

AD 652886

AD



MONTHLY
MICROCLIMATIC SUMMARY

SEPTEMBER 1966

ENVIRONMENTAL DATA BASE
FOR REGIONAL STUDIES IN THE HUMID TROPICS

USATECOM Project No. 9-4-0013-01

US ARMY
TROPIC TEST CENTER
Fort Clayton, Canal Zone



Sponsored by

Advanced Research Projects Agency, ARPA Order No. 740
Army Research Office, OCRD, Project No. 2M025001A724 01

ARCHIVE COPY

F
28

**BEST
AVAILABLE COPY**

ENVIRONMENTAL DATA BASE
FOR REGIONAL STUDIES IN THE HUMID TROPICS

MONTHLY
MICROCLIMATIC SUMMARY

SEPTEMBER 1966

Prepared by

Michael A. Fradel, Project Officer
and
Dr. Wilfried H. Portig, Meteorologist

USATECOM Project No. 9-4-0013-01

This research was supported by the Advanced
Research Projects Agency of the Department
of Defense and by the Army Research Office,
OCRD, Department of Army

Conducted by

US Army
Tropic Test Center
Fort Clayton, Canal Zone
with contractual services provided by
Weather Engineers of Panama Corp.

TABLE OF CONTENTS

	<u>Page</u>
Introduction	1
Sites.	1
Instrumentation.	2
Data Reduction and Storage	2
Figures	
1. Location Map, Isthmus of Panama.	3
2. Frequency of Observations.	4
3. Albrook Forest Site, Generalized Plot.	5
4. Chiva Chiva Open Site, Generalized Plot.	6
5. Instrument Location on Towers.	7
Data Summary Sheets	
Monthly Means of Air Temperature by Hour	8
Monthly Ranges of Air Temperature by Hour.	9
Monthly Means of Relative Humidity by Hour	10
Monthly Ranges of Relative Humidity by Hour.	11
Monthly Means of Other Elements by Hour.	12
Monthly Means of Soil Surface Temperature by Hour	
Monthly Means of Wet Bulb Temperature by Hour	
Monthly Means of Barometric Pressure by Hour	
Monthly Means of Precipitation by Hour	
Monthly Totals of Precipitation	
Monthly Ranges of Other Elements by Hour	13
Monthly Ranges of Soil Surface Temperature by Hour	
Monthly Ranges of Wet Bulb Temperature by Hour	
Monthly Ranges of Barometric Pressure by Hour	
Monthly Ranges of Precipitation by Hour	
Monthly Means of Wind Speed by Hour.	14
Monthly Ranges of Wind Speed by Hour	15
Relative Frequencies of Wind Directions (46 meters, Albrook) . .	16
Relative Frequencies of Wind Directions (4 meters, Albrook). . .	17
Relative Frequencies of Wind Directions (46 meters, Chiva Chiva)	18
Relative Frequencies of Wind Directions (4 meters, Chiva Chiva)	19
Relative Frequencies of Wind Directions (4 meters, Rio Hato) . .	20
Summary of Elements with Non-Hourly Frequencies of Observation.	21
WBG (Albrook)	
Evaporation (Albrook)	
Precipitation (Manual gauge network, Albrook)	
Precipitation (Stem Flow, Albrook)	
WBG (Chiva Chiva)	
Evaporation (Chiva Chiva)	

TABLE OF CONTENTS (cont'd)

Minimum Grass Temperature (Chiva Chiva)
Maximum Temperature (Albrook satellite)
Minimum Temperature (Albrook satellite)
Maximum Relative Humidity (Albrook satellite)
Minimum Relative Humidity (Albrook satellite)
Precipitation (Albrook satellite)
Maximum Temperature (Fort Kobbe satellite)
Minimum Temperature (Fort Kobbe satellite)
Maximum Relative Humidity (Fort Kobbe satellite)
Minimum Relative Humidity (Fort Kobbe satellite)
Precipitation (Fort Kobbe satellite)
Maximum Temperature (Fort Sherman satellite)
Minimum Temperature (Fort Sherman satellite)
Maximum Relative Humidity (Fort Sherman satellite)
Minimum Relative Humidity (Fort Sherman satellite)
Precipitation (Fort Sherman satellite)

MONTHLY MICROCLIMATIC SUMMARY

Introduction

Monthly microclimatic data summarized in this series of reports were collected by the US Army Tropic Test Center and the Weather Engineers of Panama Corporation under the project, Environmental Data Base for Regional Studies in the Humid Tropics. The project is sponsored by the Advanced Research Projects Agency of the Department of Defense and by the Army Research Office, Office of the Chief of Research and Development. It is an investigation of microclimatic, air chemistry, vegetation, soils, microbiological, and macrofaunal conditions at selected sites in the principal tropical environments of the Panama Canal Zone and the Rio Hato Military Reservation. The objective of the project is to assemble quantitative environmental data for RDT&E purposes.

Sites. Data summarized in this report were collected principally at the Albrook Forest and Chiva Chiva sites. Supplementary data were collected at four satellite sites. Figure 1 shows the site locations within the Isthmus of Panama. Geographic coordinates are shown below:

Albrook Forest	09° 01'N, 79° 33'W
Chiva Chiva	09° 01'N, 79° 35'W
Rio Hato (satellite)	08° 24'N, 80° 06'W
Fort Kobbe (satellite)	08° 54'N, 79° 34'W
Fort Sherman (satellite)	09° 16'N, 79° 59'W
Albrook (satellite)	09° 00'N, 79° 33'W

The Chiva Chiva open site and the Albrook Forest site are paired for comparative study of environmental conditions in a tropical semideciduous forest and in a large clearing. Both are located in a region where the annual precipitation is approximately 80 inches and there is a pronounced dry season. The Rio Hato satellite site is located in an appreciably drier area (approximately 40 inches annually). The other satellite sites were located primarily for soil studies purposes. The Fort Sherman site receives much higher precipitation, with a less pronounced dry season. Albrook and Fort Kobbe have climatic regimes similar to the principal sites.

