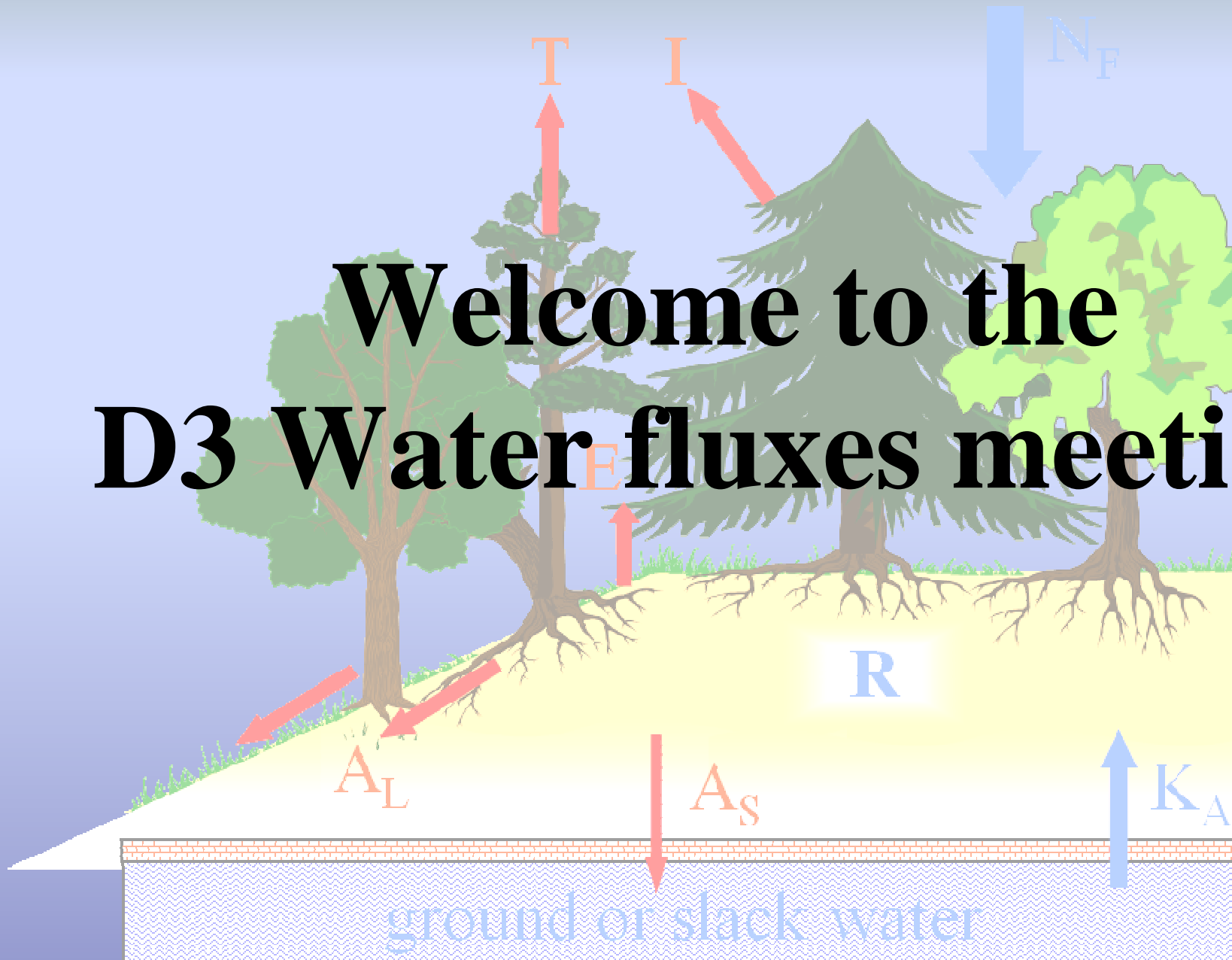




Welcome to the D3 Water fluxes meeting





Agenda / 17.02.2010

13:30 – 14:00	1. Introduction <ul style="list-style-type: none"> • Proposal • Timetable • Planned outcomes 	Raspe
14:00 – 16:30	2. Soil moisture measurements <ul style="list-style-type: none"> • Guidelines / ICP Forests Manual + protocols 	Raspe
	<ul style="list-style-type: none"> • Reports from associated beneficiaries <ul style="list-style-type: none"> ➤ Slovakia (10 min) 	Zuzana Sitkova
	<ul style="list-style-type: none"> • Evaluation strategies 	
	<ul style="list-style-type: none"> • Discussion 	participants
15:00 – 15:20	Coffee break	
16:30 – 17:50	3. Determination of pF-characteristics <ul style="list-style-type: none"> • Background and objectives 	Wagner
	<ul style="list-style-type: none"> • Soil physical ringtest 	De Vos
	<ul style="list-style-type: none"> • Reports from associated beneficiaries 	participants
17:50 – 18:00	Guest presentation: Forest Ecosystem Modelling	Salim Belyazid



