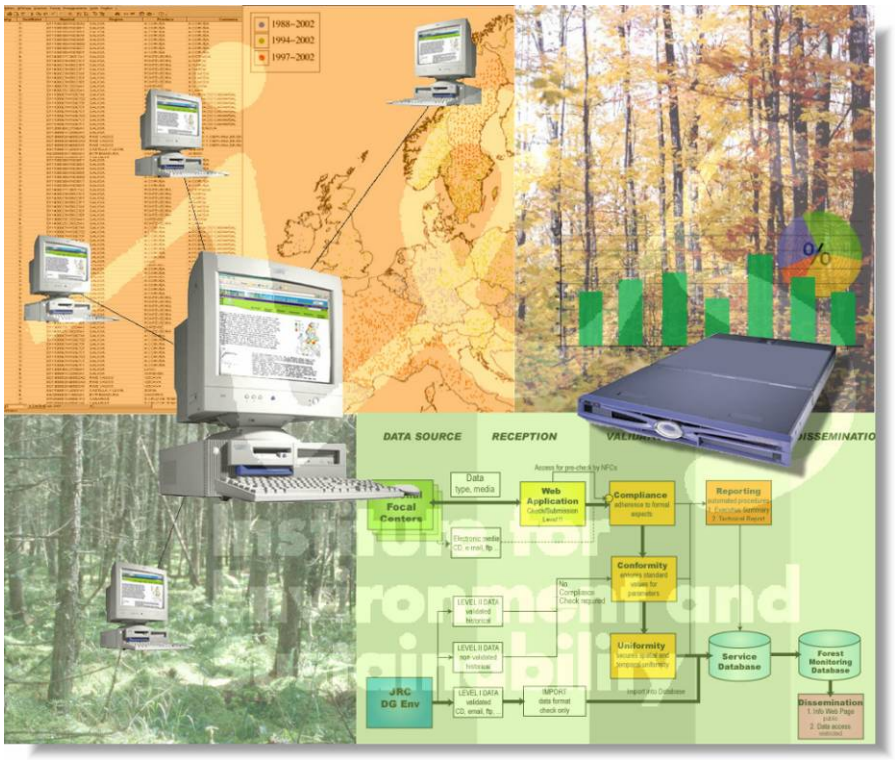
Forest Focus Monitoring Database System

EXECUTIVE SUMMARY REPORT 2005 LEVEL II DATA

Hiederer, R., T. Durrant, O. Granke,
M. Lambotte, M. Lorenz, B. Mignon



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List of Acronyms and Abbreviations

CODE	DESCRIPTION
ASCII	American Standard Code for Information Interchange
BFH	Federal Research Centre for Forestry and Forest Products Bundesanstalt für Forst- und Holzwirtschaft
BLOB	Binary large object
CLRTAP	Convention of the Long-Range Trans-boundary Air Pollution
dbh	Diameter at breast height
DAR	Data-Accompanying Report
DG AGRI	Agriculture Directorate General
DG ENV	Environment Directorate General
JRC	European Commission Joint Research Centre
DSM	Data Submission Module
EC	European Commission
EU	European Union
FFMDb	Forest Focus Monitoring Database
FIMCI	Forest Intensive Monitoring Coordinating Institute
ICP Forests	International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forests
IES	Institute for Environment and Sustainability
LM&NH	Land Management & Natural Hazards Unit
NFC	National Focal Centre
NSI	Nouvelles Solutions Informatiques s.a.
PCC	Programme Coordinating Centre
PDF	Portable Document Format
UN-ECE	United Nations Economic Commission for Europe
XML	Extended Mark-up Language

List of Survey Codes

Code	Survey Name
AQ	Air Quality
CC	Crown Condition
DP	Deposition
FO	Foliar Chemistry
GR	Growth and Yield
GV	Ground Vegetation
LF	Litterfall
MM	Meteorology
OZ	Ozone Injury
PH	Phenology
SI	System Instalment
SO	Soil Condition
SS	Soil Solution

1 GENERAL INFORMATION

This *Executive Summary Report* for 2005 Level II data supplements the *Technical Report* for the same monitoring year. It presents a concise account of the data submitted and the results obtained from the checks applied for validating the data. Problems encountered with a general character and particularities with significant consequence on the overall project are also included in the report. For details and technical background of the data and the validation process the *2005 Technical Report* should be referred to.

1.1 Reporting Background

Forest Focus (Regulation (EC) No 2152/2003[1]) is a Community scheme for harmonised, broad-based, comprehensive and long-term monitoring of European forest ecosystems. The monitoring programme of air pollution effects is linked to the *International Cooperative Programme on Assessment and Monitoring of Air Pollution Effects on Forest* (ICP Forests). ICP Forests reports to the Working Group on Effects of the *Convention of the Long-Range Trans-boundary Air Pollution* (CLRTAP) of the *United Nations Economic Commission for Europe* (UN-ECE).

Countries participating in the scheme designate authorities and agencies as National Focal Centres (NFCs) submit annually to the Joint Research Centre of the European Commission (JRC) their observations made on the network of observation plots for intensive and continuous monitoring (Level II). For managing the data the JRC has implemented a Forest Focus Monitoring Database System. The system was developed and implemented in 2005 under contract by a Consortium, coordinated by I-MAGE Consult with Nouvelles Solutions Informatiques s.a. (NSI) as consortium partner and the Bundesforschungsanstalt für Forst- und Holzwirtschaft (BFH) as sub-contractor.

1.2 Monitoring Programme

The monitoring programme of air pollution effects on forests comprises of two networks of observations plots:

- ***Level I: systematic network of observation points***

  About 6,000 plots are monitored on observations points arranged in a nominal grid throughout Europe at a spacing of approximately 16km x 16km. The objective of data collection is to gather representative information on the condition of forests. the

[1] OJ L 324, 11.12.2003, p. 1-8

- ***Level II: network of observation plots for the intensive and continuous monitoring***

  The selective location of the 860 permanent observation plots for intensive and continuous monitoring is governed by the objective of investigating particular stress factors on the forest environment in detail and over longer periods

Level II data currently provides the main research and development component of the monitoring programme. The sample plots serve to provide experimental and empirical data, which are fundamental to the understanding of conditions in forests and to the scientific developments of the programmes at all stages.

The two monitoring levels complement each other and aim at providing information on temporal and spatial trends concerning forest condition and on the effects of stress factors on the forests.

1.3 Level II Data Collection

The Pan-European Intensive Monitoring of the Forest Ecosystems on Level II plots started in 1994. The collection of data is divided into different surveys, each with a defined set of parameters to be assessed. The spatial density of plots is variable depending on the survey. Some of the surveys should be carried out on all plots, such as Crown Condition, while other surveys are only applied on a limited number of plots, such as Meteorology. Variable is also the temporal intensity of the data collection, which ranges from continuous monitoring to a 10-year repeat cycle. The Level II surveys and their minimum reporting periods for collected data are:

- **Crown Condition**
  at least once a year, on all plots, on all trees in (sub-) plots
- **Air Quality**
  continuous, on a selection of the plots
- **Atmospheric Deposition**
  continuous, on a selection of the plots
- **Meteorology**
  continuous, on a selection of the plots
- **Soil Solution**
  continuous, on a selection of the plots
- **Ozone Injury**
  several times per year, optional
- **Phenology**
  several times per year, optional
- **Foliage**
  at least every 2 years, on all plots, on 5 trees
- **Growth**
  every 5 years, on all plots, on all trees in (sub-) plot
- **Ground Vegetation**
  every 5 years, on a selection of the plots
- **Soil Condition**
  every 10 years, on all plots

Data from Level II plots collected before 2002 was processed and stored by the Forest Intensive Monitoring Coordinating Institute (FIMCI) under contract of DG AGRI. Those data were integrated into the system together with all data from surveys performed on Level I plots.

2 DATA VALIDATION PROCESS

The validation of data submitted by NFCs forms the central activity of data processing and management. Its purpose is to ensure that the information stored in the system is transparent to any user and that it can be used in the evaluation of temporal and spatial trends. It should also allow the integration of the data with other data sources in more extensive thematic analyses. During validation the data are subjected to various checking routines. The routines are applied in succession with increasing degree of complexity of the checks performed.

2.1 Validation Checks

Data are validated based on the principle that it is not possible to identify the correctness of data, but rather that it is possible to identify the probability that data represent valid observations. A sequential grading of data is applied using increasingly complex tests. A graphical overview of the validation tests is given in Figure 1.

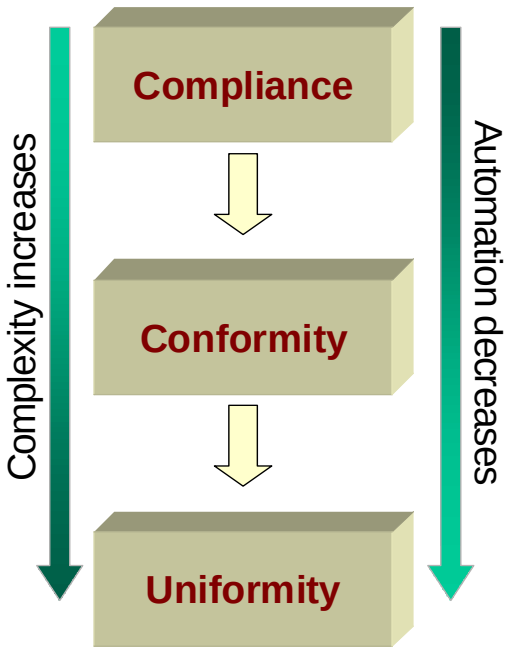

Figure 1: Sequential arrangement of Data Validation Tests

During the validation process excludes impossible values, e.g. pH = 0, and indicates those, which do not correspond to expected conditions for further investigation. In addition, data consistency is tested by checking the constancy of static values (e.g. individual tree species, altitude) from year to year and logical continuity of the change of data collected (e.g. tree diameter, age).

2.1.1 Compliance Check

The tests applied for the Compliance Check verify if the submitted data comply with the formats stipulated in the data submission forms. The submission file format is based on the *Technical Specifications* documents issued by the JRC for each monitoring year. Also validated is if the values are admissible, e.g. in case of categorical parameters. Any deviation from the defined format will lead to an error or at least a warning message. In case a value fails a compliance test the whole survey cannot be further processed and an NFC will have to submit the survey with corrected values.

2.1.2 Conformity Check

The Conformity Check comprises a number of subtasks that are made after the submitted data have been subjected to compliance checks and have been loaded to the staging area of the processing database. The data are tested for

- being plausible either within expected general ranges (single parameter),
- depending on values of other parameters (multiple parameter), or
- depending on the values from former years (time series).

At this stage data from other plots are only considered as far as the integrity of the database is concerned. The validity of a parameter is tested without taking other plots into account.

2.1.3 Uniformity Check

Data Uniformity is validated by testing the stability of a parameter as compared to data observed at neighbouring plots. Uniformity tests are more qualitative and constitute a first step into data evaluation. In contrast to compliance and conformity tests the method applied to check the uniformity tests is implemented as a semi-automated procedure. While tables and maps are produced automatically experts interpret the results and put the findings into a general context. The interpretation includes a comparison with external data as far as available.

2.2 Validation Messages

The results of the tests applied during validation are coded on a sliding scale of warning and error. The status “error” is only given when the code exceeds, warnings are given to situations resulting in a code below 50. After the Conformity Check the NFCs are asked to check each flagged value and either confirm its correctness or (if the value was erroneous after all) resubmit a corrected survey.

2.2.1 Compliance Check Messages

At the Compliance Check stage, codes of 50 or more are generated by three main types of conditions:

- **Errors** in the data submission procedure (missing mandatory form, not enough forms to complete the survey).
- **Non-viable values** within the files, such as invalid dates, invalid characters and codes outside the given lists.
- **Integrity checks** within the survey to check that plots within the data file are also mentioned within the reduced plot file.

Warnings draw attention to missing optional forms (in case the NFC intended to submit the data but forgot), blank lines (in case this should have contained data) and comment lines (to confirm that the line should be there and is a genuine comment). At this stage no consideration is given to the plausibility of a given value, only whether it fits the stated data formats.

2.2.2 Conformity Check Messages

At the Conformity Check stage the actual data values are checked. The tests are separated into three main types:

- ***Single parameter range tests*** (e.g. values must be between 0 and 100 for percentage values).
- ***Multiple parameter range tests*** within a given survey (e.g. start date must be before end date).
- ***Temporal consistency tests*** (e.g. invariable parameters such as coordinates, altitude must not change).

The single parameter range checks flag any data value that is outside an expected range for that parameter. Ranges were mostly set to identify any value outside an approximate 95% level. Multiple parameter range checks note anomalous combinations of values, and the temporal consistency tests check for unusual increases / decreases in parameters (e.g. diameter values should increase over time, but not by more than a certain amount).

There are limitations as to which conditions can be verified:

- The tests can detect an anomalous difference between two values but cannot compute which of them is incorrect.
- Submitted values that do not conform to the protocols may not be detected unless the value dimensions lead to data values outside the expected range.
- The range checks cannot pick up every implausible value, in particular in the meteorological data, because the ranges are set without geographic distinction.

