

# Addendum to National Airborne Field Experiment 2006 Workplan

December 2006



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# 1 Update the original workplan

This document aims to update the NAFE'06 workplan. It provide to the users of the NAFE'06 data a record of the various changes in flight plans and sampling procedures that occurred during the field experiment. It also summarizes the spatial and temporal characteristics of the airborne data acquired over Yanco, Kyeamba and Yenda, and of the ground data collected in the Yanco area.

During NAFE'06, the main changes in flight plans resulted from two different factors. The first factor was the willingness of monitoring the drydown period that followed two major rainfall events. The second factor was an engine breakdown at the end of week 2 on one of the two Dimonas.

## 2 Flight plans

The first rainfall occurred on Thursday November 2 and the second on Monday November 13. To capture the rapid change in near-surface soil moisture, additional flights were undertaken over the Yanco area immediately after the rain.

### 2.1 PLMR/Thermal imager

Table 1 lists the changes in PLMR/thermal imager flights over Yanco, Kyeamba and Yenda. The main changes from the original plans are:

- 2 additional regional flights in Yanco
- 1 regional flight over Yanco shifted 2 days ahead
- 1 regional flight in Kyeamba cancelled

### 2.2 TSLS/Lidar/Photography

Table 2 summarizes the changes in TSLS/lidar/photography flights over Yanco, Kyeamba and Yenda. Due to a breakdown at the end of week 2 of the engine of the Dimona VH-EOS, PLMR and S60 were removed and mounted on the second aircraft (VH-OBS) on November 12. This limited the number of TSLS/lidar flights to only one per site. The main changes from the original plans are:

- All sites (Yenda, transect, CIA and Livingstone) flew only once
- No lidar data over Livingstone

Table 1. Changes in PLMR and thermal imager flight plans.

Date	Changes
03/11	Regional flight over Yanco
05/11	Regional flight over Yanco
09/11	First Yenda flight
11/11	No regional flight over Yanco
12/11	No flight over Tumbarumba
13/11	Regional flight over Yanco No regional flight over Kyeamba
17/11	PLMR only flight over transect at 10,000ft
18/11	Second Yenda flight
20/11	PLMR only flight over Livingstone at 10,000ft

Table 2. Changes in TSLs, lidar and photography flight plans.

Date	Changes
03/11	TSLs/Lidar/Photography <sup>1</sup> flight over transect
04/11	TSLs/Lidar/Photography <sup>1</sup> flight over CIA
05/11	TSLs/Photography <sup>1</sup> flight over Livingstone
12/11	No flight over Tumbarumba
17/11	Photography <sup>2</sup> over transect at 10,000ft
20/11	Photography <sup>2</sup> over Livingstone at 10,000ft

<sup>1</sup> Photography with 50mm lens (no overlap between photos).

<sup>2</sup> Photography with 24mm lens.

## 2.3 Flight summary

Table 3 presents the coverage and the actual schedule of all the flights undertaken during NAFE'06. Any problem with the data acquisition is also reported.

Table 3. Flights during NAFE'06.

		PLMR and S60						TSLs, lidar and photography <sup>1</sup>				PLMR and photography <sup>2</sup>		
		Regional Kyeamba	Livingstone	Regional Yanco	CIA	Transect multi-angle	Transect high-resolution	Yenda	Transect	Yenda	CIA	Livingstone	Transect and CIA	Livingstone
Mon	30/10													
Tue	31/10				3									
Wed	1/11													
Thu	2/11													
rain														
Fri	3/11													
Sat	4/11													
Sun	5/11											7		
Mon	6/11													
Tue	7/11													
Wed	8/11													
Thu	9/11													
Fri	10/11													
Sat	11/11													
Sun	12/11													
rain														
Mon	13/11			4										
Tue	14/11			5										
Wed	15/11													
Thu	16/11			6										
Fri	17/11													
Sat	18/11													
Sun	19/11													
Mon	20/11													

<sup>1</sup> Photography with 50mm lens

<sup>2</sup> Photography with with 24mm lens

<sup>3</sup> Lost attitude part way through flight, landed and restarted

<sup>4</sup> Lost analogues; S60 stopped part way through

<sup>5</sup> S60 not focused for ferry to flight altitude

<sup>6</sup> Lost analogues

<sup>7</sup> No lidar data

### 3 Ground data collection in Yanco

In the Yanco area, ground sampling was undertaken in the 3 regional farms (Y2, Y9 and Y12) during regional flights and in the 3 transect farms (Y1, Y7 and Y10) during transect flights. No measurement was done in the three additional farms located in the CIA. The changes in ground sampling schedule were associated with the changes in flight plans. Regional farms were sampled on two additional sampling days, concurrently with PLMR/S60 flights.

#### 3.1 Spatial soil moisture sampling

Changes in spatial soil moisture sampling consist of:

- 1 additional regional sampling day on 5 November
- 1 regional sampling day shifted to 2 days ahead to fit with the second forecasted rainfall event.