The Albrook and Chiva Chiva main sites are approximately four kilometers apart. Each has a 46 meter walk-up tower and an air-conditioned building to house the recording equipment and observers. Both sites are approximately 30 meters above sea level. The top of the forest canopy at the Albrook site is about 26.5 meters above the ground.

Instrumentation. A number of climatic elements are measured at the Albroom and Chiva Chiva sites, but observations at the Rio Hato site are limited to temperature, precipitation, relative humidity, and wind. Types of observations and frequencies are shown on Figure 2. The towers at the Albroom and Chiva Chiva sites are similarly oriented. Sensing equipment is mounted at several levels on the towers to provide measurements through the vertical profile. Additional instruments are emplaced in the immediate vicinity on or near the ground. All instrument exposures are duplicated at each site. Figures 3, 4, and 5 show the instrument array at these sites.

Data Reduction and Storage. All data, as applicable, are recorded at or reduced to each full hour and transposed to punch cards. These punch cards, together with all raw data, are stored in the Tropic Test Center Technical Library Annex.

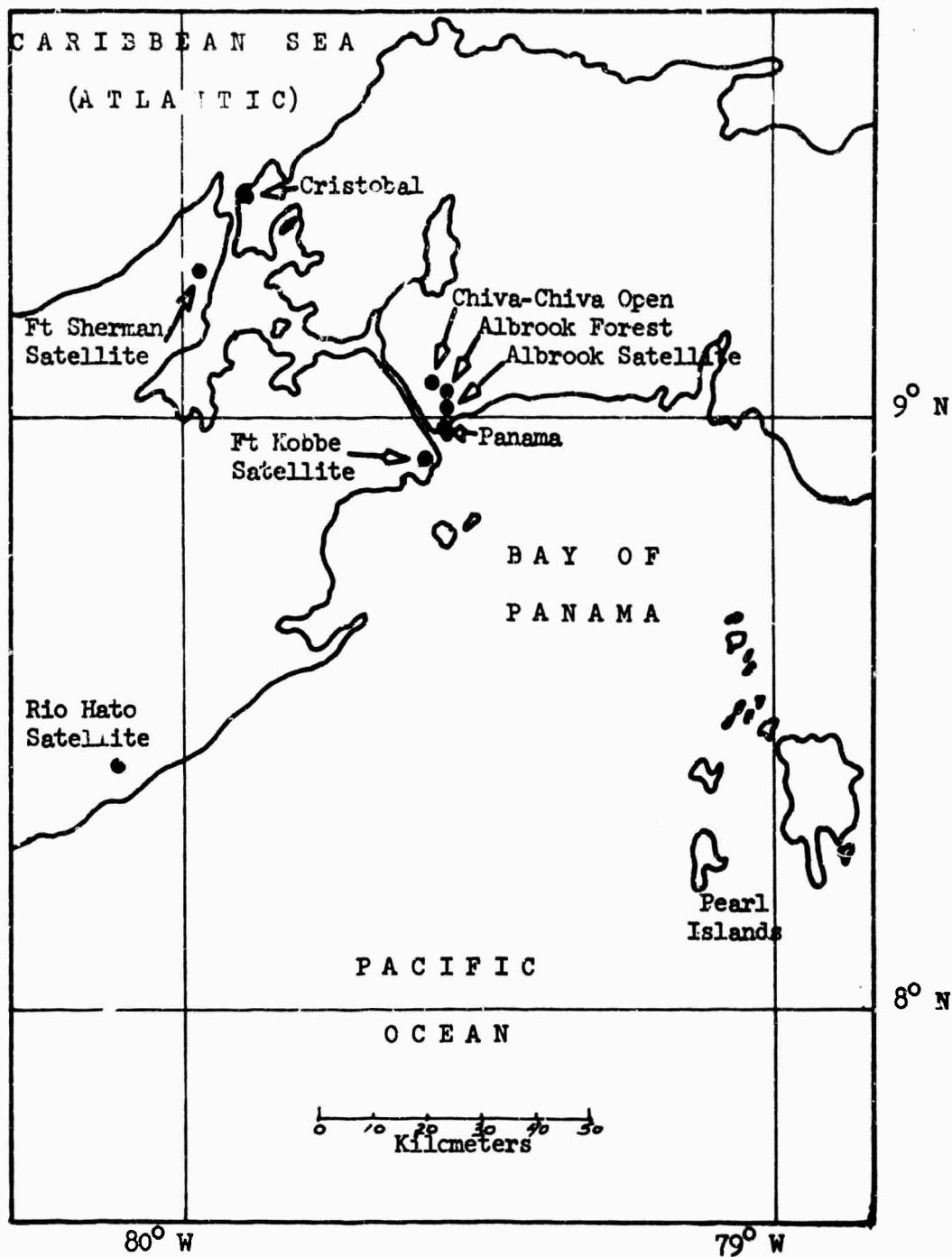


FIGURE 1.
LOCATION MAP, ISTHMUS OF PANAMA

FIGURE 2. FREQUENCY OF OBSERVATIONS

# Element	Sfc	Height (meters)						Frequency
		0.5	1.0	2.0	4.0	8.0	13.5	
Temperature:								
Dry Bulb	2	2	1	2	2	2	2	Hourly*/Continuously
Wet Bulb	-	2	-	2	2	-	-	Hourly*/Continuously/
Grass Minimum	4	-	-	-	-	-	-	Once Daily
WBGT Index	-	-	2	-	-	-	-	Hourly(0600-1900 EST)
Relative Humidity	-	2	1	2	2	2	2	Hourly*/Continuously
Barometric Pressure	-	-	2	-	-	-	-	Continuously
Evaporation	2	-	-	-	-	-	3	Once Daily
Precipitation:								
Recording Gage	-	-	1	-	-	-	-	Continuously
Manual Gage	-	-	3	-	-	-	-	4 Times Daily
Stem Flow	-	-	3	-	-	-	-	4 Times Daily
Wind:								
Direction	-	-	-	-	5	-	-	Continuously
Speed	-	-	-	2**	5	-	2**	Hourly**/Continuously

* Observation made with sling psychrometer: when recorders are inoperative.

** Hourly.

Instrument descriptions are contained in the Environmental Data Base semiannual reports.

1. All sites
2. Albrook and Chiva Chiva
3. Albrook only
4. Chiva Chiva only
5. Main sites and Rio Hato

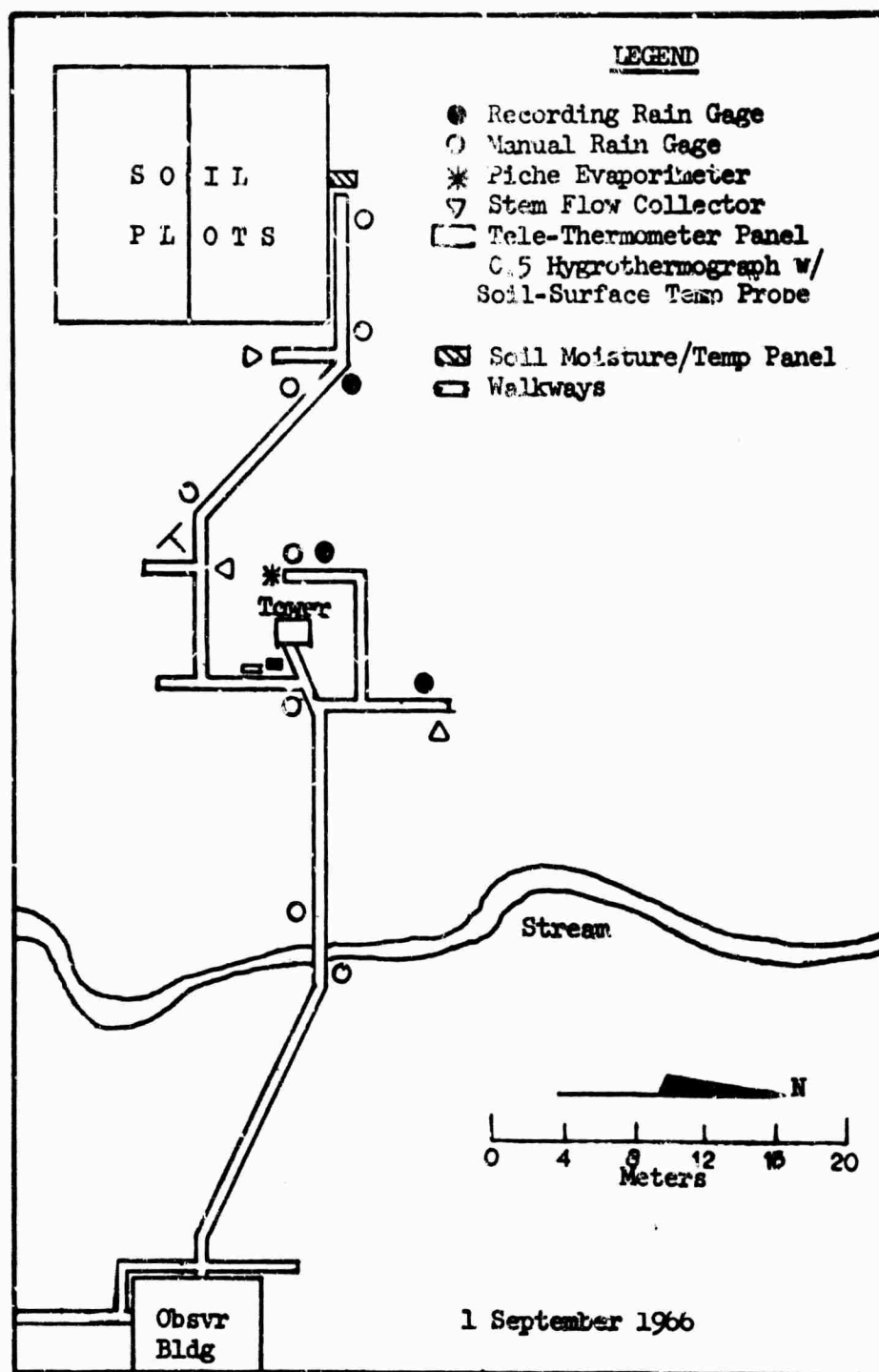


FIGURE 3.