The more complex the checks, the less clear-cut will be the results provided. The validation checks have to strike a balance between being too strict and thus incorrectly highlighting valid data or too broad to identify genuinely erroneous values.

2.3 Validation Results and Feedback from NFCs

The tests of the Compliance Check are performed on-line at the time of data submission. A report on the status of the data is generated instantly when testing the data before submitting the forms. Conformity and Uniformity checks are more and have to be performed off-line and detailed reports are sent by electronic mail to the NFCs. The NFCs had the opportunity to react in different ways:

- extreme values are confirmed by the NFCs, corresponding registry lines will be flagged as extreme event;
- in case of errors, the NFC will have to correct the errors and resubmit the whole survey. The data then has to pass through the complete set of checks (compliance, uniformity and conformity) again;
- if no answer was delivered by the NFC before the deadline and/or errors are still identified, data are not loaded into the Forest Focus Monitoring Database.

3 LEVEL II 2003 MONITORING DATA

The review given in this *Executive Summary Report* relates to data from the 2005 monitoring period collected at the intensive monitoring plots of the scheme. The status of the data received is given for surveys submitted until 10.07.2007. Results of the validation process include additional information received by the end of August, 2007.

Further details referring to the 2005 data submission status and analysis may be found in the related *Technical Report for 2005 Level II Data* (Hiederer, *et al*. 2007f). The data format specifications for the organization of measurements and observations made on the plots pertaining to the submission are defined in the *2005 Technical Specifications* document (European Commission, 2007).

3.1 Schedule for Data Submission

The standard procedure of data processing foresees for NFCs to submit data using the Web-based DSM during the period specified for a given monitoring year. Data are then passed on to the validation process and once fully validated are integrated into the FFMDb. When data do not pass one or more of the tests they should be corrected and re-submitted by the NFC. For reasons of organizing the processing chain the submission of data is restricted to specific periods.

The sequence of data submissions for the validation performed on the data from the data submission date is graphically presented in Figure 2.

States participating in the monitoring programme are EU-Member States and non-EU states. All NFCs of participating sates were invited to submit their 2005 Level II data in a letter from the JRC from 30.10.2006 (Ref. No. H07-LMNH/RH – D(06) 26636). The data submission period was specified from 15.11. to 15.12.2006. Several NFCs asked to submit data at a latter stage. The DSM was therefore left open until 02.02.2007 to allow those NFCs to submit their data.

The period for re-submissions of corrected data subsequent to the Conformity Check was made specified from 11.06. to 29.06.2007.

To allow re-submissions of corrected data having failed the Conformity Check for monitoring periods from 2002 to 2004 access to the DSM was made possible for NFCs according to the following schedule:

- 2002 Monitoring Data: 15.02.-01.03.2007
- 2003 Monitoring Data: 26.03.-06.04.2007
- 2004 Monitoring Data: 26.04.-10.05.2007

Exceptional re-submissions for corrected data had to be allowed until 10.07.2007.

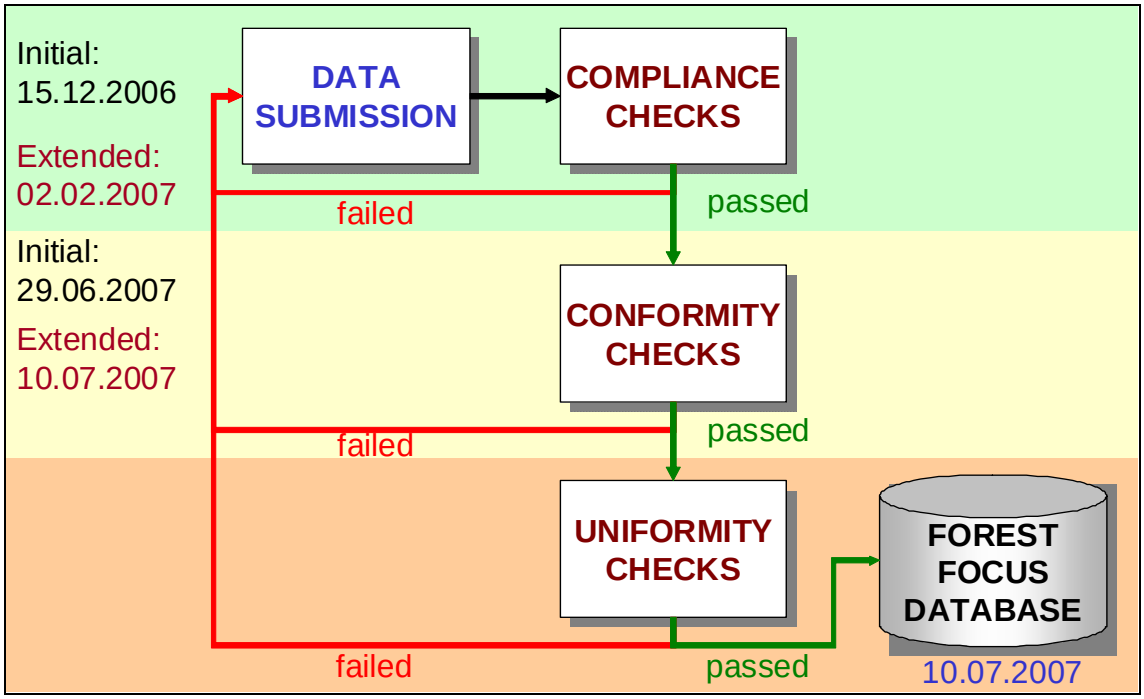

Figure 2: Data Validation Schedule for 2005 Data

3.2 Submission Status

Since the start of Forest Focus the number of submitted surveys has steadily increased from year to year. The total number of surveys submitted by 28 NFCs for Forest Focus monitoring years as received by July 2007 is as follows:

- 2002: 127
- 2003: 151 (+19% over 2002)
- 2004: 175 (+16% over 2003)
- 2005: 194 (+11% over 2004)

One of the reasons for the increase is that the data were collected more widely for the recently introduced surveys on Litterfall, Ozone Injury and Phenology and compared to 2004, a relative high number of NFCs (26) submitted data from the Foliage survey.

The number of surveys submitted by NFC for 2005 is as follows:

11 surveys:	France, Germany, Italy
9 surveys:	Denmark, Hungary, Spain
8 surveys:	Greece, Lithuania, Luxembourg
7 surveys:	Belgium-Flanders, Cyprus, Finland, Switzerland
6 surveys:	Austria, Belgium-Wallonia, Bulgaria, Czech Republic, Ireland, Slovak Republic, Slovenia, United Kingdom
5 surveys:	Norway, Poland, Romania, Sweden
4 surveys:	Estonia, Latvia

An overview of the status of data submitted by NFC by 10.07.2007 is given in Figure 3.

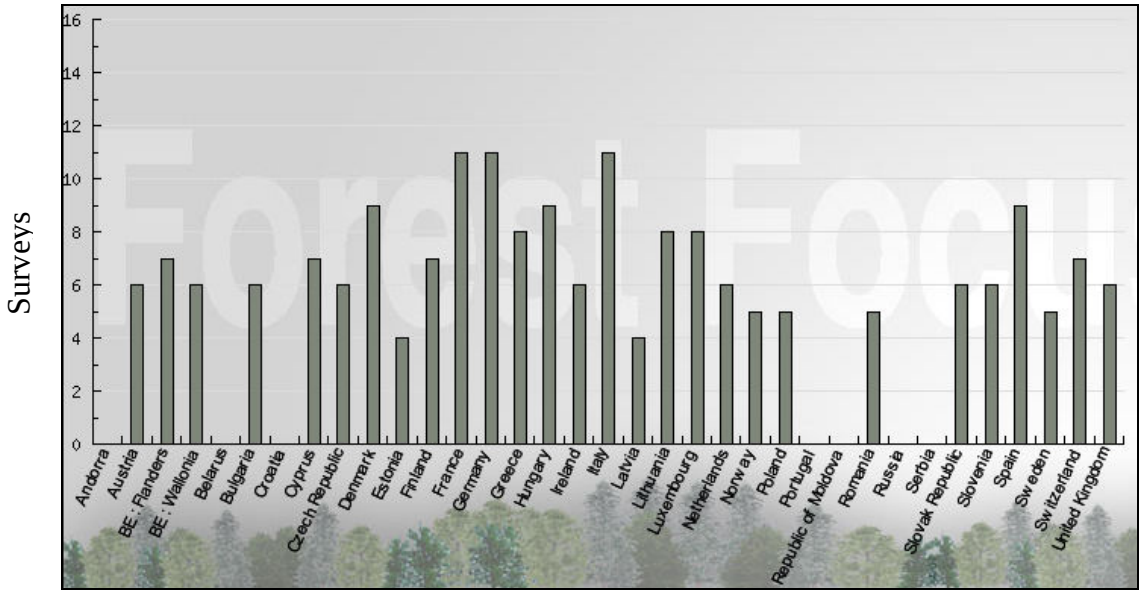

Figure 3: Number of Submitted Surveys by NFC (2005 Monitoring period, Status 10.07.2007)

A comparative representation of the number of surveys submitted by NFCs for the monitoring year 2002, 2003, 2004 and 2005 is given in Figure 4.

A number of surveys require annual data submission, such as Crown Condition, Soil Solution, Deposition or Meteorology. Data from the annually core surveys, the Crown Condition and the Deposition, were submitted by 28 NFCs. Continuous measurements for the annual Soil Solution survey were submitted by 24 NFCs. For the Meteorology survey data were submitted by 21 NFCs.

Other surveys are conducted at certain periodic intervals but are mandatory nevertheless, such as Foliar Analyses, Forest Growth or Ground Vegetation. Compared to 2004, a relative high number of NFCs (26) submitted data from the Foliar Analysis survey. This could be explained by the bi-annual assessment interval and most of the NFCs started to collect data for the survey in odd years. Less frequently submitted than the main surveys were data from complementary surveys, such as Ozone Injury (6 NFCs), Air Quality (7 NFCs), Phenology (9 NFCs), or Litterfall (10 NFCs). Data from surveys with more than an annual assessments interval were also frequently submitted, e.g. Growth (16 NFCs) or Ground Vegetation (11 NFCs). No data were submitted for the Soil Condition survey. This survey has to be carried out every 10 years on a plot or at the time of installing a new plot. Given the installation dates and the number of new plots the absence of any data for the survey was noted as unusual.

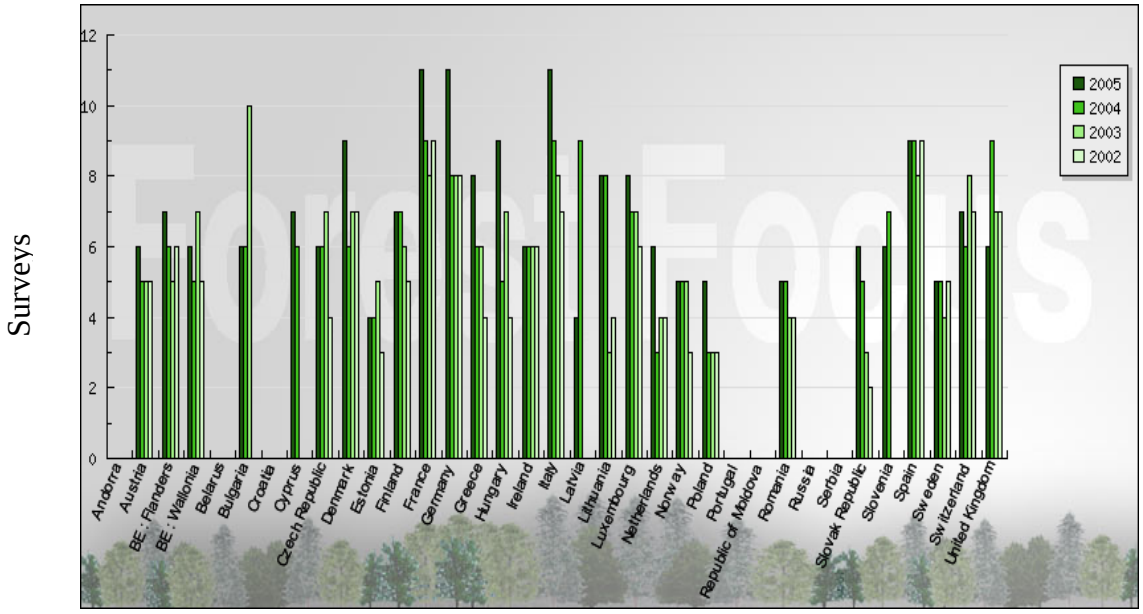

Figure 4: Number of Surveys Submitted by NFCs under Forest Focus for Monitoring Years 2002, 2003, 2004 and 2005

4 PROCESSING OF 2005 MONITORING DATA

The validation of 2005 Level II data was performed after submission until mid-July 2007. Because the validation of a given year is based on validated data from preceding monitoring years prior to this validation stage NFCs were encouraged to re-submit corrected data for those surveys which have failed the Conformity Check for monitoring periods from 2002 to 2004. The Web-site for data submissions was opened for periods published at the beginning of 2007 to allow re-submitting corrected data in temporal sequence of the monitoring year. Before each data correction period the NFCs were informed about the status of the data following the Conformity Check.

