VALERI-2001 campaigns in Nezer site (France):

01-17 April 2001 and 18-29 June 2001

Dominique GUYON

Organisation : INRA, Bioclimatologie, France
E-mail: guyon@bordeaux.inra.fr

Date of report : 04 April 2002
Updating : 19 April 2003

Participants :

- Dominique Guyon, Gaston Courrier, Didier Garrigou, Sandra Debesa, Jean-Marc Bonnefond, et Jean-Charles Samalens
  INRA Bioclimatologie, Bordeaux
- Jean-Louis Roujean, Laurent Franchisteguy et Sébastien Garrigues
  Météo France, CNRM, Toulouse

1. INTRODUCTION

Nezer is located in the Landes forest which covers about 1 million hectares in the South-West of France and where maritime pine (*Pinus pinaster* Ait.) is the dominant species. A VALERI experiment was been already made in the same site in 2000 in the middle of the summer. (Cf. Guyon 2001).

Two measurement campaigns devoted to the VALERI project were carried out in the Nezer site in 2001:

- **from 01 to 17 April 2001 (spring experiment).**

The first campaign was achieved at beginning of spring before the budburst of vegetation. Green LAI of trees and undergrowth was minimal.

- **from 18 to 29 June 2001 (summer experiment)**.

The second was performed at the beginning of summer. The growth of vegetation was not finished and green LAI was not yet maximal

The objective of the VALERI project is to estimate LAI and cover fraction at low spatial resolution (1km² for instance) for validating the products resulting from satellites with large swath. The protocol used in 2000 has been modified for improving the spatial accuracy of estimates.

2. LOCATION OF THE TEST SITE

The test site is included into a 8km * 11km grid whose co-ordinates are given in table 1.

	Geographic co-ordinates (geodesic system: WGS84) Longitude ; Latitude	LAMBERT 3 co-ordinates (geodesic system: NTF) Easting ; Northing
Upper left corner	1°05.15' W ; 44°37.20' N	328000 m ; 3263000 m
Lower right corner	0°59.45' W ; 44°34.14' N	336000 m ; 3252000 m

Table 1: Co-ordinates of the 8x11km grid

The projection used is LAMBERT3. All the characteristics of are provided in the following table:

Geodesic Map Datum		**Map Projection**	
Associated Ellipsoïd	CLARKE1880	Latitude of origin	44°06'00"
Semi-major axe	6378249.2m	Longitude of origin	2°20'14.025"
Semi-minor axe	6 356 515,0m	Parallels	
1/flattening		1st	43°11'57.449"
		2nd	44°59'45.938
Eccentricity		Xo: false easting	600000
		Yo: false northing	3200000
		Scale factor	0.99987750

3. DESCRIPTION OF THE TEST SITE

The study area is covered in major part by large and homogeneous (even-aged trees) stands of maritime pine which are intensively managed. The mean size of stands is about 500m x 500m. Their various stages of development range from the sowing to the clear-cutting, which is performed mostly after 50 years. The remainder consists mainly of small deciduous wood lands, mosaics of small-sized stands of deciduous species or pine, large agricultural fields, urban and industrial areas, and unmanaged heath lands (see the land use map in figure 1).

In 2001 the experiments were focused in the central part of the study area. This part covers roughly 5*8 km. It is made up mainly of stands of pine and several rare small islands of deciduous trees.

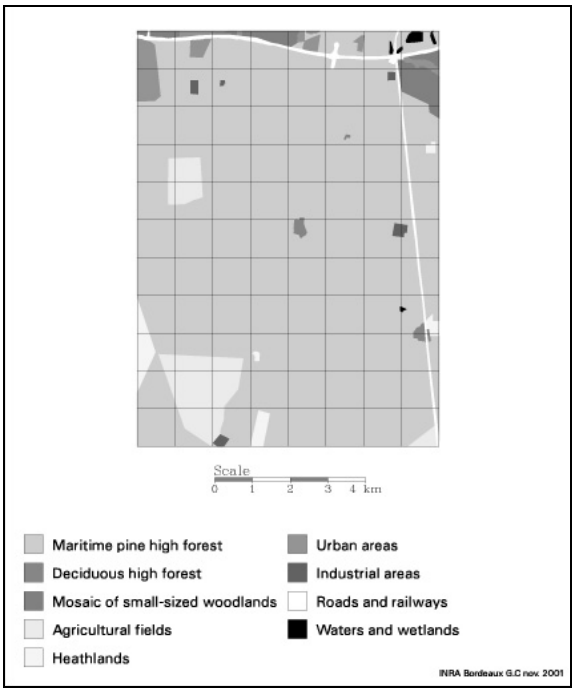


Figure 1: Land use map in 2000 (from aerial photographs and Spot images)