Agenda / 18.02.2010

08:00 – 09:00	3. Determination of pF-characteristics (continuation)	
	• Reports from associated beneficiaries (continuation)	participants
	• Data submission	Grandke/Mues
	• Evaluation	Wagner
	• Discussion	participants
09:00 – 10:00	4. Leaf area index estimation	
	• Importance for water budget modelling	Raspe
	• Discussion of drafted field protocol	participants
	• Reports from associated beneficiaries	participants
	• Evaluation strategies	participants
10:00 – 10:20	Coffee break	
10:20 – 11:00	5. Stand precipitation	
	• Measurements	participants
	• Calculation possibilities	participants
11:00 – 11:30	6. Water Model Intercomparison	
	• First results	Wagner
11:30 – 12:00	7. Future work in ForEU	Raspe



Objectives of action D3

- **Demonstrate the feasibility of more intensive soil moisture measurements**
- **Only data collection**
- **Development and implementation of water budget modelling on intensive monitoring plots → C1-Met39(BY)**



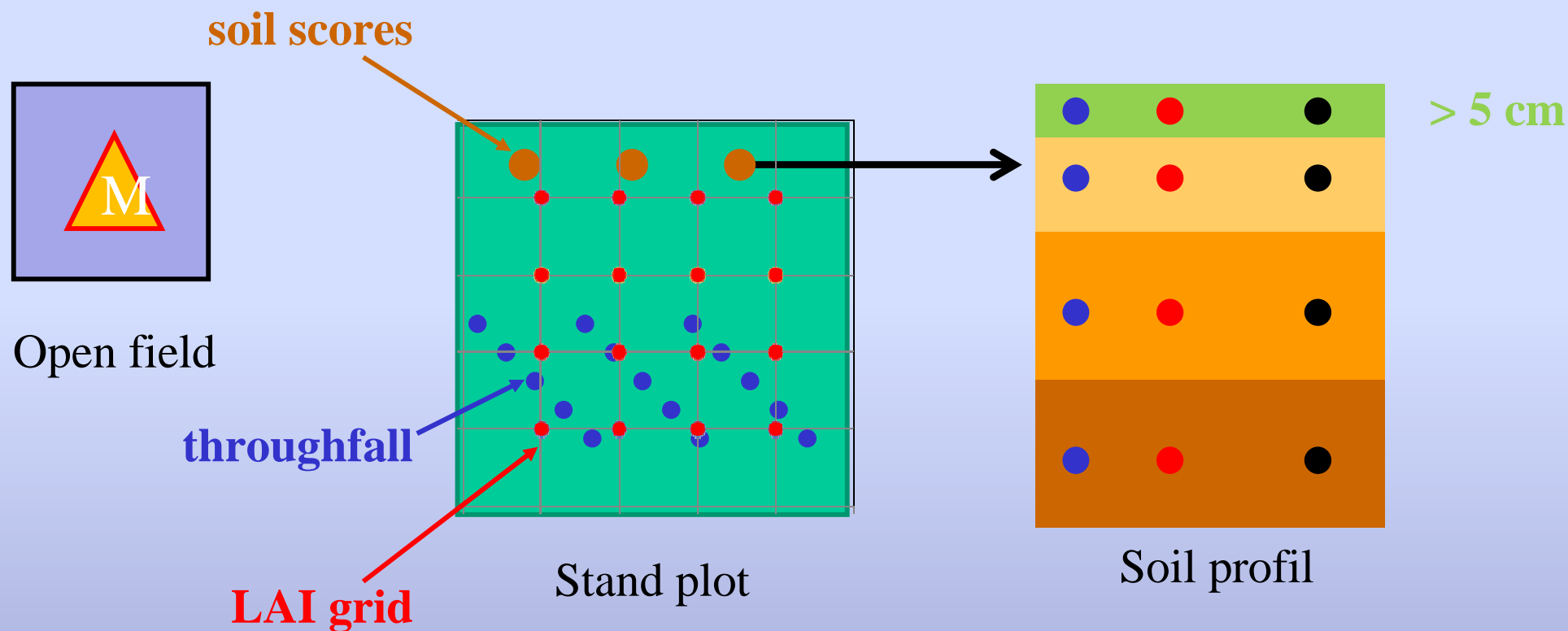
MONITORING OBLIGATIONS OF PARTICIPATING ASSOCIATED BENEFICIARIES



Surveys spec. necessary for D3 action

- **Determination of hydraulic functions**
 - Water retention
 - (Hydraulic conductivity)
- **Soil volumetric water content**
- **(Matrix potential)**
- **Stand precipitation**
- **Soil temperature**
- **Leaf area index**

Experimental design



- Volumetric water content
- Soil temperature
- Soil sample



Requirements for water budget modelling

- **Daily values**
 - Soil moisture and temperature
 - Meteo including stand precipitation
- **One time data**
 - stand characteristics
 - soil information
 - growth information



Timetable presented at Hamburg

Action	1/09	2/09	3/09	4/09	1/10	2/10	3/10	4/10
Field protocol	Red	Grey	Grey	Grey	Grey	Grey	Grey	Grey
Tabel of references	Red	Grey	Grey	Grey	Grey	Grey	Grey	Grey
Soil moistureworks hop	Grey	Red	Grey	Grey	Grey	Grey	Grey	Grey
Istallation of new plots	Grey	Red	Red	Red	Grey	Grey	Grey	Grey
Field measurements	Orange	Orange	Orange	Red	Red	Red	Red	Red
Data submission 09	Grey	Grey	Grey	Grey	Grey	Grey	Red	Grey

Soil Moisture Workshop, Freising



Soil Moisture Workshop, Freising

- **Inform FutMon beneficiaries about**
 - Soil moisture measurement techniques
 - pF curve determination methods
- **Discuss with experts and intern**
 - Advantages and disadvantages of different methods