For reasons imposed by the processing system only data from previously submitted surveys could be corrected during those periods. Due to the nature of the checks, including time-series analysis, data correction periods could not be combined into a single period and had to be defined separately for each monitoring year.

4.1 Compliance Status

The status of data Compliance of all surveys submitted by NFCs at the end of the last submissions processed for 2005 (10.10.2007) is summarized in Table 1.

A total of 194 surveys have been submitted of which 71 surveys (37 %) are tested OK and complete, while 73 % of the surveys are tested compliant, but are subject to a condition outside the norm.

Positively noted should be the lack of forms tested with error(s) for the submission process for 2005 data, especially in comparison to 2004 where the Compliance Check detected errors in several surveys. This encouraging development is attributed to the following conditions:

- the Forest Focus Data Submission Workshop held at the JRC at the 14th - 15th November 2006,
- the intensive support given to NFCs in response to questions related to data submission by the Consortium and the JRC,
- further customisation to the web-based DSM,
- effects of the direct quality assurance from former monitoring years,
- and modifications of the checking system, for example allowing a floating comma to be used for several variables.

Table 1: Compliance Status by Survey and NFC for the Year 2005

Country	Survey												
	SI	CC	SO	SS	FO	GR	DP	MM	GV	PH	AQ	OZ	LF
Austria	-	W	-	O	O	W	W	W	-	-	-	-	-
BE : Flanders	-	W	-	W	W	-	W	W	-	W	-	-	W
BE : Wallonia	-	O	-	O	O	W	W	O	-	-	-	-	-
Bulgaria	-	W	-	-	W	W	W	-	O	-	-	-	W
Cyprus	-	O	-	O	O	O	O	O	-	-	O	-	-
Czech Republic	-	O	-	O	O	W	W	O	-	-	-	-	-
Denmark	O	W	-	W	O	W	W	W	O	-	-	-	O
Estonia	-	W	-	W	O	-	W	-	-	-	-	-	-
Finland	W	W	-	W	W	-	W	W	W	-	-	-	-
France	-	W	-	O	O	W	W	W	O	W	W	O	W
Germany	-	O	-	O	O	W	W	O	O	O	O	O	W
Greece	O	W	-	W	O	W	W	W	-	-	-	-	O
Hungary	W	O	-	-	W	W	W	W	W	W	-	W	-
Ireland	W	W	-	W	W	-	W	W	-	-	-	-	-
Italy	W	O	-	O	O	W	W	O	O	W	W	W	-
Latvia	-	O	-	O	O	-	O	-	-	-	-	-	-
Lithuania	-	O	-	O	W	W	W	-	-	-	W	W	W
Luxembourg	-	W	-	-	O	-	W	W	O	W	W	-	W
Netherlands	-	W	-	W	W	W	W	-	W	-	-	-	-
Norway	-	W	-	W	O	-	W	-	O	-	-	-	-
Poland	-	W	-	O	O	W	O	-	-	-	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	-
Romania	O	W	-	-	-	-	W	-	-	W	-	-	W
Slovak Republic	-	W	-	O	O	W	O	O	-	-	-	-	-
Slovenia	-	W	-	O	W	-	W	W	-	W	-	-	-
Spain	O	O	-	O	W	W	W	W	-	O	-	-	W
Sweden	-	O	-	W	-	-	W	W	W	-	-	-	-
Switzerland	-	W	-	W	W	-	W	W	-	-	W	W	-
United Kingdom	O	W	-	O	O	-	W	W	-	-	-	-	-
TOTAL	**9**	**28**	**0**	**24**	**26**	**16**	**28**	**20**	**11**	**9**	**7**	**6**	**10**
Relative OK	**56%**	**36%**	**-**	**58%**	**62%**	**6%**	**14%**	**30%**	**64%**	**22%**	**29%**	**33%**	**20%**
Relative OK, OK with Warnings	100 %	100 %	-	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %	100 %

Status: 10.10.2007

O	= OK	W	= OK with warnings	E	= Errors detected

4.2 Conformity Status

The test routines used for the Conformity Check detect unlikely values for a defined data range (outside approximately 95% of cases). The range limits were mostly derived from the Level II legacy data validated by the Forest Intensive Monitoring Coordinating Institute (FIMCI) and from expert knowledge. Therefore, a value outside the ranges does not necessarily signify that a value is erroneous and should be rejected. The NFCs are asked to pay attention to those values and state if the values are accurate and should be treated outliers, or if the data need corrections and have to be re-submitted.

At the end of the Conformity Check NFCs were informed about any problems encountered when subjecting the data to the tests. Each NFC received an automatically generated detailed status report, in which the problems found were presented. A request for correction(s) and/or confirmation(s) was included in the report. Corrected and re-submitted data were re-processed and the new status determined.

Of the of 192 surveys processed from 28 NFC (187 surveys for 27 countries [2]) 142 surveys from 26 NFCs (138 surveys from 25 countries) were found to pass the check. The lowest level of Conformity was achieved by the Growth survey (53.3%), followed by the surveys for Meteorology (66.7%) and Soil Solution (69.6%), while the System Instalment and Litterfall survey reached an overall level exceeding 85%.

A summary of the general Conformity status of the surveys for 2005 is:

- >=85 System Installment, Litterfall
- >=80 - <85% Ground Vegetation, Ozone Visible Injury
- >=75 - <80% Foliar, Deposition, Phenology
- >=70 - <75% Crown Condition, Air Quality
- >=65 - <70% Meteorology, Soil solution
- <65% Growth

The status of the surveys after the Conformity Check is summarized in Table 2.

For the 3 Monitoring years 2003, 2004 and 2005, a total of 505 surveys have been submitted of which 383 surveys (75.8 %) could be declared Conform. The results by monitoring year are graphically presented in Figure 3.

In total 3565 tests were performed on the surveys. The surveys passed nearly 81% (2003: 80%, 2004: 82%, first processing) of the tests. The results of tests with warnings or errors were communicated to the NFCs concerned for verification of the situation or correction of any erroneous data. The various tables describing the analysis made by country may be consulted in the *Technical Report 2005 Level II Data* (Hiederer, *et al*, 2007f).

[2] Belgium accounts for 2 NFCs (Wallonia and Flanders submitted 5 common surveys).

Table 2: Data Conformity Status for each Survey by NFC for the Years 2003, 2004 and 2005

Year 200-	SI			CC			SO			SS			FO			GR			DP			MM			GV			PH			AQ			OZ			LF			TOTAL 2005
	3	4	5	3	4	5	3	4	5	3	4	5	3	4	5	3	4	5	3	4	5	3	4	5	3	4	5	3	4	5	3	4	5	3	4	5	3	4	5	
AT				✓	✓	✓				✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓																6
BE	✓	✓		✓	✓	x				✓	✓	✓	x		✓		✓	x	✓	✓	✓	✓	✓	✓	✓				✓	✓									✓	8
BG	✓			✓	✓	✓	✓			✓	✓		✓		✓			✓	x	✓	✓	x	✓		x		✓				✓	✓					✓	✓	✓	6
CH				✓	✓	x				✓	✓	✓	✓		✓				✓	✓	✓	✓	✓	✓	✓							✓	✓	✓	✓	✓	✓				7
CY		✓			✓	✓						✓			✓			✓		✓	✓		✓	✓		✓						✓	x							7
CZ	✓	✓		x	x	x				x	x	x	x		x			x	x	x	x	x	x	x	✓	✓														6
DE	✓	✓		x	x	x				x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x			✓			x			✓			x	10
DK	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓		✓			✓	x	x	✓	x	✓	✓			✓										✓	✓	✓	9
EE	✓			✓	✓	✓				✓	✓	✓	✓		✓		✓		✓	✓	✓																		4
ES			✓	✓	✓	✓				✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓		✓	✓				✓	9
FI		✓	✓	✓	✓	✓				✓	✓	✓	✓		✓		x		✓	✓	✓	✓	✓	x	✓	✓	✓													7
FR				✓	✓	✓				✓	✓	✓			✓	✓	x	✓	✓	✓	✓	✓	✓	✓			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	11
GR	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓		✓			✓	✓	✓	✓	✓	✓	✓								✓						✓	✓	8
HU			x	✓	✓	x							✓		x				✓	x	x	x	x	x	✓		✓	x	x	x				✓	✓	✓				8
IE	✓	✓	✓	✓	x	✓				x	x	x	✓	x	x				x	x	x	x	x	x															6
IT	✓	x	✓	✓	x	✓				✓	x	✓	✓		✓			x	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	✓		✓	✓				11
LT				✓	x	x				✓	✓	x		✓	✓			x	✓	✓	✓					✓						✓	✓		✓	x		✓	✓	8
LU				✓	✓	✓							✓		✓		✓		✓	✓	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	8
LV		✓			✓	✓		✓			✓	✓		✓	✓		✓			✓	✓					✓										✓				4
NL				x	x	x				x	x	x	✓		x			x	x	x	x						x												6
NO				✓	✓	✓				✓	✓	✓	✓		✓		x		✓	✓	✓				✓	✓	✓													5
PL				x	x	✓					x	✓			✓			x	x	x	✓				x															5
PT																																								
RO	✓	✓	✓	x	✓	✓													✓	✓	✓							✓	x	x							✓	✓	5
SE				✓	✓	✓				✓	✓	✓					x		✓	✓	✓	✓	✓	✓			✓													5
SI		✓			✓	✓					✓	x			✓					✓	✓		✓	✓		✓			✓	✓										6
SK				✓	✓	✓					x	✓			✓	x	x	✓	✓	x	✓			x		✓														6
UK	✓	✓	✓	x	✓	x				✓	✓	x	x		x		✓		✓	✓	x	✓	✓	x		x					✓	x			✓					6
Conform	11	12	8	17	21	19	1	1	0	15	16	16	13	4	19	2	6	8	17	19	21	11	15	12	7	9	9	4	6	7	6	9	5	4	8	5	4	7	9	138
Total	11	13	9	24	27	27	1	1	0	19	23	23	17	6	25	4	12	15	24	27	27	17	19	18	10	11	11	5	8	9	6	10	7	4	8	6	4	7	10	187
Relative (%)	100.0	92.3	88.9	70.8	77.8	70.4	100.0	100.0		78.9	69.6	69.6	76.5	66.7	76.0	50.0	50.0	53.3	70.8	70.4	77.8	64.7	78.9	66.7	70.0	81.8	81.8	80.0	75.0	77.8	100.0	90.0	71.4	100.0	100.0	83.3	100.0	100.0	90.0	**73.8%**

✓Data conform × Data not conform

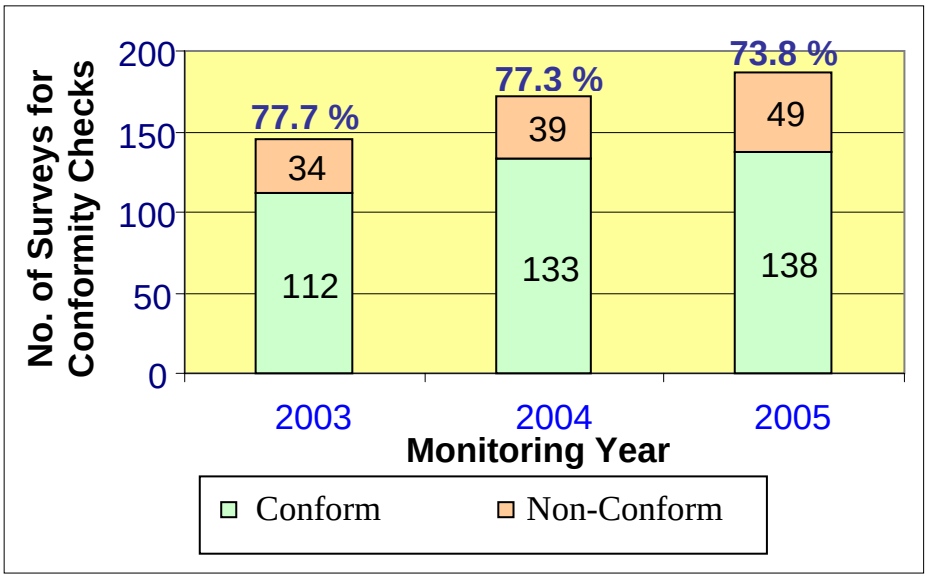

Figure 5: Number of Surveys Validated for Conformity by Country for 2003, 2004 and 2005 Monitoring Years

The range tests triggered many warnings, especially for measurements in the forms of the Meteorological surveys. In contrast to previous years where the proportion of range tests was higher than 90% of all messages, for data from the 2005 monitoring year the proportion of messages triggered by range tests (49.4%), and messages triggered by tests detecting temporal inconsistencies (45%) were approximately equal, although a high number of range test messages caused by new tests increased the total number of messages.

The development of new checks for the integrity of data between plot and data forms in the Air Quality and Phenology surveys produced a total of 7,357 new messages, of which 94% of were found in the Air Quality survey. The new tests verify in the Air Quality survey, if sample numbers which were used in the data file (AQM) also appear in the respecting plot files (PAC and PPS). A similar situation is found in the Phenology survey: species and tree numbers, which were submitted in the plot file (PLP) must also occur in the respecting data file. The cumbersome definition of the survey forms was addressed by providing guidelines on how to record data properly.