4. GROUND MEASUREMENTS OF LAI

4.1 Protocol of spatial sampling

The protocol used in 2000 has been modified for improving the spatial accuracy of LAI estimates. We reduced the sampled area, the size of sampling plots or ESUs (Elementary Sampling Units) and increased their number.

Selection and spatial distribution of ESUs

Strategy used to define the location of the ESUs:

- According to the distribution of the age classes of pine stands
- Accessibility
- Local variability: sampling within several stands with ESUs separated by 50 meters. They constituted five 500m transects. The measurements with this method of sampling were not performed during the spring experiment because of the bad weather.
- Spatial variability at larger scale: sampling of the variability between stands with ESUs whose spacing ranges from 100-500 meters to several kilometres.

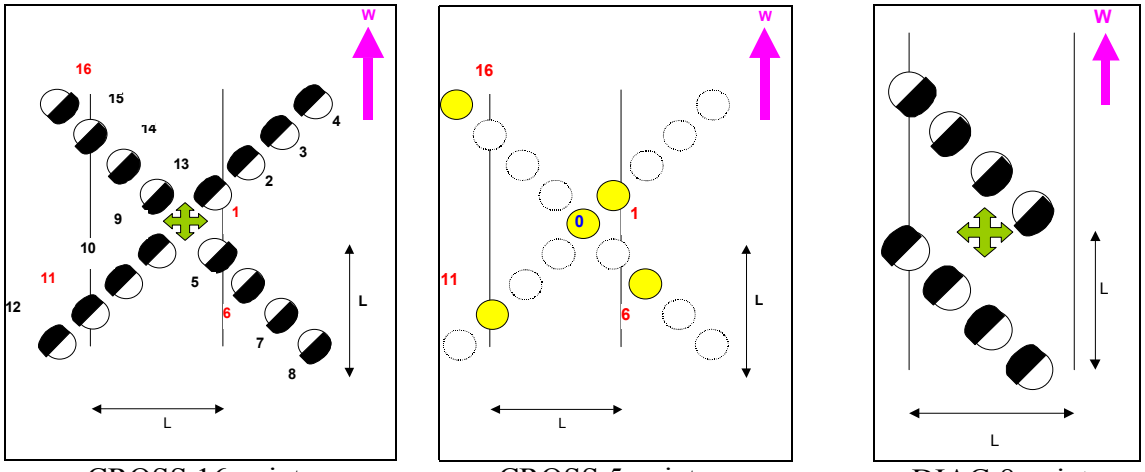
The geographical location of the centre of each plot is obtained from ground measurements of distance and from the INRA geographic databases. It is given in LAMBERT3 map projection. We did not use GPS system.

Strategies of sampling within ESU

Each ESU covered approximately 20m*20m.

Several strategies of sampling within ESUS were defined:

- cross with 16 points (= Cross 16points): for measurements at ground level, below both layers of trees and undergrowth
- diagonals with 8 points (= Diag 8 points): for the same purpose; but the number of points was reduced in order to reduce the measurement time. Applied only for the transects.
- Cross with 5 points (= Cross 5points): for measurements below the layer of trees.