#### 3.2 Vegetation sampling

Vegetation samples, LAI and MSR data were collected in the six focus farms. Each vegetation type was sampled at least once during the field campaign and the sampling procedure was repeated up to 3 times (once a week) to characterize any change in vegetation water content. Table 5 reports the types of vegetation sampled and the sampling schedule.

Table 4. Spatial soil moisture sampling schedule during NAFE'06. Changes in sampling schedule are highlighted.

Day	Date	Spatial soil moisture sampling
Mon	30/10	Livingstone
Tue	31/10	Yanco regional farms
Wed	01/11	Yanco transect farms
Thu	02/11	Yanco regional farms
rain		
Fri	03/11	Yanco transect farms
Sat	04/11	Yanco regional farms
Sun	05/11	Yanco regional farms
Mon	06/11	Livingstone
Tue	07/11	Yanco regional farms
Wed	08/11	Yanco transect farms
Thu	09/11	Yanco regional farms and Yenda site
Fri	10/11	Yanco transect farms
Sat	11/11	
Sun	12/11	
rain		
Mon	13/11	Livingstone and Yanco regional farms
Tue	14/11	Yanco regional farms
Wed	15/11	Yanco transect farms
Thu	16/11	Yanco regional farms
Fri	17/11	Yanco transect farms
Sat	18/11	Yanco regional farms and Yenda site
Sun	19/11	
Mon	20/11	Livingstone

Table 5. Vegetation sampling schedule for the Yanco area.

Field	Crop	Sample	LAI	MSR	Notes	Mean VWC Kg/m <sup>2</sup>
Y1	Dry Wheat	10/30/2006	10/30/2006	10/30/2006	Done	0.09
	Irrigated Wheat	11/6/2006	11/6/2006	11/6/2006	Again	1.02
		11/14/2006	11/14/2006	11/14/2006		0.67
	Hay - cut			11/6/2006	MSR only	
Y2	Pasture	11/4/2006	11/4/2006	11/4/2006	Done	0.05
		11/14/2006	11/14/2006	11/14/2006		0.04
Y7	Pasture	10/31/2006	10/31/2006	10/31/2006	Done	0.03
Y9	Dry Barley	11/1/2006	11/1/2006	11/1/2006	Again	0.30
		11/9/2006	11/9/2006	11/9/2006		0.35
		11/16/2006	11/16/2006	11/16/2006		0.30
	Irrigated Wheat	11/1/2006	11/1/2006	11/1/2006	Again	1.25
		11/9/2006	11/9/2006	11/9/2006		0.78
		11/15/2006	11/15/2006	11/15/2006		0.75
	Alfalfa	11/5/2006	11/5/2006	11/5/2006	Again	1.40
		11/11/2006	11/11/2006	11/11/2006		1.75
		11/16/2006	11/16/2006	11/16/2006		1.58
	Corn	11/5/2006	11/5/2006	11/5/2006	Again	0.67
11/11/2006		11/11/2006	11/11/2006	1.58		
11/17/2006		11/17/2006	11/17/2006			
Rice				11/5/2006	MSR only	
				11/9/2006	MSR only	
				11/11/2006	MSR only	
		11/17/2006		11/17/2006		0.01
Y10	Pasture	11/3/2006	11/3/2006	11/3/2006	Again	0.17
		11/10/2006	11/10/2006	11/10/2006	Done	0.03
Y12	Dry Barley	11/2/2006	11/2/2006	11/2/2006	Again	0.24
		11/10/2006	11/10/2006	11/10/2006	Done	0.07
	Pasture	11/2-11/3	11/2-11/3	11/3/2006	Done	0.10
	Canola	11/3/2006	11/3/2006	11/3/2006	Again	0.80
		11/7/2006	11/7/2006	11/7/2006	Done	0.61
Bare Field				11/7/2006	MSR only	
Cut Wheat	11/7/2006	11/7/2006	11/7/2006	Done	0.03	
Corn					Still too small	

### 3.3 Volumetric soil samples

Volumetric soil samples were taken on every sampling day at 5 measurement points of the HDAS sampling grid. The 5 'calibration points' were moved from the original plans so as to cover a range of soil and vegetation types, moisture conditions, and facilitate access. Figure 1 illustrates the actual location of volumetric points at each farm.

### 3.4 Soil roughness

Soil roughness measurements were taken at the location of the five volumetric points (see Figure 1). Table 6 reports the actual schedule of soil roughness measurements in the six focus farms in Yanco.

### 3.5 Vegetation type/height

Table 6 reports the actual schedule for vegetation type surveys and vegetation height estimation. Vegetation type was not recorded in Y7 (dry land pasture).

### 3.6 Surface temperature

Surface skin temperature was measured with six hand held radiometers (OMEGA) on Thursday 9 and Thursday 16 November. Measurements were collected between 9-11am eastern standard time in the three regional farms (Y2, Y9 and Y12) at several measurement points of the HDAS sampling. Surface temperature measurements were concurrent with ASTER full mode overpass on Thursday 16 Nov.