Besides the numerous warnings for values outside the ranges tests the most common warnings and errors were caused by:

- changes in static parameters, such as tree species;
- continuity of the change of variable values, such as age of tree;
- the treatment of missing values and values below the detection limits of the instrument used.

Most of the detected errors in changes of static parameter were due to the

occurrence of new trees on the plots, individual trees that changed species type over time, and changes in coordinates or altitudes. Reasons for these changes were that a plot or a tree was assessed the first time, the location of a plot had changed, or the previous submitted value was incorrect or measured with less accuracy, in particular plot co-ordinates.

Warnings concerning continuity of changes with an abnormal progression were found in data of the Growth Assessment survey; for instance that the diameter or the height is smaller than in the previous measurement. In many cases the data were corrected by the NFCs and re-submitted. However, some situations were also confirmed by NFCs following an unusual time interval between two measurements, incorrect measuring technique applied during previous assessments, or stem breaks.

4.3 Uniformity Status

The tests applied for the Uniformity Check provide an interpretation of temporal and spatial development of parameters. Only surveys passing the conformity checks are subjected to tests for Uniformity. The tests include an automatic procedure for generating tables, graphs and maps. Results are manually interpreted by experts. The findings are presented for selected parameters of the Crown Condition, Soil Solution and Deposition surveys.

4.3.1 Crown Condition

The annual data ob defoliation is mapped for the 6 tree species (*Pinus sylvestris*, *Picea abies*, *Fagus sylvatica*, *Quercus robur* and *Q. petrea*,). The resultant maps show those plots where at least 3 trees of the respective tree species were assessed in the reporting year. For each plot, defoliation is classified according to 6 classes (0-10%, 11-20%, 21-30%, 31-40%, 41-50%, 51-100% mean defoliation).

- ***Pinus sylvestris***

Mean plot defoliation of *Pinus sylvestris* is shown in Figure 6. The density of plots with validated mean defoliation data is highest in southern Sweden and in Poland. The majority of the Swedish plots show a mean defoliation between 0 and 20%, in Poland between 20 and 40% but there are also several plots showing defoliation up to 50%. Defoliation on plots in Finland, Norway, Estonia, Latvia, Slovenia, France and Austria is mainly below 20%. Higher levels of defoliation were reported for plots in the Slovak Republic and Spain ranging from 21% to 40%. For two plots located in Austria defoliation between 31% and 50% was detected.

The degree of defoliation on Level II plots in Sweden and Poland compares closely with those found for Level I plots in those regions. The difference between Poland with a higher mean defoliation than in southern Sweden is also visible on the Level I plots (Lorenz, *et al.*, 2006). Furthermore, for a few Level I plots in southern Sweden defoliation exceeds the values found at Level II plots, ranging up to 51% to 100%.

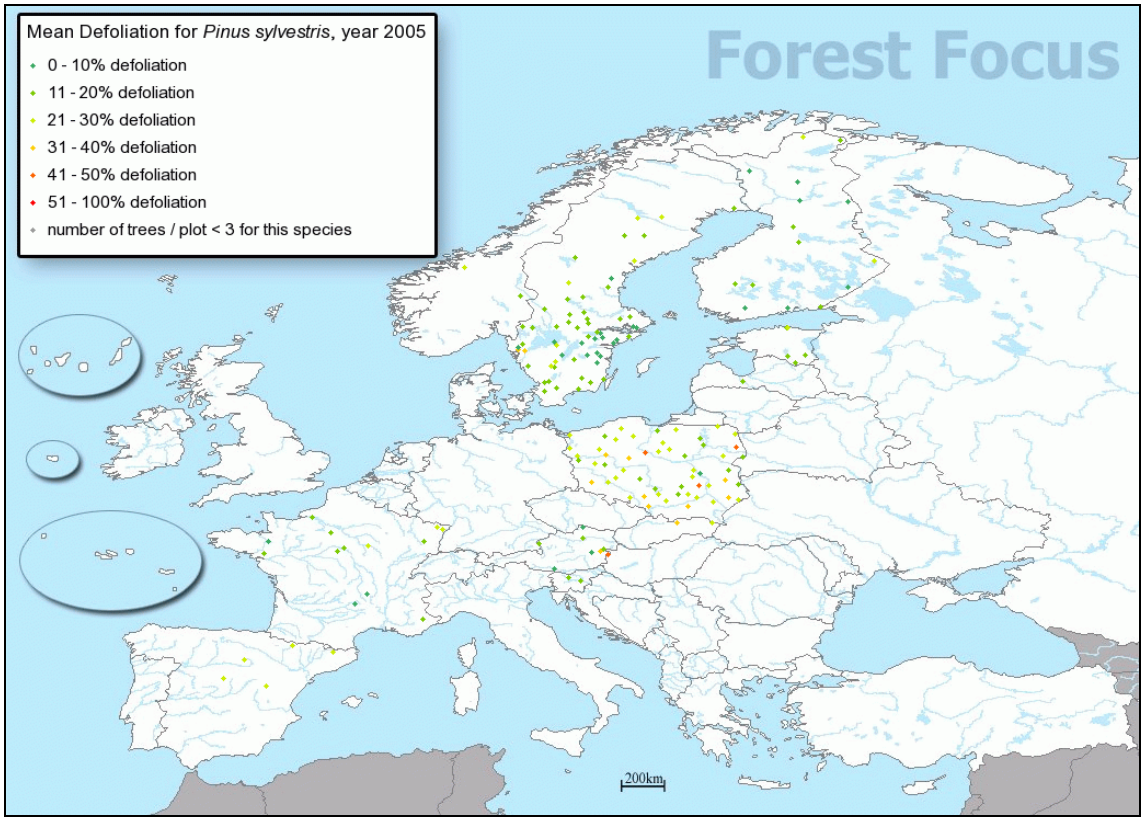

Figure 6: Mean Defoliation of Pinus sylvestris

- ***Picea abies***

The results of mapping mean plot defoliation of *Picea abies* are given in Figure 7.

For this species the highest density of plots is found in southern Sweden, Denmark, southern Norway and Austria. On most plots of these plots the mean defoliation is below 21% and only in a few cases up to 30%. A comparable situation was be found for most other plots. For a few plots in Slovenia, Czech and Slovak Republic higher levels of defoliation were observed, ranging from 31 to 50%. In areas with high density of Level II plots these results are comparable to those described for the Level I plots for the year 2005 (Lorenz *et al.*, 2006). One obvious exception is the relatively low mean defoliation in the southern parts of Norway, Sweden and Finland. In these regions the variance defoliation on the Level I plots is much higher than found on Level II plots in those regions. The selective nature of the Level II plots could explain the discrepancy in the observed conditions.

- ***Fagus sylvatica***

A map depicting mean defoliation of *Fagus sylvatica* is shown in Figure 8. Mean defoliation for the species is lowest on plots in Austria and in Zealand (Denmark) with less than 10% on most of the plots. The highest levels of defoliation of up to 50% are found on some plots in the Slovak Republic and in France. For the majority of plots the

level of defoliation varies between 11 and 30%. Where the location of Level II plots allows a comparison with results from plots of the Level I survey, the defoliation found on Level II plots is confirmed by the results of the survey at Level I.

- ***Quercus robur and Qu. petraea***

Mean plot defoliations of *Quercus robur* and *Qu. petraea* in 2005 is depicted in Figure 9. For these species the small sample of Level II plots shows a wide range in the level of defoliation. For a number of Level II plots in Spain, Slovak Republic and Slovenia relatively low values of defoliation below 30% were observed. Higher levels of defoliation in 2005 were reported for plots located in Denmark, Poland, Hungary, Italy, France, and the southern part of Sweden, ranging between 31 and 50%. There is also one plot with more than 50% defoliation in southern Sweden. Due to the limited geographic spread and the high spatial variation a comparison with the results of the assessment on Level I plots would be inappropriate. But nevertheless the trend of a slight increase of defoliation on Level II plots since 2004 could be detected, similar to the observations on the Level I plots at least for some regions, in particular the Sub-Atlantic region.