CROSS 16 points CROSS 5 points DIAG 8 points

L= spacing between rows of trees

Figure 2: Sampling within the ESUs

4.2 Methods of measurement

	Method	Comments
☒	Hemispherical photographs	• Instrument : (Nikon coolpix E990, INRA Avignon, marque jaune, serial number= 4070545) + fisheye converter FC-E8 • Data compression: none (format TIFF) • Geometrical resolution: maximal; image size= 1536*2048 pixels • Recording in Black and White • **CP** measurements: Measurement **below the tree storey**: sensor height=0.8 to 1.3m • Illumination conditions: clear, solar elevation <16°, at evening • **Spring**: no measurement • **Summer**: on 12 ESUs, only one photo per ESU, in its center (point 0 of CROSS5points)
☒	LAI2000	• ID and Serial number of instruments: VAL1= PCH-0979, VAL3= PCH-1467, UREF= PCH-0122 • **CP** measurements : Measurement **under the tree storey**: height=0.8 to 1.3m; 3 repetitions on each point; without view cap both below and above the canopy ; sampling strategy : CROSS5points • **CS** measurements : Measurement **under the undergrowth: at ground level**; without view cap above the canopy; with view cap of 180° below the canopy; gap fraction measured on each point in the direction given by the view cap drawn in figure 2 ; with 3 repetitions per point; sampling strategies: CROSS16points or DIAG8points. • Illumination conditions: clear or uniform overcast sky, solar elevation <16°, at evening or morning • **Spring**: only CS measurement on 19 ESUs, not performed in ESUs distributed along the transects because of bad weather. • **Summer**: CS measurement on all ESUs; CP measurement on 12 ESUs

4.3 Characteristics of ESUs

- Spring experiment:

Cf. the Excel file GPSNezer2001Spring.xls:

GPSnezer2001Spring.xls
Spring experiment: 01-17 April 2001
location of GCPs, Corners and ESUs on NEZER site, VALERI 2002
and dates of measurement
3 revolving teams with Dominique Guyon, Gaston Courrier, Didier Garrigou, Sandra Debesa
Team A: D.Guyon, G.Courrier; Team B: D.Guyon, D.Garrigou, Team C: G.Courrier, S.Debesa
Projection Name, reference ellipsoid, datum: LAMBERT3, CLARKE1880, NTF
column 1: Name
Names begining with GCP correspond to Ground control point. A minimum of 4 GCPs must be acquired
Name begining with ULC defines the upper left corner of the site
Name begining with LRC defines the upper lower right corner of the site
Names begining with a number correspond to ESUs
columns 2-4 : locating
method for locating: noGPS (by measuring distance to landmarks)
columns 5-8 : LAI measurements at ground
column 5: date of LAI measurements with LAI2000 sensors: L-CS = trees+undergrowth
format : DD/MM/YY
column 6: sampling within ESU
column 7: sensors names: ABOVE/BELOW (only 1 sensor if above=below)
column 8 : field of view of sensors (degrees): above/below
column 9 : comments
mise à jour: 29/04/2003 (correction erreur localisation des ESUs 582000, 120000, 134000)

# Name	GPS	Easting(m)	Northing(m)	L-CS	ESU sampling	sensors	view field	Comments on the vegetation status, condition of acquisitions, etc...
# 1	2	3	4	5	6	7	8	9
ULC		328000	3263000					
LRC		336000	3252000					
162000	no GPS	332973	3261671	04/04/01	cross- 16 points	VAL1/VAL3	360/180	pine stand
632000	no GPS	332534	3259396	04/04/01	cross- 16 points	VAL1/VAL3	360/180	pine stand
642000	no GPS	332492	3259155	12/04/01	cross- 16 points	VAL1/UREF	360/180	pine stand
671000	no GPS	333629	3259420	12/04/01	cross- 16 points	VAL1/UREF	360/180	pine stand
681000	no GPS	334023	3259345	12/04/01	cross- 16 points	VAL1/UREF	360/180	pine stand
780000	no GPS	333133	3258392	12/04/01	cross- 16 points	VAL1/VAL3	360/180	pine stand
872000	no GPS	333357	3258030	12/04/01	cross- 16 points	VAL1/VAL3	360/180	pine stand
882000	no GPS	333797	3257596	12/04/01	cross- 16 points	VAL1/VAL3	360/180	pine stand
1130000	no GPS	332101	3256543	12/04/01	cross- 16 points	VAL1/UREF	360/180	pine stand
1141000	no GPS	332220	3256524	12/04/01	cross- 16 points	VAL1/VAL3	360/180	pine stand
1200000	no GPS	330734	3256357	12/04/01	cross- 16 points	VAL1/UREF	360/180	clear cutted area (no trees); flowering gorses (Ulex europeaus)
1250000	no GPS	332002	3256323	12/04/01	cross- 16 points	VAL1/UREF	360/180	pine stand
1392000	no GPS	332256	3255527	12/04/01	cross- 16 points	VAL1/VAL3	360/180	pine stand
72000	no GPS	333468	3261754	17/04/01	cross- 16 points	UREF/UREF	180/180	young pine stand: only one vegetation stratum (trees + undergrowth); abundance of flowering Ulex
81000	no GPS	333584	3261734	17/04/01	cross- 16 points	UREF/UREF	180/180	young pine stand: only one vegetation stratum (trees + undergrowth); abundance of flowering Ulex
181000	no GPS	333449	3261644	17/04/01	cross- 16 points	UREF/UREF	180/180	young pine stand: only one vegetation stratum (trees + undergrowth); abundance of flowering Ulex
191000	no GPS	333564	3261619	17/04/01	cross- 16 points	UREF/UREF	180/180	young pine stand: only one vegetation stratum (trees + undergrowth)
582000	no GPS	331592	3259485	17/04/01	cross- 16 points	UREF/UREF	180/180	clear cutted area (no trees)
1340000	no GPS	330960	3255721	17/04/01	cross- 16 points	UREF/UREF	180/180	clear cutted area (no trees)
1340001	no GPS			17/04/01	no measurement			bare soil - recent tilling