ALBROOK FOREST SITE, GENERALIZED PLOT

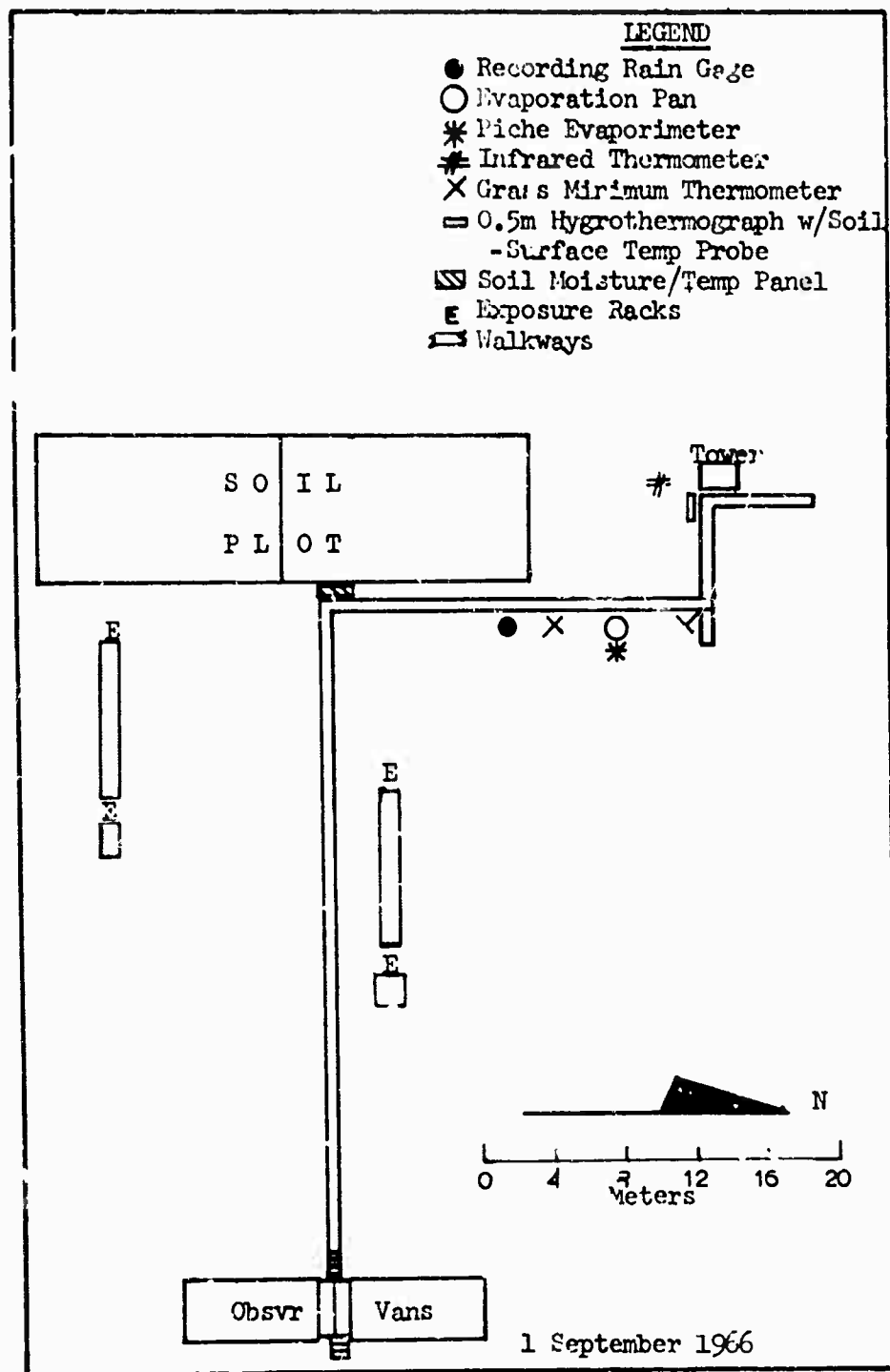


FIGURE 4.
CHIVA CHIVA OPEN, GENERALIZED PLOT

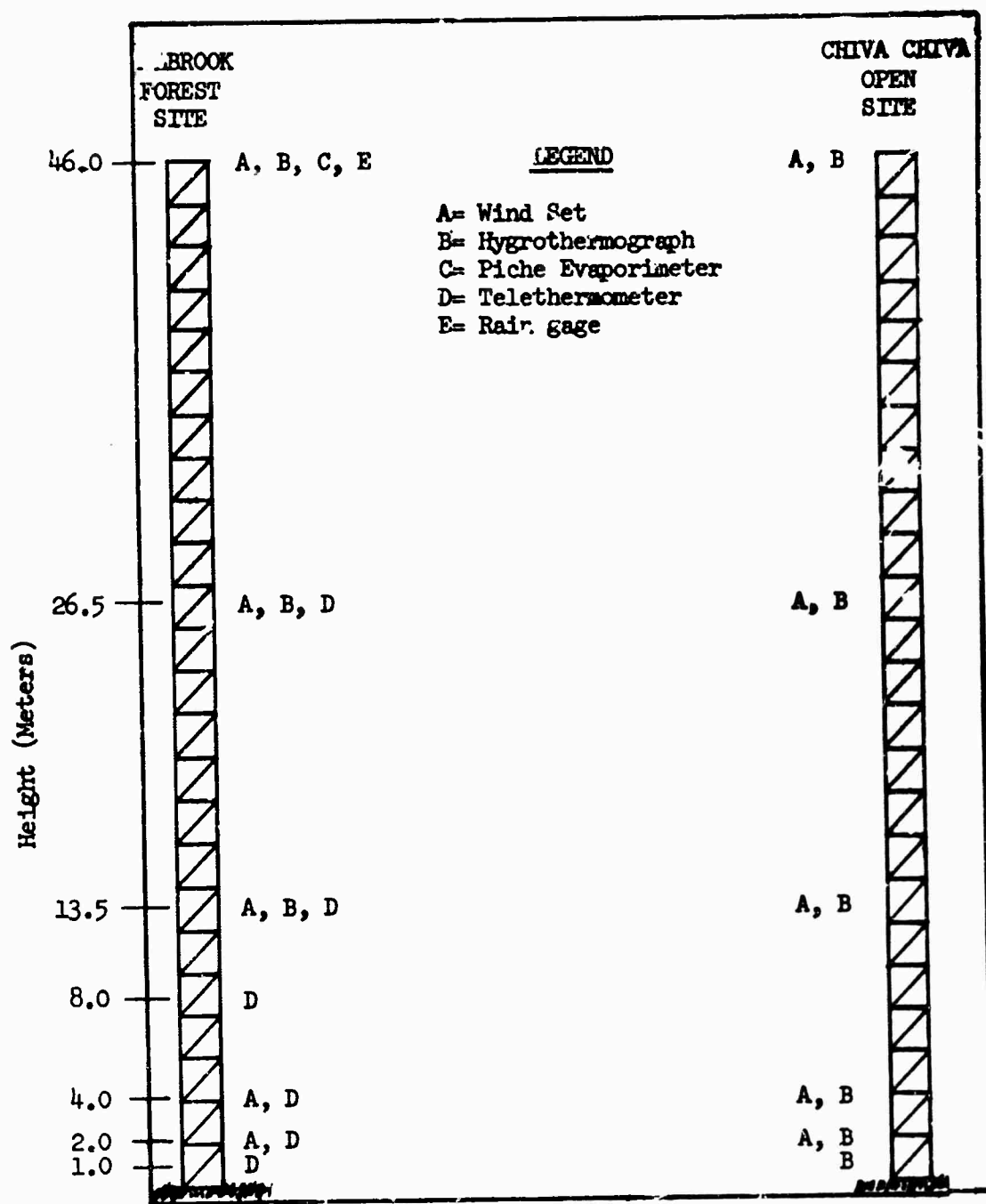


FIGURE 5.
INSTRUMENT LOCATION ON TOWERS

SUMMARY OF METEOROLOGICAL OBSERVATIONS

HOURLY DATA

SEPTEMBER 1966

Exposure		Monthly Means of Air Temperature by Hour (°F)																								Monthly Summary				
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No. of Obs.	Min.	Mean	Max.	
Albrook (Forest site)	46.0m	75.3	75.1	74.9	74.7	74.6	75.5	78.6	80.3	81.8	82.0	82.2	82.3	82.2	81.0	80.4	79.7	78.4	77.0	76.8	76.5	76.1	76.0	75.7	75.5		720	70.6	77.7	98.4
	28.5m									This level was not instrumented for air temperature at this time																				
	26.5m	74.5	74.4	74.1	74.0	73.9	73.8	75.6	79.4	81.2	82.6	83.5	84.2	83.4	82.4	82.1	81.0	79.1	78.1	76.5	76.1	75.7	75.3	75.0	74.7		696	69.6	77.9	90.8