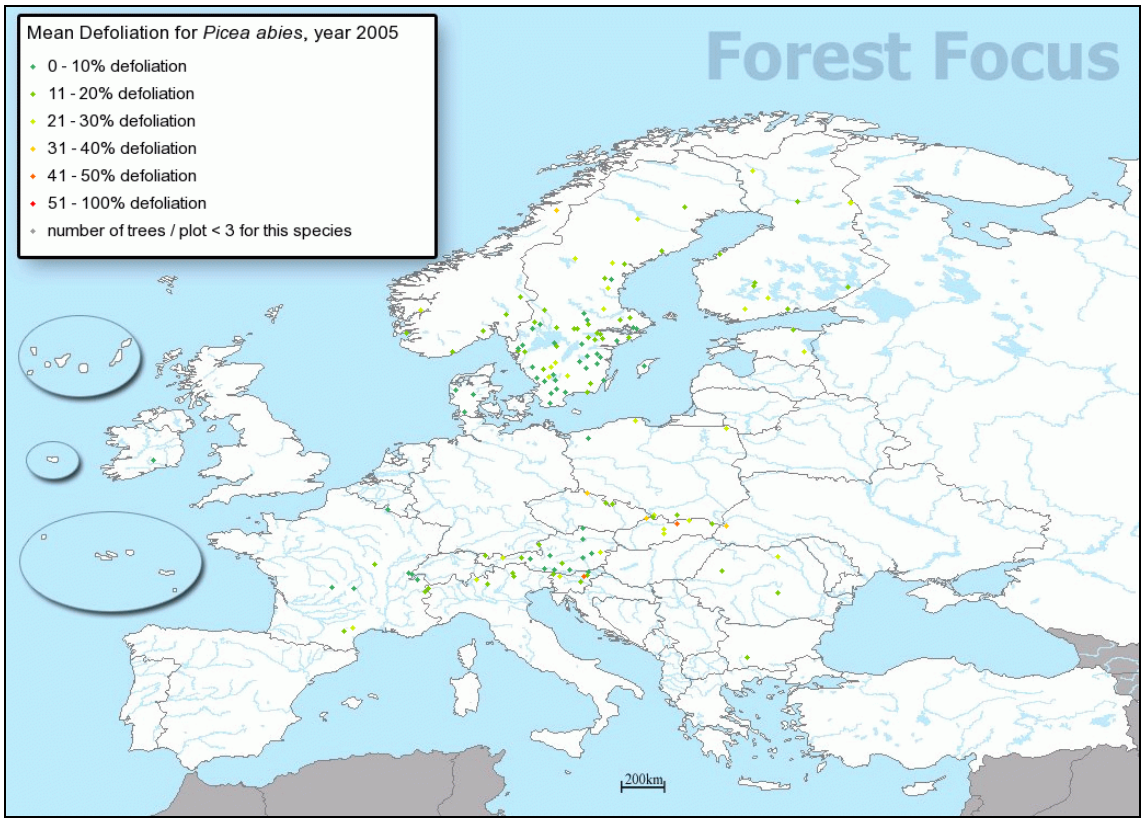

Figure 7: Mean Defoliation for Picea abies

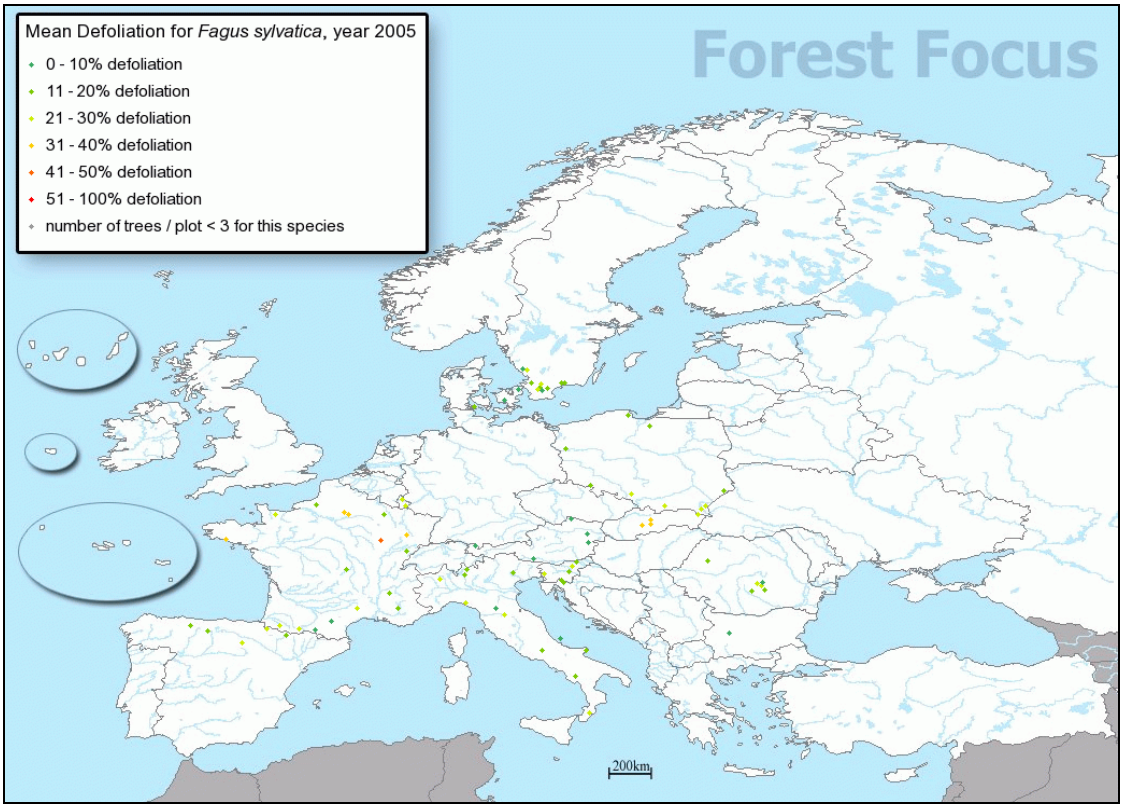

Figure 8: Mean Defoliation for Fagus sylvatica

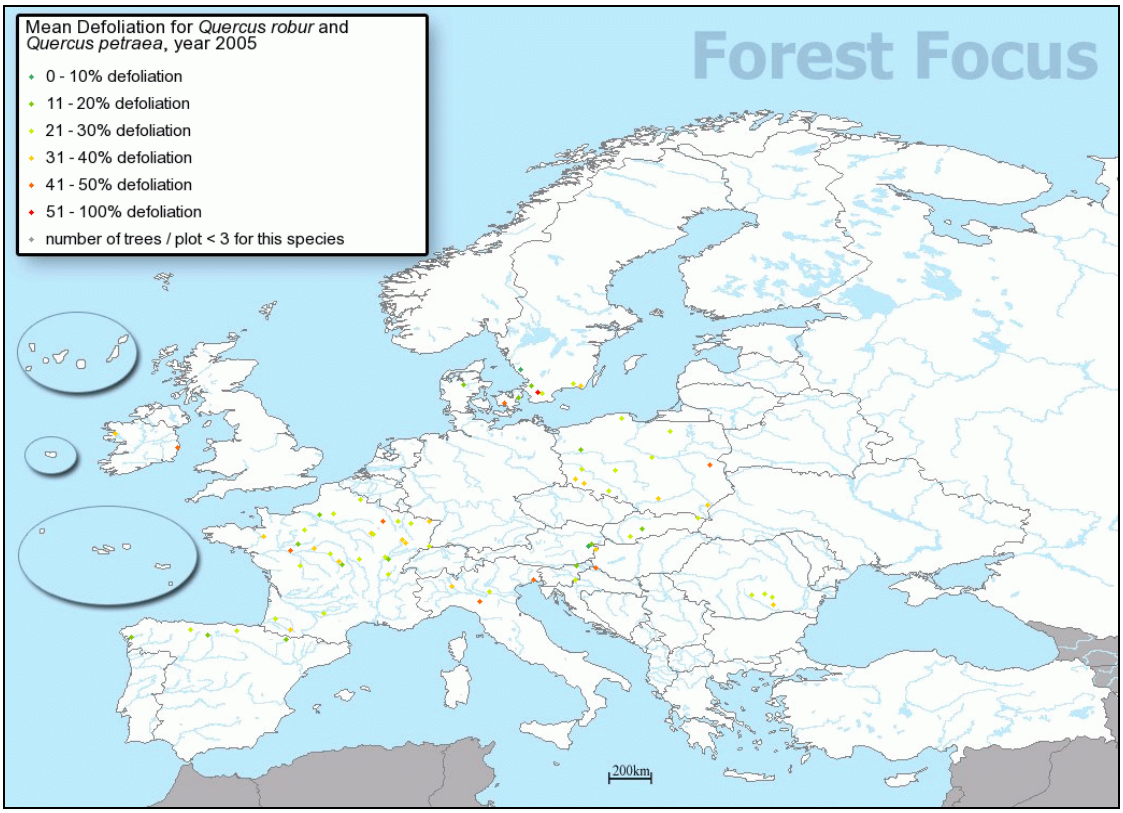

Figure 9: Mean Defoliation for Quercus robur and Qu. petraea

4.3.2 Soil Solution

For identifying the validity of concentrations of the three soil solution compounds sulphur ($S\text{-}SO_4$) and nitrogen ($N\text{-}NO_3$ and $N\text{-}NH_4$) changes in the values reported for previous monitoring years are assessed. The difference between the time-weighted mean concentration in the reporting year and the average of the weighted mean concentration of the five preceding years is evaluated as part of the tests. Not all Soil Solution data stored in the FFMDb are necessarily mapped. For plots displayed on the map the following conditions apply:

- the sample has to be taken from the mineral soil layer;
- the layer depth must be at least 30 cm;
- the total sample period must be more than 300 days.

- ***SO4 Concentration***

The corresponding data for 2005 for the compound $S\text{-}SO_4$ is presented in Figure 10.

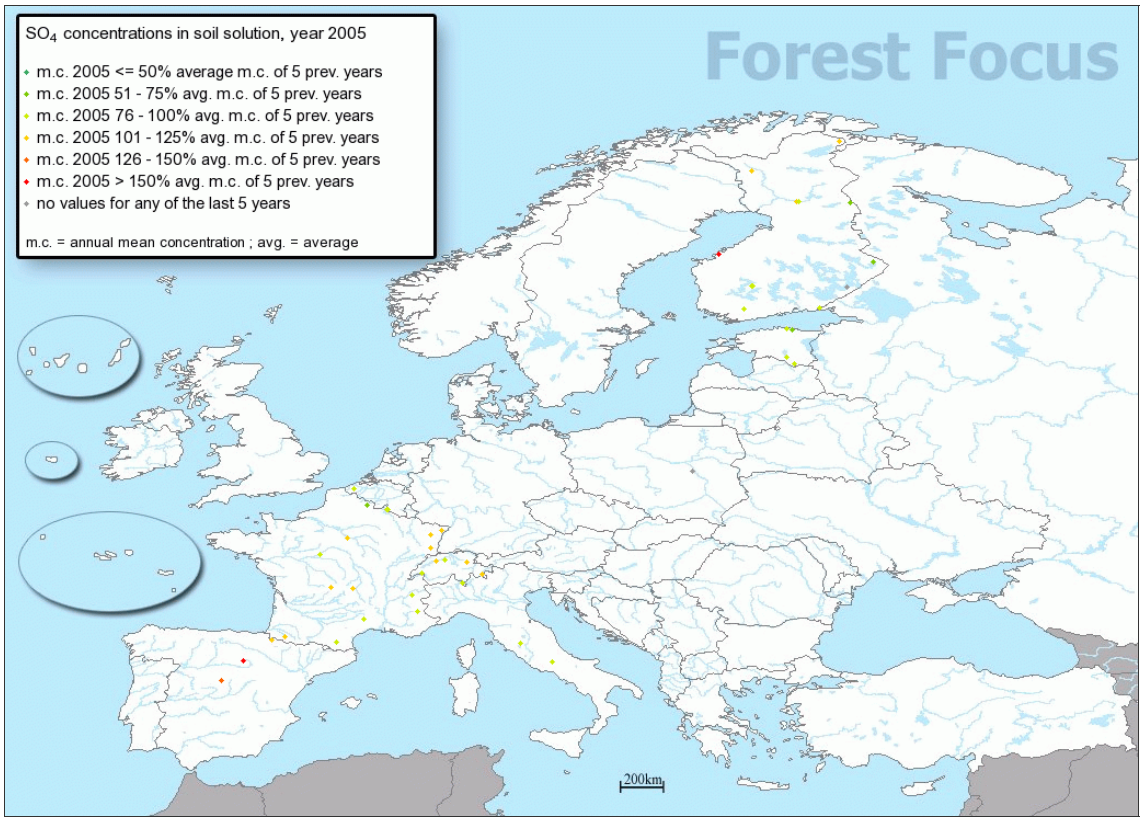

Figure 10: SO_4 Concentrations in the Soil Solution

For the majority of plots with compliant data the $S\text{-}SO_4$ concentrations show a slight increase between 101% and 125% of the average concentration measured for the previous five years. For a limited number of plots in Finland and in Spain the reported concentrations are more than 150% of the average concentration

measured for the previous five years. Conversely, concentrations below 50% were observed for one plot located in Italy.

- ***NO3 Concentration***

The concentrations of $N\text{-}NO_3$ are mapped in Figure 11. In most countries a clear trend of the development of the $N\text{-}NO_3$ concentration is visible on the plots surveyed, although it is not uniform between plots. The majority of nitrate concentrations observed in Norway and on plots located in Belgium, Poland, Spain and Italy are below 50% of the average concentration measured for the previous five years. For several plots in Finland, Switzerland and Italy $N\text{-}NO_3$ concentrations between 51% and 125% were reported. Plots with nitrogen concentrations above 150% were found for most plots in the France, but also on plots in Switzerland, Finland and Norway, Spain and Estonia.

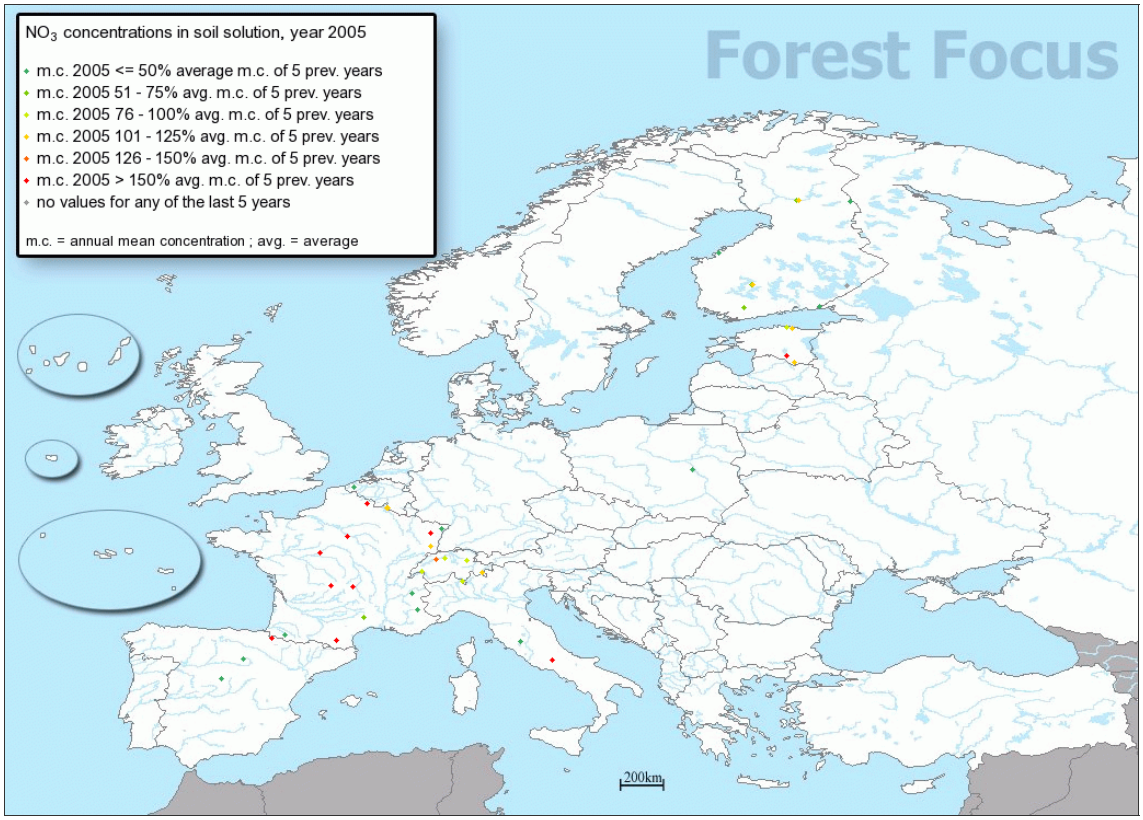

Figure 11: NO_3 Concentrations in the Soil Solution

- ***NH4 Concentration***

A high variability of $N\text{-}NH_4$ concentrations than for $N\text{-}NO_3$ was detected for plots in Finland and France, mainly in the range of 51% and above 150% of the average concentration measured for the previous five years. For five plots located in France an increase in concentrations above 150% was reported, whereas on four plots the concentration decreased below 75% of

the previous mean. In southern Finland four plots show a slight increase in the average concentration, whereas plots in northern Finland tend to have lower concentrations. For the plots located in Switzerland the N-NH_4 concentrations are below 100% of the average concentration measured for the previous five years.