- Summer experiment

Cf. the Excel file GPSnezer2001Summer.xls :

GPSnezer2001Summer.xls
Summer experiment: 18-29 June 2001
location of GCPs, Corners and ESUs on NEZER site, VALERI 2002
and dates of measurement
several revolving teams with Dominique Guyon, Gaston Courrier, Didier Garrigou, Sandra Debesa, Laurent Franchistéguy, Sébatien Garrigues, Jean-Charles Samalens, Jean-Paul Guyon
Projection Name, reference ellipsoid, datum: LAMBERT3, CLARKE1880, NTF
column 1: Name
Names begining with GCP correspond to Ground control point. A minimum of 4 GCPs must be acquired
Name begining with ULC defines the upper left corner of the site
Name begining with LRC defines the upper lower right corner of the site
Names begining with a number correspond to ESUs
columns 2-4 : locating
method for locating: noGPS (by measuring distance to landmarks)
columns 5-13 : LAI measurements at ground
column 5-12 : measurements with LAI2000 sensors: L-CS = trees+undergrowth
column 5: date DD/MM/YY
column 6: sampling within ESU
column 7: sensors names: ABOVE/BELOW (only 1 sensor if above=below)
column 8 : field of view of sensors (degrees): above/below
column 9-12 : measurements with LAI2000 sensors: L-CP = trees
column 9: date DD/MM/YY
column 10: sampling within ESU
column 11: sensors names: ABOVE/BELOW (only 1 sensor if above=below)
column 12 : field of view of sensors (degrees): above/below
column 13-13 : measurement with Hemispherical photos: hp-CP = trees layer
only one photo per ESU, in its center ; (Nikon coolpix E990 (INRA Avignon, marque jaune, serial number= 4070545)
column 13 : date DD/MM/YY
column 14 : comments
mise à jour: 29/04/2003 (correction erreur localisation des ESUs 582000, 120000, 134000)