	13.5m	74.2	74.0	73.8	73.7	73.4	73.4	74.4	76.3	78.8	80.5	81.7	82.2	82.2	81.6	80.1	79.6	78.6	77.6	76.7	76.2	75.8	74.4	74.1	74.8		672	69.8	77.0	88.2
	8.0m	74.4	74.3	74.1	73.9	73.8	73.7	74.1	76.4	78.6	80.2	81.5	81.9	81.8	81.1	80.2	79.4	78.3	77.3	76.5	76.1	75.7	75.4	75.1	74.7		720	69.8	77.0	86.8
	4.0m	74.3	74.1	74.0	73.8	73.6	73.4	74.7	76.7	79.0	80.3	81.4	81.9	82.0	81.3	80.1	79.1	78.1	77.1	76.3	75.9	75.5	75.4	74.9	74.5		703	69.5	76.9	96.1
	2.0m	74.3	74.1	74.0	73.8	73.6	73.4	74.0	76.6	78.8	80.1	81.2	81.6	81.7	81.0	79.9	79.0	78.1	77.1	76.3	75.9	75.5	75.4	74.9	74.4		703	70.0	76.9	86.0
	1.0m	74.8	74.6	74.4	74.2	74.0	73.9	74.2	75.6	77.7	79.3	80.4	81.0	81.1	80.8	80.2	79.4	78.5	77.6	77.0	76.5	76.0	75.7	75.5	75.2		719	70.0	76.9	83.4
0.5m	74.7	74.6	74.5	74.3	74.1	74.1	74.3	76.5	78.2	79.5	80.2	80.6	80.7	80.3	79.5	78.9	77.8	77.0	76.4	75.9	75.7	75.4	75.2	75.0		720	71.6	76.8	84.0	