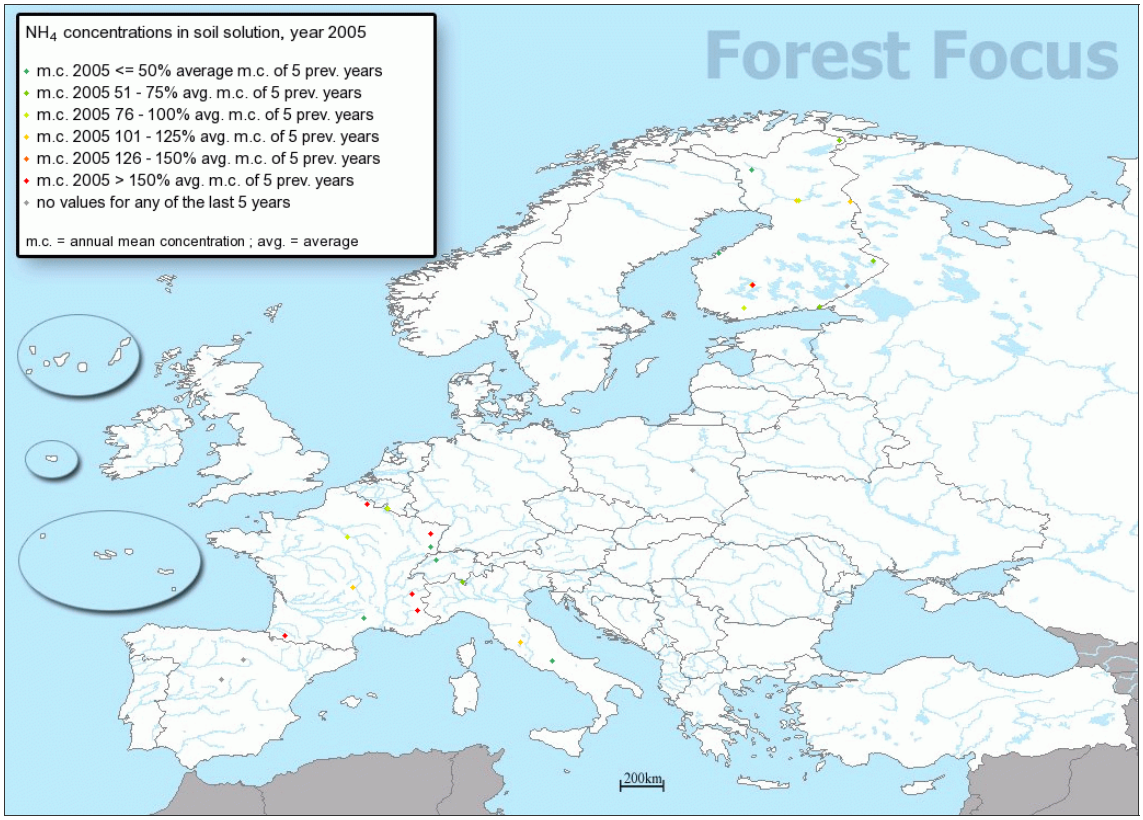

Figure 12: NH_4 Concentrations in the Soil Solution

4.3.3 Deposition

Validating Uniformity for data of the Deposition survey is based on contrasting the values reported for S-SO_4, N-NO_3 and N-NH_4 in two series of maps. The first series shows the plot-wise quantity weighted (volume of sampled precipitation) mean concentration of bulk deposition for S-SO_4, N-NO_3 and N-NH_4 in mg/l for the particular reporting year. The calculations of a quantity weighted mean concentration is necessary, because various instances of periodic measurements are submitted for a particular year. The calculations are only applied to data of plots for which data were submitted for at least 300 days (plot specific sum of period lengths in the PLD form).

Within the interpretation, precipitation of the respective year has to be taken into account as a major additional influence on the concentrations. The purpose of this second series of maps is intended to reveal sudden changes in concentrations of the depositions related

to the amount of water (quantity of precipitation) in the bulk deposition.

- ***S-SO4 Concentration***

The quantity-weighted mean S-SO_4 concentrations in bulk deposition for 2005 are given in Figure 13. Plots with comparatively high S-SO_4 values are found generally on plots in Poland and more scattered in Belgium, Slovak Republic, Denmark, Bulgaria, Greece and Italy and Cyprus. The highest value from 20.7 mg/l is caused by a single plot in Poland with high deposition rates also for calcium and potassium especially in the winter periods. However, all measured values for this plots are not exceeding the maximum range value in the single parameter tests. Lower sulphate concentrations ranging from 0.14 to 0.78 mg/l were reported for plots located in the Baltic States, Switzerland, France, Austria, Italy, and Slovenia, lowest.

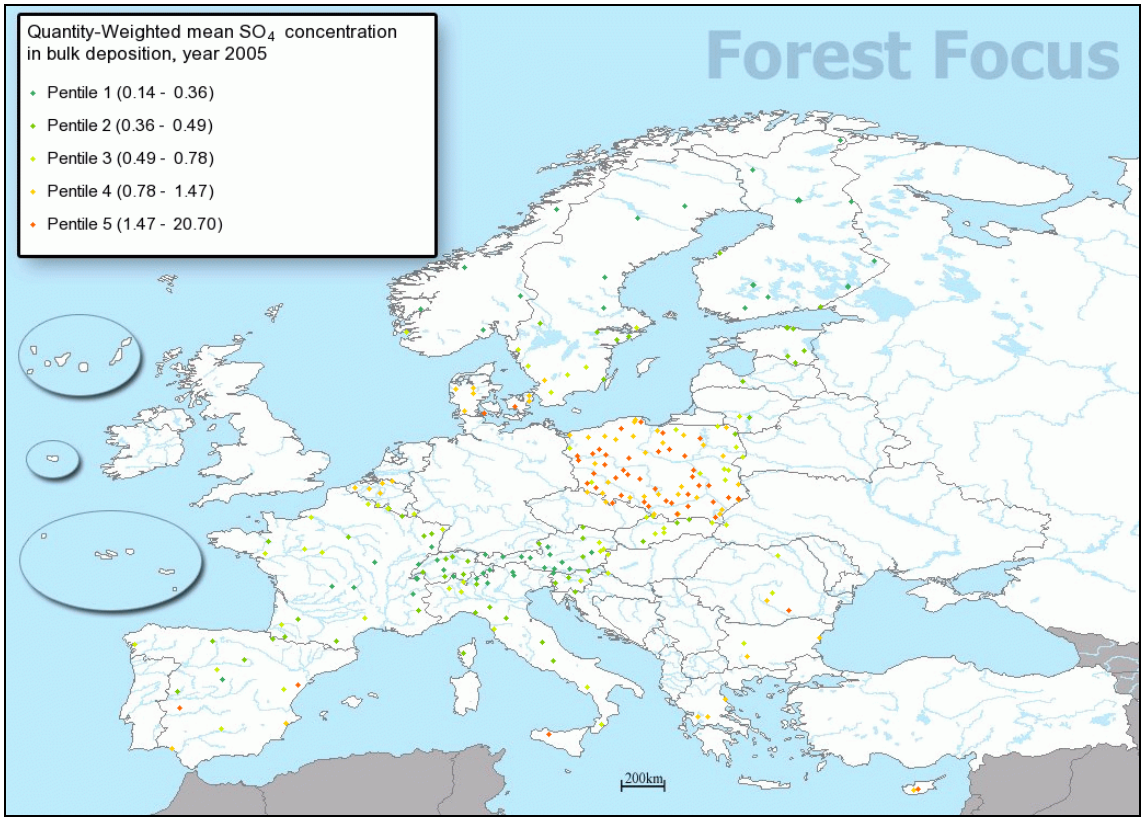

Figure 13: Quantity-Weighted Mean SO4 Concentration in Bulk Deposition

- ***N-NO3 Concentration***

The quantity-weighted nitrogen concentrations in bulk deposition are shown in the Figure 14. The spatial pattern of these data is similar to those of the sulphur concentrations. The lowest values were observed with prevalence on plots in alpine regions and northern Europe, although some plots in other regions were assigned to the lowest percentile as well. The

highest N-NO_3 concentrations ranging from 0.65 to 8.25 mg/l were observed for the majority of plots in Poland, several plots in Denmark and Spain, on two plots in Belgium, Lithuania and Italy

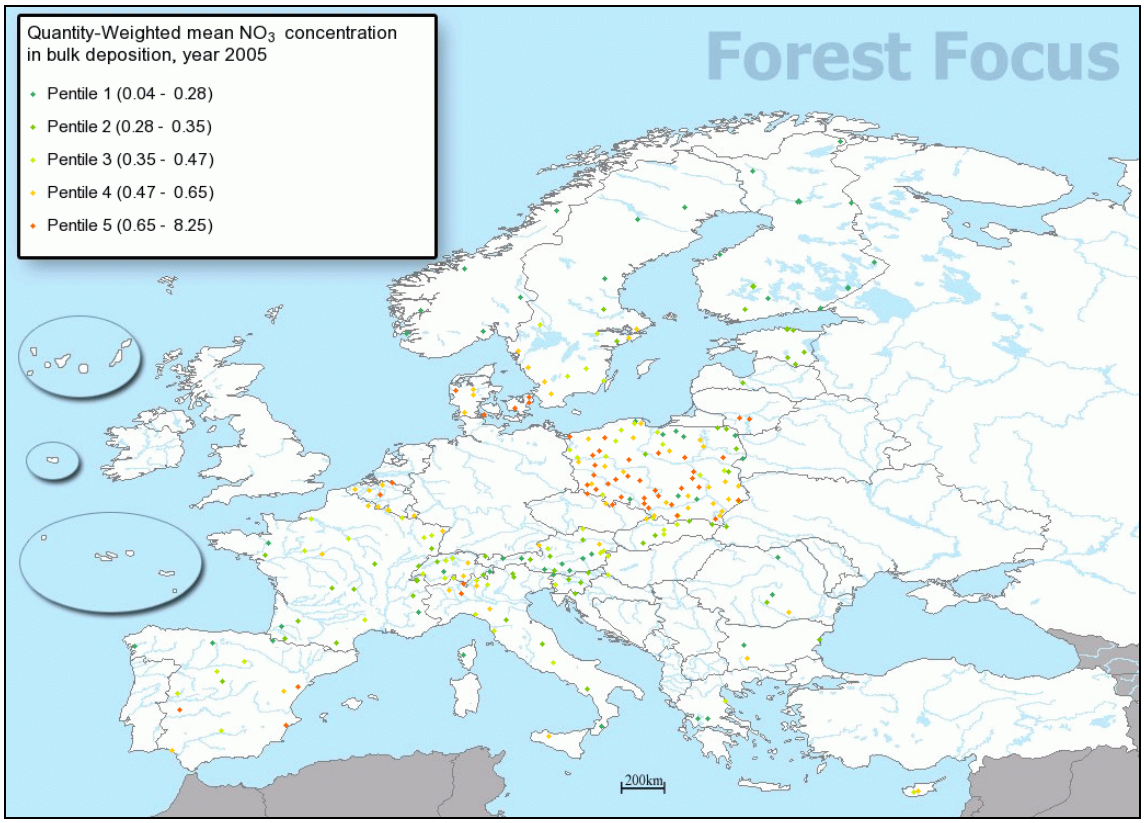

Figure 14: Quantity-Weighted Mean NO_3 Concentration in Bulk Deposition

- ***N-NH4 Concentration***

Concentrations of N-NH_4 in bulk deposition are presented in Figure 15. High concentrations of N-NH_4 were measured on most plots in Poland within the range of 1.45 to 7.80 mg/l. For plots in most other regions considerably lower concentrations were reported. Comparatively low ammonium concentrations in comparison to the nitrate concentrations could be found on several plots in Italy, while the opposite situation is found for plots in Romania.

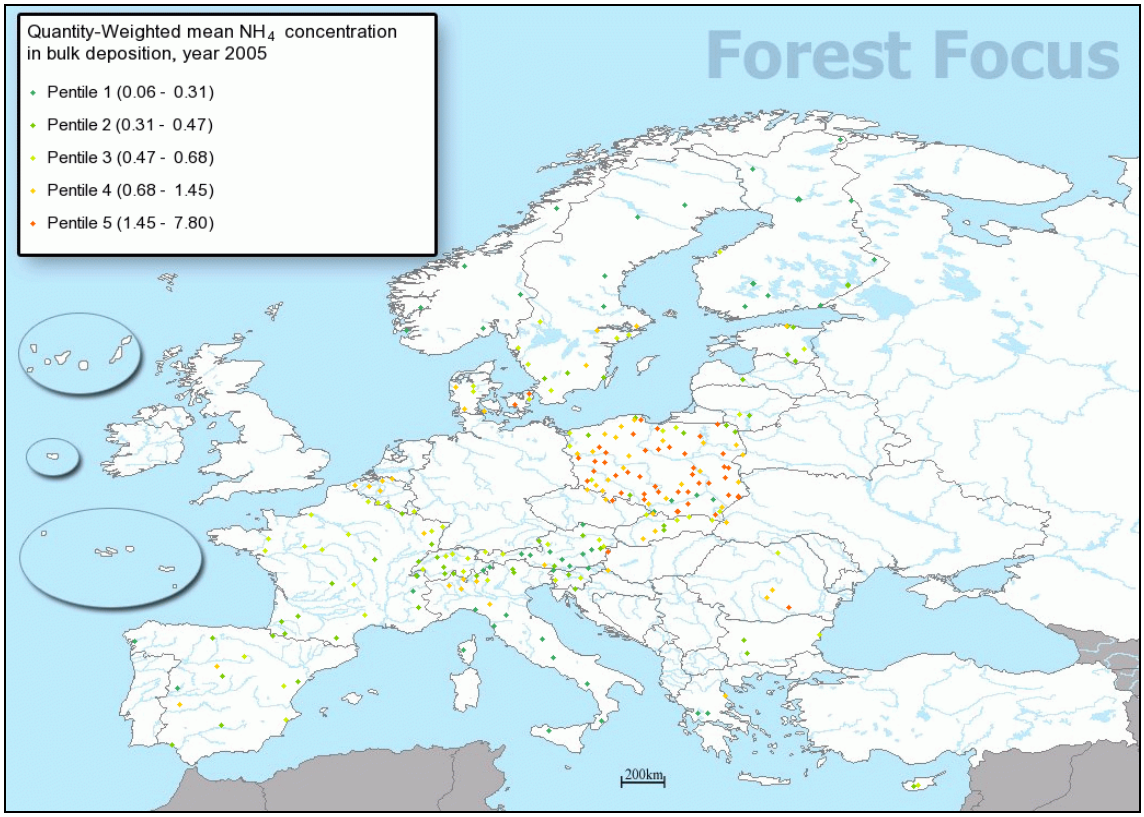

Figure 15: Quantity-Weighted Mean NH_4 Concentration in Bulk Deposition

- ***Deviations in the Quantity-Weighted Mean Depositions***

The data for deviations in the quantity-weighted mean depositions of the monitoring year 2005 from the average deposition reported over the previous five years are mapped for the three selected parameters in Figure 16 (S-SO_4), Figure 17 (N-NO_3) and Figure 18 (N-NH_4). A very irregular distribution of the development is discernible for many plots in Poland. For the majority of these plots the values range between 76% and 125% for S-SO_4 but for several plots an increase in concentrations above 150% in the western parts of the country was observed. Such increases are also reported for a plot in Sicily and two plots in Spain. A decrease in the deposition was reported for plots largely located in eastern Poland, Italy, Slovak Republic, Lithuania, Romania and Bulgaria.