# Name	GPS	Easting(m)	Northing(m)	L-CS	ESU sampling	sensors	view field	L-CP	ESU sampling	sensors	view field	hp-CP	Comments on the vegetation status, condition of acquisitions, etc...
# 1	2	3	4	5	6	7	8	9	10	11	12	13	14
ULC		328000	3263000										
LRC		336000	3252000										
72000	no GPS	333468	3261754	29/06/01	diag- 8 points	VAL1/UREF	360/180						young pine stand: only one vegetation stratum (trees + undergrowth);
81000	no GPS	333584	3261734	22/06/01	diag- 8 points	VAL1/VAL3	360/180						young pine stand: only one vegetation stratum (trees + undergrowth);
162000	no GPS	332973	3261671	19/06/01	cross- 16 points	VAL1/UREF	360/180	29/06/01	cross- 5 points	VAL1/UREF	360/360	29/06/01	pine stand
181000	no GPS	333449	3261644	22/06/01	diag- 8 points	VAL1/UREF	360/180						young pine stand: only one vegetation stratum (trees + undergrowth);
181001	no GPS	333498	3261635	22/06/01	diag- 8 points	VAL1/UREF	360/180						young pine stand: only one vegetation stratum (trees + undergrowth)
181003	no GPS	333400	3261653	22/06/01	diag- 8 points	VAL1/UREF	360/180						young pine stand: only one vegetation stratum (trees + undergrowth)
181004	no GPS	333351	3261662	22/06/01	diag- 8 points	VAL1/UREF	360/180						young pine stand: only one vegetation stratum (trees + undergrowth)
181005	no GPS	333302	3261671	22/06/01	diag- 8 points	VAL1/UREF	360/180						young pine stand: only one vegetation stratum (trees + undergrowth)
191000	no GPS	333564	3261619	22/06/01	diag- 8 points	VAL1/VAL3	360/180						young pine stand: only one vegetation stratum (trees + undergrowth)
191001	no GPS	333515	3261628	22/06/01	diag- 8 points	VAL1/VAL3	360/180						young pine stand: only one vegetation stratum (trees + undergrowth)
191003	no GPS	333613	3261610	22/06/01	diag- 8 points	VAL1/VAL3	360/180						young pine stand: only one vegetation stratum (trees + undergrowth)
191004	no GPS	333662	3261601	22/06/01	diag- 8 points	VAL1/VAL3	360/180						young pine stand: only one vegetation stratum (trees + undergrowth)
191005	no GPS	333711	3261592	22/06/01	diag- 8 points	VAL1/VAL3	360/180						young pine stand: only one vegetation stratum (trees + undergrowth)
582000	no GPS	331592	3259485	19/06/01	cross- 16 points	VAL1/UREF	360/180						clear cutted area (no trees)
632000	no GPS	332534	3259396	19/06/01	cross- 16 points	VAL1/UREF	360/180	28/06/01	cross- 5 points	VAL1/UREF	360/360	29/06/01	pine stand
632001	no GPS	332583	3259387	20/06/01	diag- 8 points	VAL1/UREF	360/180						pine stand;
632002	no GPS	332534	3259396	20/06/01	diag- 8 points	VAL1/UREF	360/180						pine stand; = ESU 632000
632003	no GPS	332485	3259405	20/06/01	diag- 8 points	VAL1/UREF	360/180						pine stand
632004	no GPS	332436	3259414	20/06/01	diag- 8 points	VAL1/UREF	360/180						pine stand
632005	no GPS	332387	3259423	20/06/01	diag- 8 points	VAL1/UREF	360/180						pine stand
632006	no GPS	332337	3259433	20/06/01	diag- 8 points	VAL1/UREF	360/180						pine stand: low trees density
632007	no GPS	332288	3259442	20/06/01	diag- 8 points	VAL1/UREF	360/180						pine stand: low trees density ;
632008	no GPS	332239	3259451	20/06/01	diag- 8 points	VAL1/UREF	360/180						clear cutted area (no trees)
632009	no GPS	332193	3259460	20/06/01	diag- 8 points	VAL1/UREF	360/180						clear cutted area (no trees)
632010	no GPS	332141	3259469	20/06/01	diag- 8 points	VAL1/UREF	360/180						young pine stand: seedlings
642000	no GPS	332492	3259155	19/06/01	cross- 16 points	VAL1/UREF	360/180	28/06/01	cross- 5 points	VAL1/UREF	360/360	29/06/01	pine stand
671000	no GPS	333629	3259420	19/06/01	cross- 16 points	VAL1/UREF	360/180	29/06/01	cross- 5 points	VAL1/UREF	360/360	29/06/01	pine stand