 - Practical difficulties and limitations
 - Implications for FutMon field protocols
- **Build up contacts**
 - Companies
 - Users



Combined Field Course on Phenology and LAI, Lipica





LAI workshop

- **Discussion of methods**
- **First draft of field protocol was developed by a core group**
- **Discussion of draft field protocol**
- **Decision on a field exercise for comparison of methods**



FIELD PROTOCOLS



Field Protocol SWC finalised

field_prot_SoilWater_v1_150509.doc

page 1 / 12

FutMon Field Protocol
Determination of the soil water retention characteristic
V 1.0; last update 15th May 2009

Soil water retention characteristic (pF analysis)	
Method sheet	SA14
Reference method	ISO 11274
Method suitable for	Mineral and organic soil horizons, undisturbed samples

1. Introduction

During the FutMon LIFE+ project 2009-2010, the demonstration action D3 aims at the assessment of forest water budgets. Data is collected on more than 100 D3 plots being a subset of the IM1 plots. For the parameterisation of various water balance models meteo data, stand characteristics and soil physical data are essential. For the validation of the models soil temperature, soil moisture and stand precipitation measurements are needed.

The soil water retention characteristic is a physical soil property depending mainly on soil texture, organic material and bulk density. Therefore it will vary both vertically (horizons/layers in the profile) and horizontally in each plot. Stratified sampling according to horizons or specific layers is a prerequisite to determine the overall hydrological behaviour of a soil profile.

Specific points on the soil water retention curve (SWRC), which is the relationship between volumetric soil water content and matric pressure, are required to (1) determine indices of the volume of plant-available water, (2) estimate the soils' pore size distribution and (3) predict other soil physical properties (e.g. hydraulic conductivity). The SWRC is an essential part in most water budget models.

This protocol describes the determination of the soil water retention characteristic in the laboratory, extending from saturated soil (no pressure or suction; 0 kPa) to oven-dry soil (about -10^6 kPa).

The format of this protocol is in line with the new standard structure for sub-manuals proposed by the QA committee (Quality objectives in FutMon).