For the most part concentrations of for N-NH_4 and N-NO_3 increased on Level II plots. Many of the plots with a strong increase are located in Poland, although this picture is biased by the relatively dense network of plots with measurements. Marked increases are also found on plots in very diverse regions, such as southern Sweden and Spain.

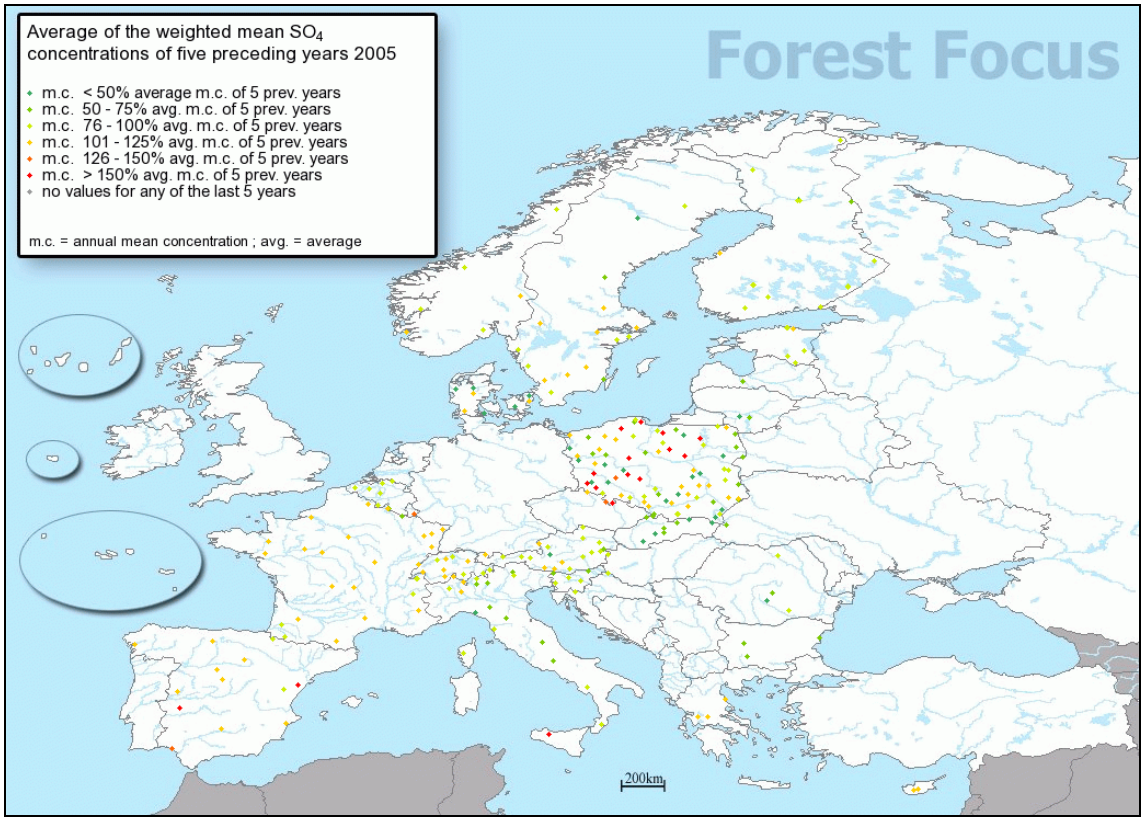

Figure 16: Average of the Weighted Mean SO_4 Concentration of 5 Preceding Years

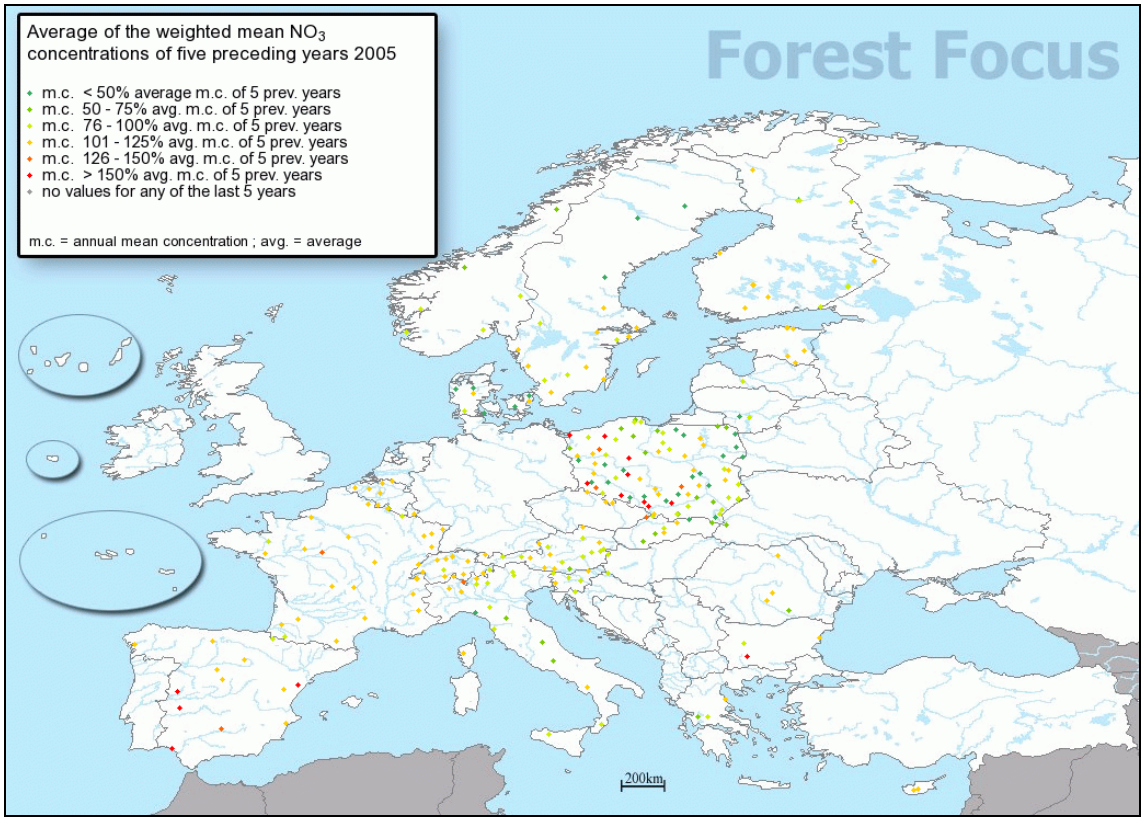

Figure 17: Average of the Weighted Mean NO_3 Concentration of 5 Preceding Years

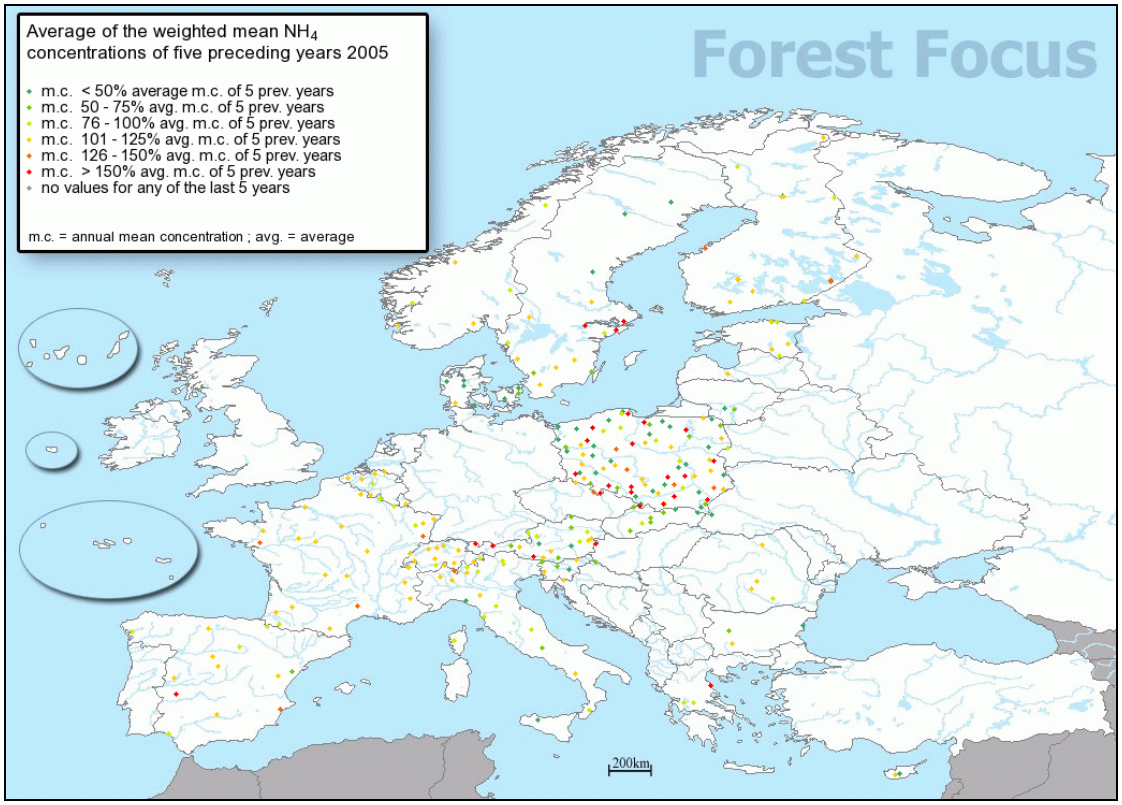

Figure 18: Average of the Weighted Mean NH_4 Concentration of 5 Preceding Years

4.4 Data Stored in Forest Focus Monitoring Database

In total 137 surveys from 25 countries (142 surveys from 26 NFCs) could be transferred to the FFMDb. Relative to the number of surveys submitted the transfer rate is 74%. The rate is a marked increase compared to the first submission phase of the 2004 data, when only 48% of the surveys (73 of 151 submitted surveys) could be declared fully validated and inclided in the FFMDb.

In 74 cases the surveys were uploaded despite the identification of warnings or errors during the Conformity Check, because the situation could be verified and confirmed or corrected by the NFC concerned. For 11 countries all submitted surveys could be transferred to the FFMDb: Austria, Bulgaria, Denmark, Estonia, France, Greece, Latvia, Luxembourg, Norway, Spain and Sweden. No survey could be uploaded into the FFMDb for Czech Republic and The Netherlands due to a missing reaction to the Conformity Check report in time for the surveys to be included in the validation campaign.

A summary of all surveys successfully validated for the 2005 monitoring year and transferred to the FFMDb is given in Table 3.