681000	no GPS	334023	3259345	19/06/01	cross- 16 points	VAL1/VAL3	360/180	29/06/01	cross- 5 points	VAL1/UREF	360/360	29/06/01	pine stand
780000	no GPS	333133	3258392	19/06/01	cross- 16 points	VAL1/UREF	360/180	28/06/01	cross- 5 points	VAL1/VAL3	360/360	29/06/01	pine stand
872000	no GPS	333357	3258030	19/06/01	cross- 16 points	VAL1/VAL3	360/180	28/06/01	cross- 5 points	VAL1/VAL3	360/360	29/06/01	pine stand
882000	no GPS	333797	3257596	19/06/01	cross- 16 points	VAL1/VAL3	360/180	29/06/01	cross- 5 points	VAL1/UREF	360/360	29/06/01	pine stand
882001	no GPS	333847	3257587	22/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
882002	no GPS	333797	3257596	22/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand ; = ESU 882000
882003	no GPS	333747	3257605	22/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
882004	no GPS	333697	3257614	22/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
882005	no GPS	333647	3257623	22/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
882007	no GPS	333547	3257642	28/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
882008	no GPS	333497	3257651	28/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
882009	no GPS	333447	3257660	28/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1130000	no GPS	332101	3256543	19/06/01	cross- 16 points	VAL1/UREF	360/180	28/06/01	cross- 5 points	VAL1/UREF	360/360	28/06/01	pine stand
1141000	no GPS	332220	3256524	19/06/01	cross- 16 points	VAL1/VAL3	360/180	29/06/01	cross- 5 points	VAL1/UREF	360/360	29/06/01	pine stand
1200000	no GPS	330734	3256357	28/06/01	cross- 16 points	VAL1/VAL3	360/180						clear cutted area (no trees)
1250000	no GPS	332002	3256323	19/06/01	cross- 16 points	VAL1/VAL3	360/180	28/06/01	cross- 5 points	VAL1/UREF	360/360	28/06/01	pine stand
1250001	no GPS	332052	3256314	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1250002	no GPS	332002	3256323	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand ; = ESU 125000
1250003	no GPS	331952	3256332	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1250004	no GPS	331902	3256341	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1250005	no GPS	331852	3256350	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1250006	no GPS	331802	3256360	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1250007	no GPS	331752	3256369	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1250008	no GPS	331702	3256378	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1250009	no GPS	331652	3256387	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1340000	no GPS	330960	3255721	28/06/01	cross- 16 points	VAL1/VAL3	360/180						young pine stand: seedlings
1392000	no GPS	332256	3255527	19/06/01	cross- 16 points	VAL1/VAL3	360/180	28/06/01	cross- 5 points	VAL1/UREF	360/360	28/06/01	pine stand
1392001	no GPS	332056	3255564	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1392002	no GPS	332106	3255554	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1392003	no GPS	332156	3255545	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1392004	no GPS	332206	3255536	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1392005	no GPS	332256	3255527	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand ; = ESU 1392000
1392006	no GPS	332306	3255518	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1392007	no GPS	332356	3255509	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1392008	no GPS	332406	3255500	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1392009	no GPS	332456	3255490	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand
1392010	no GPS	332505	3255481	20/06/01	diag- 8 points	VAL1/VAL3	360/180						pine stand