Field Protocol LAI drafted

Field protocol on Radiation measurements and Leaf Area Index (LAI)
D1, D2, D3

(First draft; 7th May 2009)

- 1. Introduction and Data Requirements..... 1
- 2. Sampling design..... 2
- 3. Field measurement methods..... 3
 - 3.1. Direct methods 3
 - 3.1.1. Litterfall traps (Litterfall Field protocol and Manual)..... 3
 - 3.1.2. "Heinz Ellenberg method"..... 3
 - 3.2. Radiation measurement methods..... 3
 - 3.2.1. Canopy analyzers 3
 - 3.2.2. Canopy analysis systems based on hemispherical image analysis..... 3
 - 3.2.3. Planar Mosaic photographs 4
- 4. Determination / Data operating systems..... 4
- 5. Data submission..... 4
 - 5.1. Plot description..... 4
 - 5.2. Measurement point coordinates 5
 - 5.3. Form for settings submission..... 5
 - 5.4. Parameter outcome 5
 - 5.4.1. Direct measurement..... 5
 - 5.4.2. LAI2000, TRAC..... 6
 - 5.4.3. Digital Photography Systems 6

1. Introduction and Data Requirements

Leaf area index (LAI) is defined as the total one-sided foliage area per unit ground surface area (Chen and Black 1991). Data requirements within the FutMon project are depending on the focus of the Demonstration actions D1 – D3. An overview is made by the following table:

Action	D1	D2	D3
Action Objectives	Develop new tree vitality parameters which are comparable with defoliation. Such could be e.g. transparency, foliage biomass, gap fraction or, as a parameter which is related to the foliage biomass, the LAI	In D2 action a parameter contributing to the estimation of leaf biomass need to be tested and developed.	Parameterisation of water budget models (interception, transpiration, soil evaporation) Improvement of transfer functions
Action Data Requirement	Relation to crown condition sites and the growth measurements;	A general value for the plot linked to throughfall deposition	Representative value for plot (& species) in case of deciduous tree species



Field Protocol Meteo

- **planned for June**
- **Only view additions to ICP Forests manual**
 - Gap filling
 - Transfer functions/modeled data
 - Calculation of daily values for stand precipitation from depo survey



DATA SUBMISSION FORMS



Soil Water Retention Curves

- **Draft**
- **Splitted forms**
- **SWC**
 - Sample information
- **SWA**
 - Analysis data

columns	parameter	Format
1 - 4	Sequence number (1-9999)	I 4
6 - 7	Country code	I 2
9 - 12	Plot Number	I 4
14 - 19	Sampling date	Date
21 - 24	Profile pit ID (maximum 4 characters)	C 4
26 - 28	Code depth layer	C 3
30 - 30	Replicate	I 1
32 - 33	Horizon number	I 2
35 - 37	Sample ring depth (upper side of ring) in cm below the top of the mineral soil; negative values for sampling rings taken in organic layer.	I 3
39 - 41	Sample ring depth (lower side of ring) in cm below the top of the mineral soil; so negative values for sampling rings taken in organic layer.	I 3
43 - 82	Other observations (text)	C 40
XX2009.SWA		
columns	parameter	Format
1 - 5	Sequence number (1-99999)	I 5
7 - 8	Country code	I 2
10 - 13	Plot Number	I 4
15 - 20	Sampling date	Date
22 - 25	Profile pit ID (maximum 4 characters)	C 4
27 - 29	Code depth layer	C 3
31 - 31	Replicate	I 1
33 - 34	Horizon number	I 2
36 - 41	Volumetric water content in m ³ .m ⁻³ at matric pressure specified in field "matric pressure"	F 6
43 - 50	Matric pressure [kPa]; e.g. -5; mandatory for new calculation s under FutMon: 0kPa, -1kPa, -5kPa, -33kPa, -1500kPa and -10 ⁶ kPa (dry soil bulk density)	F 8
52 - 57	Date laboratory analysis (DDMMYY)	Date
59 - 98	Other observations (text)	C 40



Soil Moisture, Soil Temperature & Stand Precipitation

- **First draft of additions to ICP Forests
Meteo forms (PLM, MEO, MEM)**
 - Send to Hamburg
 - Have to be discussed and finalised



FUTURE WORK



Future work

- **Analysis and evaluation of Soil Ring Test**
- **Determination of SWC**
- **LAI comparison exercise**
 - still necessary?
- **Water budget modeling (C1-MET)**
 - Project running at the LWF
 - Data acquisition
 - Start of modelling
- **Field measurement and data submission**



D3 plots?