Table 3: Surveys uploaded to the FFMDb after Validation Checks

Country	Survey													Rel.
	SI	CC	SO	SS	FO	GR	DP	MM	GV	PH	AQ	OZ	LF	%
Austria		✓		✓	✓	✓	✓	✓						100.0
Belgium*				✓	✓		✓	✓		✓			✓	75.0
Bulgaria		✓			✓	✓	✓		✓				✓	100.0
Cyprus		✓		✓	✓	✓	✓	✓						85.7
Czech Republic														0.0
Denmark	✓	✓		✓	✓	✓	✓	✓	✓				✓	100.0
Estonia		✓		✓	✓		✓							100.0
Finland	✓	✓		✓	✓		✓		✓					85.7
France		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	100.0
Germany										✓		✓		18.2
Greece	✓	✓		✓	✓	✓	✓	✓					✓	100.0
Hungary									✓			✓		22.2
Ireland	✓	✓												33.3
Italy		✓		✓	✓		✓	✓	✓	✓	✓	✓		81.8
Latvia		✓		✓	✓		✓							100.0
Lithuania					✓		✓				✓		✓	50.0
Luxembourg		✓			✓		✓	✓	✓	✓	✓		✓	100.0
Netherlands														0.0
Norway		✓		✓	✓		✓		✓					100.0
Poland		✓		✓	✓		✓							80.0
Portugal**														0.0
Romania	✓	✓					✓						✓	80.0
Slovenia		✓			✓		✓	✓		✓				83.3
Slovak Republic		✓		✓	✓	✓	✓							83.3
Spain	✓	✓		✓	✓	✓	✓	✓		✓			✓	100.0
Sweden		✓		✓			✓	✓	✓					100.0
Switzerland				✓	✓		✓	✓			✓	✓		85.7
United Kingdom	✓													16.7
Total	**7**	**19**	**0**	**16**	**19**	**8**	**21**	**12**	**9**	**7**	**5**	**5**	**9**	**73.8**

✓ Survey transferred to FFMDb.
* Combined for Flanders and Wallonia.
** No data submitted by NFC for 2005.

Most of the surveys loaded were for Deposition (21), Crown Condition (19), Growth (19) and Soil Solution (16). Data for the less intensively monitored Air Quality and Ozone surveys could be transferred for plots from 5 NFCs. No data were submitted for the Soil Condition survey, which should be carried out with a 10-year repeat cycle.

4.5 Specific Problem: Corrections to Previously Submitted Data

The feed-back given to NFCs during data validation uncovered numerous instances of data inconsistencies in the data validated through the previous contract, i.e. preceding the 2002 monitoring campaign (legacy data), but also data submitted under Forest Focus, which were previously confirmed by NFCs. Several requests for modifications to the legacy data have been received from NFCs. For example, the Spanish NFC found that the plot coordinates stored in the legacy data did not conform to the information stored in the national database. In the absence of the original data, no files were provided by DG AGRI or FIMCI other than the export of the legacy database, it is not possible for the project o verify the data status in the legacy data. It also confirms the position of the project to not modify data submitted by NFCs.

Most affected by changes to already submitted data are modifications of static parameters. Static parameters generally concern the characteristics of the plot, e.g. co-ordinates, altitude, orientation, etc. Reasons for changes are not evident from the data submitted and need to be verified or confirmed explicitly by an NFC to exclude erroneous entries. Typical situations requiring changes to static data are:

- Location of ancillary plot has changed
- Previous value was incorrect
- New value is more accurate
- Method of parameter assessment changed

By definition static data should not change over time. Accordingly, changes to static data would affect all other static data already submitted. For instance, modified plot coordinates following more accurate methods of locating the plot submitted for a recent monitoring year would be applicable to the parameter for any monitoring year, including past surveys. This situation s graphically presented in Figure 19.

The situation could be dealt with in an analysis of the data by always using the latest submission for static data as long as it can be ascertained that the plot has not changed.

When re-submitting modified data for a previous monitoring year not only are the parameters affected but potentially affected are also the previous findings from the validation procedure for subsequent monitoring years. The situation is presented in Figure 20.

Another element of complexity is added to the process for any static data repeated elsewhere in the data files. When parameters are updated in the general description of the plot the same information repeated in other forms should also be checked for consistency. Thus, any plot coordinates given in the survey forms should be identical to those in the form describing the plot in general. At least this conditions applies to coordinates given in the survey forms, where the monitoring is performed within the plot. The link cannot be established for surveys where the monitoring of parameters also take place outside the plot.

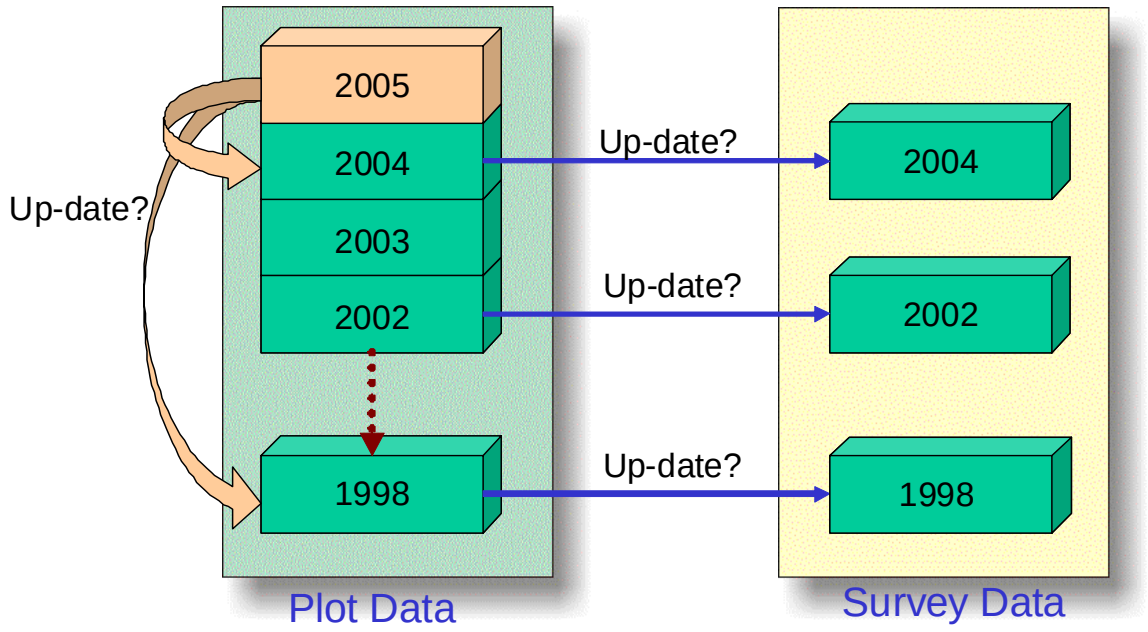

Figure 19: Up-dating Static Parameter Data from Latest Submission

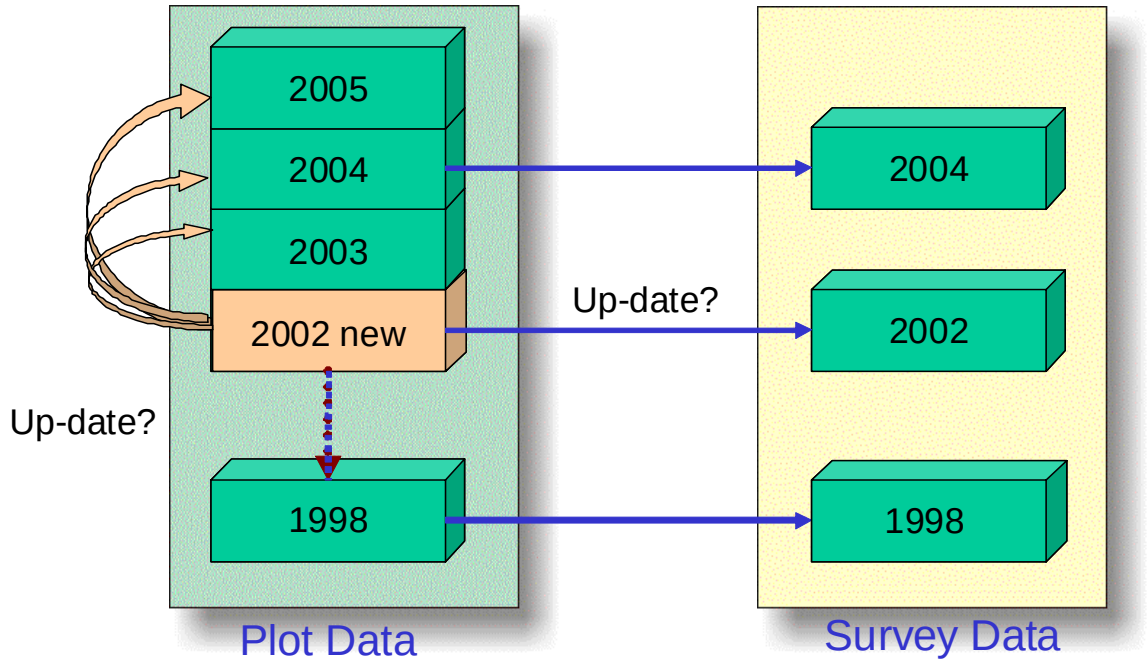

Figure 20: Up-dating Static Parameter Data from Previous Submission

In the treatment of re-submissions of data corrections a distinction has to be made between legacy data and Forest Focus data.

- ***Up-dating Legacy Data***

  Up-dating legacy data is not a trivial task. For once, the data format definitions used at the time are no longer available. In addition, the validation process includes time-series analyses of several parameters. By changing data for one year the validation status of subsequent years can be altered. This is certainly the case when presumed static parameters, such as plot co-ordinates or tree species, are modified. When up-dates to legacy data were received the data were used as ancillary information in the validation process. However, the data could not be newly validated and inserted into the FFMDb but are stored in a separate area.

- ***Up-dating Forest Focus Data***

  When treating re-submitted forest Focus data one has to separate between data received for data, which could not be uploaded to the FFMDB and data, which were up-loaded to the FFMDb, i.e. fully validated data.

  Data not yet uploaded to the FFMDb can be re-processed and, in case the data pass the checks, can be uploaded to the FFMDb. The main obstacle is the check of temporal consistency. For example, when the tree numbering system is modified between submissions in the Growth survey data from following years can become inconsistent with the modified data from the re-submission. However, such data could have been declared consistent when validating the data from the following year. Consequently, the re-submission of a survey for one year necessitates re-processing and analyzing all subsequent years as well.

  For data already uploaded to the FFMDb the situation is more complex. Changes to the database are intentionally restricted. For example, for reasons of security existing data stored in the FFMDb open for dissemination cannot be simply removed or overwritten with modified data. Apart from the technical hurdles there is also a logistic problem when an NFC provides corrections for data which the NFC has previously declared correct.

The quality and consistency in the data submitted by NFCs was overestimated in the initial assessment of data, although it very much improved with time. To broaden the base of validated data the introduction of additional re-submission periods was found inevitable.

5 SUMMARY

The validation of data collected on Level II plots during the 2005 monitoring year and submitted by NFCs to the JRC was the fourth period of its type under Forest Focus. Compared to previous periods uncertainties related to data formats in the files were largely reduced and the procedures involved in submitting data using an on-line module did not pose any specific problems.

For the monitoring year of 2005 a total of 194 surveys were submitted by 28 NFCs. The intensity of data submissions for the 13 surveys ranges from zero for Soil Condition to 28 for Crown Condition and Deposition. After validating the data from the 2005 monitoring year 142 surveys from 26 NFCs could be fully validated and uploaded into the FFMDb. The main reason for a survey failing to pass the validation process stems from the errors generated when testing values for temporal consistency. In cases the tests revealed a change in static parameters, such as changes in site coordinates or tree species, the NFC is required to verify and correct the situation. The lack of verification reduced the number of surveys, which could be transferred to the FFMDb.

A particular problem for the validation of 2005 data was the number of re-submissions received for previous monitoring years. NFCs were given the opportunity to re-submit corrected data for all Forest Focus monitoring years. This opportunity involved a considerable effort from all sides, but significantly increased the amount of validated data in the database.

In order to further improve the quality of the data submitted for Level II plots the recommendations the following recommendations can be given:

- Missing data and measurements below the detection limit of the instrument used should be coded according to the guidelines provided.
- The data formats in use should be revised by the Expert Panels with respect to the dimensions of the fields used.
- For future revisions of the survey forms particular consideration should be given to the demands of storing the data in a database and retrieving distinct data.
- Any changes to the monitoring setup or instruments used should be documented in DARs.
- NFCs should verify their data after having received the Conformity Status reports and react in case any messages are generated.

The results obtained from the validation activity are encouraging with respect to a consolidation of reporting and validation procedures made for Level II plots Most problems related to data formats and ambiguities in the significance of codes could be addressed. Progress has been made concerning the treatment of missing data, which enhance the integrity of the data for further analyses.

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Abstract

Forest Focus (Regulation (EC) No 2152/2003) is a Community scheme for harmonized, broad-based, comprehensive and long-term monitoring of European forest ecosystems. Under this scheme the monitoring of air pollution effects on forests is carried out by participating countries on the basis of the systematic network of observation points (Level I) and of the network of observation plots for intensive and continuous monitoring (Level II).

According to Article 15(1) of the Forest Focus Regulation Member States shall annually, through the designated authorities and agencies, forward to the Commission geo-referenced data gathered under the scheme, together with a report on them by means of computer telecommunications and/or electronic technology. For managing the data JRC has implemented a Forest Focus Monitoring Database System.

This Executive Report presents the results obtained from all processing stages (data reception, validation checks – compliance, conformity, uniformity) for submitted data referring to the monitoring year 2005. This report presents the results at the end of the processing phase after data have been re-submitted in 2006 and 2007. It presents in addition a brief comment on the data status for each NFC, for the reporting year, with respect to the parameter assessed and including analyses of spatial variability of data and temporal trends of parameters.

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