4.4 Inter-calibration of the three LAI2000 sensors

- Sensors characteristics

Id	VAL1	VAL3	UREFV
Serial Number	PCH-0979	PCH-1467	PCH-0122
Calibration coefficients :			
Ring 1 (7°)	4068	4032	4026
Ring 2 (23°)	1260	1258	1248
Ring 3 (38°)	1000	1000	1000
Ring 4 (53°)	1007	1000	1016
Ring 5 (68°)	1378	1278	1437

- Inter-calibration measurements:

- Location: INRA Bioclimatologie, Bordeaux :44.79°N, 0.57°W
- Clear sky
- Azimutal field of view : 360° (no view cap)
- Time sampling : 15s

date	atmospherics Conditions	Time TU	sun elevation
27 March 2001	Heterogeneous haze	7h19-7h35	14-17°
30 March 2001	Several cirrus and alto cumulus	7h12-7h35	13-18°
3 April 2001	Clear sky	6h46-7h35	11.5-20°
20 June2001	Clear sky	5h35-6h00	11.1-15.3°

The values of inter-calibration coefficients resulting from these experiments showed a discrepancy with those obtained on July 2000 (cf. report Guyon, 2001) and March 2002 (Cf. reports Guyon, 2002).

VAL3=a3 VAL1				
1/a3	24/07/2000	03/04/2001	26/06/2001	27/03/2002
7	0.3299	0.2961	0.3006	0.3327
23	0.3338	0.3011	0.3041	0.3372
38	0.3404	0.3169	0.3117	0.3478
53	0.3512	0.3294	0.3176	0.3590
68	0.3691	0.3376	0.3197	0.3687
urefv = a0 VAL1				
1/a0	24/07/2000	03/04/2001	26/06/2001	
7	0.8455	0.8969	0.8717	
23	0.8445	0.8857	0.8723	
38	0.8315	0.8821	0.8641	
53	0.8077	0.8677	0.8421	
68	0.7733	0.7966	0.8156	

A lack of co-linearity of the responses when the solar elevation was increasing (>11°) could explain the results. The coefficient values for VAL3 in 2000 and 2002 resulted from observations when sun elevation was low (<11°). They were very similar. We thus assumed that the drift of the sensors was very slight during this lapse of time

- Coefficient values used

Consequently we used the coefficient values estimated from measurements performed on the 24th July 2000 (solar elevation: 3 to 7°) (Cf. report Guyon, 2001) :

Val1 : Pch-0979	val3 : pch-1467			Urefv : pch-0122		
	val3 = a3 VAL1			urefv = a VAL1		
Ring	a3	1/a3	2*(1/a3)	a0	1/a0	2*(1/a0)
1 (07°)	3.0314	0.3299	0.6598	1.1827	0.8455	1.6910
2 (23°)	2.9956	0.3338	0.6676	1.1841	0.8445	1.6890
3 (38°)	2.9380	0.3404	0.6807	1.2027	0.8315	1.6629
4 (53°)	2.8471	0.3512	0.7025	1.2381	0.8077	1.6154
5 (68°)	2.7093	0.3691	0.7382	1.2932	0.7733	1.5466

They are suitable for measuring without view cap both below and above the canopy. We approximated their values by dividing a*i* by 2 for measurements with a view cap of 180° below the canopy and without view cap above the canopy.

5. ANCILLARY DATA

4.1 Atmosphere properties

- Spring experiment

Any measurement with sun photometer was not performed. However data of incoming global and diffuse radiation was available from 19 March to 27 March and from 3 to 17 April 2001. It was provided from two sensors of photosynthetic active radiation located in the Carboreuroflux site at about 25 km (44°42'N, 0°46'W;) from the Nezer site.

- Summer experiment

For atmospheric correction of remote sensing data, aerosol optical depth and water vapour content were provided by AERONET network from measurements with the automatic sun photometer located in the INRA Research Centre of Bordeaux (N44°47', W00°34'), at about 40 km from the Nezer site. The photometer has been installed on the 15th May 2001.

Global and diffuse incoming radiation were measured in the NEZER site for assessing horizontal variations of atmosphere properties. An integrated sensor of photosynthetic active radiation (BF2, Delta-T Devices Ltd, Inra-Avignon) was used. It was set in the northern part of NEZER (…….m Easting, …….m Northing Lambert3). Measurements were recorded from 28 June to 23 July 2001. The PAR sensors of the Carboreuroflux site provided complementary data for the period of 18 June to 23 July 2001.

5.2 Ground observations on vegetation conditions

Observations on the undergrowth vegetation of sampled plots: phenology, development and cover fraction.
Illustration with photographs.

Spring experiments: on 13th and 17th April 2001
Summer experiment: on 9th and 10th July 2001

6. SPOT IMAGES

Satellite used	SPOT4 HRVIR2
Level of processing	SPOTVIEW Basic Ortho
Projection type	LAMBERT3
Date:	02 April 2001, 20 June 2001

7. BIBLIOGRAPHY

Guyon D., 2001. VALERI-2000 campaign in Nezer site (France), 17 July - 10 August 2000. VALERI Project, Technical report, 7p. [en ligne] <http//www.avignon.inra.fr/valeri/>

Guyon D., 2002. Ground measurement acquisition report for the VALERI site **NEZER** sampled from 08/04/2002 to 25/04/2002, Technical report, 12p. [en ligne] <http//www.avignon.inra.fr/valeri/>

Guyon D., 2002. Inter-Calibration of three LAI2000 sensors : 27 March 2002. VALERI Project, Technical report, 3p. [en ligne] <http//www.avignon.inra.fr/valeri/>