88

Chiva Chiva (Open site)	46.0m	74.8	74.6	74.4	74.1	74.0	73.9	75.2	78.0	80.1	81.4	82.0	81.9	82.0	80.8	79.9	79.1	77.8	77.3	76.5	76.3	76.1	75.8	75.5	75.3	708	68.9	77.4	87.2
	28.5m	This level was not instrumented for air temperature at this time																											
	26.5m	74.8	74.5	74.4	74.3	74.2	74.0	75.6	78.6	80.7	82.4	83.1	83.1	83.1	82.1	80.9	80.0	79.0	78.0	77.0	76.5	76.2	76.0	75.5	75.3	710	70.1	77.9	89.0
	13.5m	74.9	74.7	74.5	74.4	74.4	74.1	75.5	78.7	81.2	82.8	83.7	83.5	83.8	82.7	81.4	80.1	78.9	78.1	77.0	76.5	76.0	75.9	75.4	75.3	711	70.0	78.1	91.6
	8.0m	This level was not instrumented for air temperature at this time																											
	4.0m	73.9	73.7	73.4	73.3	73.2	73.0	75.9	78.9	81.4	83.6	84.7	84.4	85.0	83.6	81.7	80.3	79.0	77.7	76.5	75.9	75.4	75.2	74.8	74.4	719	68.5	77.9	92.8
	2.0m	73.8	73.6	73.3	73.2	73.0	72.9	75.5	80.0	81.6	84.0	85.1	84.8	85.0	83.7	81.6	80.2	78.9	77.9	76.8	76.2	75.5	75.2	74.6	74.2	719	68.4	78.0	92.6
	1.0m																												
	0.5m	74.5	74.2	73.9	73.8	73.8	73.4	75.2	78.2	81.0	83.4	84.8	85.1	85.8	83.9	82.5	80.9	78.9	77.9	77.0	76.3	75.7	75.4	75.3	74.8	720	70.0	78.1	91.9

1.5m	75.1	74.7	74.4	74.4	74.2	74.0	75.4	78.0	80.3	82.3	83.3	84.7	84.9	84.5	83.9	83.0	82.3	80.6	78.4	77.7	77.1	76.8	76.5	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9
1.5m	75.1	74.7	74.4	74.4	74.2	74.0	75.4	78.0	80.3	82.3	83.3	84.7	84.9	84.5	83.9	83.0	82.3	80.6	78.4	77.7	77.1	76.8	76.5	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9	75.9

SEPTEMBER 1966

Exposure		Monthly Ranges of Air Temperature by Hour (°F)																								Monthly Summary *				
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24					
Albrook (Forest site)	46.0m	5.0	4.8	6.0	5.3	5.6	6.0	7.0	12.5	10.6	15.0	14.3	11.1	11.6	15.1	15.0	16.8	12.0	7.5	6.5	5.1	6.0	6.0	5.6	5.5					
	28.5m							This level was not instrumented for air temperature at this time																						
	26.5m	6.5	7.1	7.5	7.6	7.5	7.4	9.0	16.2	13.0	17.5	16.0	14.0	18.0	18.0	15.7	17.9	12.0	12.1	6.5	6.5	6.7	6.8	6.6	7.5					
	13.5m	5.3	4.8	5.2	5.4	5.6	6.0	7.1	7.1	9.1	11.5	13.2	12.8	13.0	13.0	13.7	12.2	7.5	5.8	4.8	5.2	5.5	5.6	6.6	6.7					
	8.0m	6.0	6.3	6.0	7.0	7.3	7.5	7.8	9.3	8.1	9.8	10.8	10.2	11.9	13.0	14.3	11.2	7.6	7.2	7.0	5.5	6.0	5.2	6.1	6.0					
	4.0m	5.0	5.5	6.5	6.5	6.8	7.0	6.4	7.2	7.5	9.3	10.3	9.2	10.1	12.1	12.0	12.0	8.5	5.5	6.0	5.5	5.0	6.0	5.0	5.0					
	2.0m	5.5	5.5	6.7	7.5	7.0	6.5	6.9	7.6	7.5	8.1	8.9	10.1	10.2	12.0	12.0	11.5	7.0	5.5	5.8	5.5	6.0	6.5	5.5	5.0					
	1.0m	5.9	5.7	6.7	7.3	7.8	7.4	7.7	7.9	7.8	8.4	8.3	9.0	8.9	10.3	10.3	11.8	6.1	6.0	4.8	4.5	4.3	3.9	4.9	4.9					
0.5m	4.5	4.0	4.5	4.8	5.0	4.9	5.4	5.7	5.5	6.7	7.6	7.6	7.2	6.4	8.1	8.5	9.0	6.2	6.0	4.5	5.0	4.5	4.5	4.3	4.5					

* No monthly summary was computed for the ranges.

Chaya Chiva (Open site)	46.0m	6.2	9.1	9.9	9.9	9.9	7.7	9.8	12.3	13.4	15.0	14.1	12.2	13.0	16.5	15.8	18.4	15.8	9.7	5.4	6.0	4.8	4.7	5.2	7.5
	28.5m							This level was not instrumented for air temperature at this time																	
	26.5m	6.3	6.5	6.9	6.4	7.0	7.0	8.4	14.1	15.0	15.9	14.4	13.5	14.0	16.0	15.5	15.1	15.5	10.0	6.5	5.5	6.0	6.0	7.0	7.0
	13.5m	6.6	7.3	7.1	7.3	6.6	6.8	8.0	10.0	13.4	18.2	17.2	16.5	15.2	19.3	17.5	16.1	14.7	9.3	6.7	5.7	6.2	5.9	6.7	6.8
	8.0m							This level was not instrumented for air temperature at this time																	
	4.0m	6.0	7.0	7.0	8.4	7.0	8.0	9.0	15.0	11.5	14.0	17.0	14.5	13.0	15.0	17.0	16.0	14.5	8.5	6.0	5.0	5.5	4.5	7.0	5.5
	2.0m	5.5	7.0	7.5	7.5	7.5	8.0	9.0	13.8	11.8	14.9	17.8	15.8	14.0	14.4	17.7	15.7	14.0	8.5	6.0	5.0	5.0	5.5	8.0	6.0
	0.5m	4.5	5.5	6.0	6.6	6.5	6.0	6.0	7.6	8.6	11.1	13.1	15.6	14.6	16.0	14.7	14.2	12.5	7.0	6.0	5.0	5.0	4.5	5.0	5.0

