: | Overview on problems with the existing Meteo-manual |
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14:15 Discussion on the following subjects

- content of the existing manuals on Meteo and Pheno
- quality assurance of data assessment
- quality assurance of data use
- need of derived and/or condensed data
- use of (external) Meteo and Pheno data
- co-operation with other groups/networks

- models for standardised use of data
proposals for the review of both manuals

16:00 End of the workshop