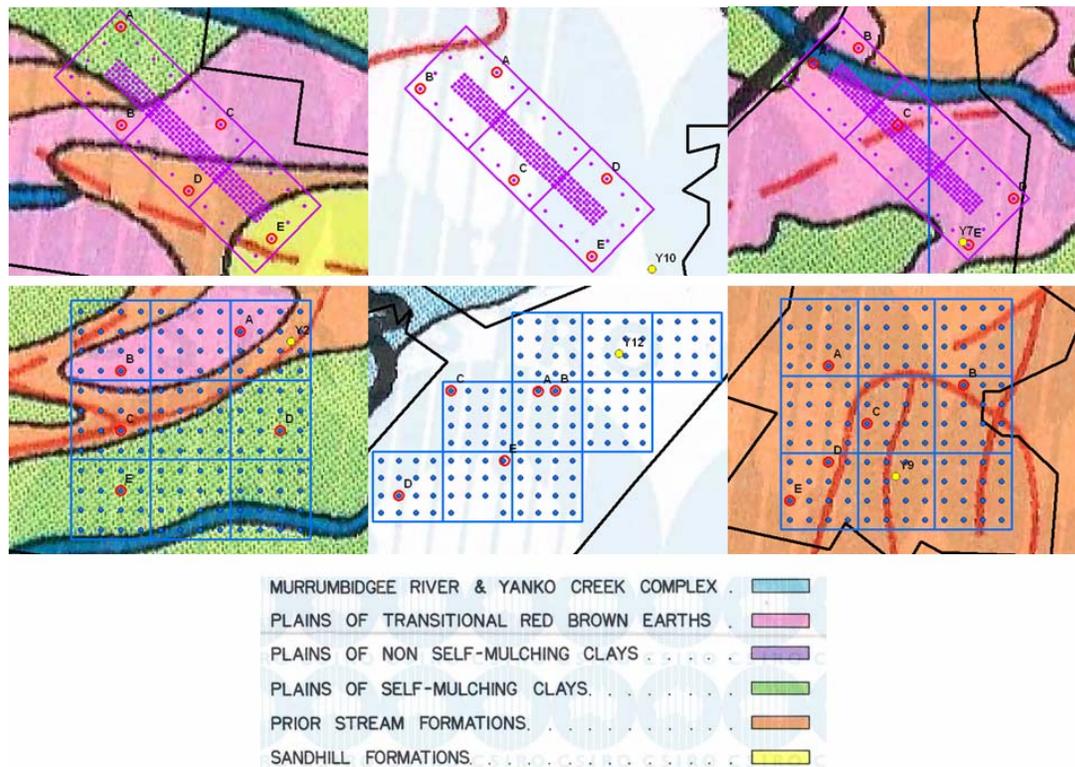


Fig. 1. Location of the five volumetric samples at each farm. Background is a soil map from CSIRO (V.N.C. Blight, Government printer, NSW, 1970 – Digitally revised by Hornbuckle and Christen 2006).

Table 6. Time table for soil roughness measurements and vegetation type/height surveys.

Farm	Soil roughness	Vegetation type	Vegetation height
Y1	Week2	01/11	
		08/11	08/11
		15/11	15/11
Y2	Week2	05/11	05/11
		14/11	14/11
Y7	Week1		08/11
			15/11
Y9	Week1	31/10	
		04/11	
		09/11	
		14/11	14/11
Y10	Week3	08/11	08/11
			17/11
Y12	Week3	31/10	
		04/11	
		09/11	09/11
		14/11	14/11

### 3.7 Dew

Two attempts for collecting dew samples in the Yanco area were undertaken on Wednesday 8 November and Wednesday 15 November. No dew was observed.

### 3.8 Rock cover

Rock cover was not recorded during NAFE'06.

### 3.9 Lake data for PLMR calibration

Measurements of the water temperature and water salinity were collected along the North-South and East-West boat transects on each Monday.

Data from the buoy were logged from 30 October to 20 November. Notes:

- Unreliable temperature data between 5 Nov 12:00 and 8 Nov 00:00
- Unreliable conductivity data on 6 Nov at 9:00 - 10:00am and on 14 Nov at 8:00 - 9:00.

### 3.10 NAFE stations

Table 7 reports the coordinates of the additional stations set up for the duration of NAFE'06.

Table 7. Additional stations in the Yanco area.

Station	Farm	Land cover	Lat	Long	Comments
TIR1	Y1	Dry wheat	-34.664	145.892	4/11/06 T1 sensor found out of ground TIR malfunction from approx 2/11/06 00:00 Dry/wet air temperature data from 7/11/06
TIR2	Y9	Bare soil	-34.957	146.027	No leaf wetness sensor installed
TIR3	Y12	Irrigated wheat	-35.089	146.129	No data from 30/10/06 12:00 to 4/11/06 18:00 Unreliable TIR between 15/11/06 20:00 and 16/11/06 10:00
TIR4	Y9	Lucerne	-34.973	146.008	Data missing between 4/11/06 18:00 and 12/11/06 16:00
TIR5	Y7	Dry land pasture	-34.851	146.115	No TIR sensor No data between 26/10/06 12:00 and 10/11/06 12:00
TIR6	Y10	Dry land pasture	-35.005	146.310	No TIR sensor No data after 5/11/06 – equipment stolen