Rio Hato	1.5m	4.5	5.0	5.0	5.0	5.0	5.5	5.0	9.0	10.5	12.5	13.5	11.0	9.5	9.5	10.0	9.5	11.0	9.5	7.0	6.5	5.0	5.0	4.5	4.0
----------	------	-----	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	-----	-----	------	-----	------	-----	-----	-----	-----	-----	-----	-----

SEPTEMBER 1966

Exposure		Monthly Means of Relative Humidity by Hour (%)																								Monthly Summary				
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No. of Obs.	Mean	Min.	Max.	
Albrook (Forest site)	46.0m	97.0	97.0	97.0	97.0	97.0	97.0	96.0	91.0	86.0	81.0	77.0	76.0	77.0	81.0	83.0	85.0	89.0	92.0	95.0	96.0	96.0	97.0	97.0	97.0	97.0	720	96.0	91.0	98.0
	28.5m	This level was not instrumented for relative humidity at this time																												
	26.5m	97.0	97.0	97.0	97.0	97.0	97.0	95.0	93.0	88.0	84.0	81.0	81.0	83.0	85.0	86.0	89.0	91.0	95.0	97.0	97.0	97.0	97.0	97.0	97.0	97.0	720	97.0	92.0	100.0
	13.5m	97.0	97.0	97.0	97.0	97.0	97.0	97.0	96.0	91.0	86.0	83.0	83.0	85.0	86.0	89.0	92.0	92.0	95.0	96.0	96.0	96.0	96.0	97.0	97.0	97.0	719	96.0	93.0	100.0
	8.0m	This level was not instrumented for relative humidity at this time																												
	4.0m	98.0	98.0	98.0	98.0	98.0	98.0	98.0	98.0	96.0	91.0	87.0	85.0	84.0	83.0	85.0	89.0	91.0	94.0	95.0	97.0	97.0	98.0	98.0	98.0	98.0	703	95.0	94.0	100.0
Albrook (Open site)	2.0m	98.0	98.0	98.0	98.0	98.0	98.0	98.0	96.0	93.0	89.0	87.0	86.0	85.0	87.0	90.0	92.0	94.0	96.0	97.0	97.0	97.0	98.0	98.0	98.0	98.0	703	94.0	94.0	100.0
	1.0m	97.0	97.0	97.0	97.0	97.0	97.0	98.0	100.0	98.0	94.0	91.0	89.0	88.0	89.0	90.0	92.0	93.0	94.0	95.0	96.0	97.0	97.0	97.0	97.0	719	98.0	95.0	100.0	
	0.5m	97.0	97.0	97.0	96.0	96.0	97.0	96.0	93.0	93.0	92.0	91.0	91.0	90.0	91.0	91.0	92.0	95.0	97.0	97.0	97.0	97.0	97.0	97.0	97.0	720	96.0	95.0	100.0	

Chiva Chiva (Open site)	46.0m	96.0	97.0	97.0	96.0	96.0	96.0	95.0	93.0	83.0	77.0	73.0	74.0	75.0	78.0	82.0	84.0	85.0	88.0	93.0	93.0	94.0	95.0	95.0	95.0	693	54.0	89.0	100.0	
	28.5m	This level was not instrumented for relative humidity at this time																												
	26.5m	96.0	97.0	97.0	96.0	96.0	96.0	95.0	90.0	83.0	79.0	76.0	76.0	75.0	79.0	82.0	86.0	87.0	91.0	94.0	94.0	95.0	96.0	95.0	96.0	718	56.0	89.0	100.0	
	13.5m	97.0	97.0	97.0	97.0	97.0	97.0	96.0	93.0	83.0	78.0	75.0	75.0	75.0	79.0	84.0	86.0	89.0	91.0	94.0	95.0	95.0	96.0	96.0	96.0	715	57.0	94.0	100.0	
	8.0m	This level was not instrumented for relative humidity at this time																												
	4.0m	96.0	97.0	97.0	97.0	97.0	97.0	92.0	82.0	79.0	74.0	71.0	72.0	71.0	74.0	80.0	82.0	86.0	91.0	94.0	95.0	95.0	96.0	96.0	96.0	719	52.0	88.0	100.0	
	2.0m	98.0	97.0	97.0	97.0	98.0	97.0	94.0	81.0	76.0	73.0	70.0	70.0	70.0	73.0	78.0	81.0	88.0	92.0	95.0	95.0	97.0	97.0	97.0	97.0	719	51.0	88.0	100.0	
	1.0m	97.0	97.0	97.0	97.0	97.0	97.0	96.0	91.0	81.0	74.0	70.0	72.0	72.0	78.0	81.0	85.0	88.0	94.0	96.0	96.0	97.0	97.0	97.0	97.0	710	44.0	89.0	100.0	
	0.5m	96.0	96.0	96.0	96.0	95.0	95.0	95.0	89.0	85.0	80.0	78.0	77.0	76.0	79.0	80.0	83.0	88.0	92.0	94.0	95.0	95.0	96.0	95.0	95.0	95.0	720	58.0	89.0	100.0

Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No. of obs.	Mean	Min.	Max.
Albrook	1.5m	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.0	93.0	88.0	85.0	82.0	83.0	83.0	85.0	86.0	88.0	91.0	97.0	100.0	100.0	100.0	100.0	100.0	658	63.0	94.0	100.0

SEPTEMBER 1966

Exposure		Monthly Ranges of Relative Humidity by Hour (%)																								Monthly Summary*	
Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
Albrook (Forest site)	46.0m	3.0	5.0	3.0	4.0	4.0	4.0	10.0	22.0	28.0	36.0	35.0	34.0	35.0	41.0	38.0	42.0	32.0	20.0	8.0	7.0	7.0	7.0	7.0	7.0		
	28.5m							This level was not instrumented for relative humidity at this time																			
	26.5m	2.0	2.0	2.0	2.0	2.0	2.0	23.0	34.0	34.0	40.0	41.0	43.0	40.0	37.0	35.0	39.0	31.0	23.0	7.0	5.0	3.0	5.0	3.0	3.0		
	13.5m	9.0	10.0	9.0	9.0	10.0	14.0	14.0	15.0	27.0	33.0	35.0	37.0	38.0	34.0	33.0	28.0	29.0	19.0	10.0	11.0	10.0	9.0	9.0	11.0		
	8.0m							This level was not instrumented for relative humidity at this time																			
	4.0m	7.0	5.0	7.0	8.0	5.0	5.0	8.0	9.0	19.0	25.0	22.0	26.0	33.0	34.0	34.0	27.0	17.0	13.0	11.0	9.0	9.0	9.0	5.0	5.0		
Albrook (Forest site)	2.0m	5.0	8.0	7.0	9.0	5.0	5.0	5.0	12.0	14.0	21.0	23.0	28.0	31.0	34.0	34.0	27.0	17.0	15.0	12.0	9.0	9.0	9.0	5.0	5.0		
	1.0m	6.0	4.0	4.0	4.0	4.0	4.0	4.0	3.0	14.0	17.0	23.0	25.0	31.0	32.0	31.0	32.0	20.0	13.0	10.0	9.0	7.0	6.0	6.0	5.0		
	0.5m	10.0	8.0	10.0	10.0	10.0	10.0	12.0	10.0	13.0	12.0	14.0	14.0	20.0	21.0	22.0	20.0	16.0	10.0	8.0	8.0	8.0	6.0	8.0	8.0		

* No monthly summary was computed for the ranges.

Chiva Chiva (Open site)	46.0m	7.0	6.0	6.0	7.0	8.0	9.0	12.0	14.0	37.0	36.0	37.0	40.0	46.0	46.0	44.0	42.0	20.0	28.0	12.0	8.0	10.0	6.0	6.0	14.0		
	28.5m							This level was not instrumented for relative humidity at this time																			
	26.5m	4.0	4.0	4.0	6.0	7.0	8.0	11.0	30.0	32.0	36.0	38.0	41.0	43.0	43.0	42.0	40.0	36.0	28.0	8.0	10.0	6.0	8.0	7.0	9.0		
	13.5m	9.0	9.0	9.0	9.0	9.0	9.0	23.0	33.0	33.0	32.0	34.0	38.0	43.0	37.0	36.0	39.0	35.0	30.0	9.0	7.0	7.0	7.0	7.0	8.0		
	8.0m							This level was not instrumented for relative humidity at this time																			
	4.0m	7.0	7.0	5.0	7.0	5.0	7.0	19.0	39.0	28.0	34.0	31.0	45.0	30.0	43.0	41.0	36.0	29.0	17.0	17.0	11.0	9.0	10.0	9.0	9.0		
Chiva Chiva (Open site)	2.0m	5.0	10.0	16.0	11.0	6.0	7.0	24.0	33.0	31.0	38.0	38.0	43.0	36.0	40.0	43.0	35.0	30.0	20.0	14.0	11.0	8.0	8.0	6.0	6.0		
	1.0m	7.0	5.0	5.0	4.0	4.0	7.0	23.0	35.0	45.0	50.0	56.0	53.0	54.0	52.0	47.0	42.0	42.0	22.0	10.0	7.0	5.0	4.0	5.0	4.0		
	0.5m	8.0	6.0	7.0	7.0	10.0	9.0	8.0	14.0	16.0	21.0	24.0	30.0	31.0	24.0	20.0	35.0	37.0	14.0	10.0	11.0	13.0	11.0	13.0	11.0		

Hato	1.5m	1.0	1.0	1.0	1.0	1.0	1.0	3.0	18.0	22.0	26.0	28.0	28.0	37.0	56.0	28.0	30.0	26.0	15.0	9.0	2.0	1.0	1.0	2.0	1.0		
------	------	-----	-----	-----	-----	-----	-----	-----	------	------	------	------	------	------	------	------	------	------	------	-----	-----	-----	-----	-----	-----	--	--

SEPTEMBER 1966

Exposure	Monthly Means ² of other Elements by Hour																								Monthly Summary				
	Site	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of Obs.	Min.	Mean	Max.
Albrook (Forest site)	ST	75.0	75.0	75.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	74.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	75.0	720	74.0	75.0	76.0
	W8 (4.0m)	73.9	73.7	73.6	73.4	73.1	73.0	73.6	75.8	77.1	77.2	77.9	78.0	77.8	77.6	77.2	77.0	76.6	76.0	75.5	75.2	75.0	74.8	74.5	74.1	703	69.	75.0	81.5
	W8 (0.5m)	73.9	73.7	73.6	73.4	73.1	73.0	73.6	75.8	77.3	77.5	78.1	78.2	78.1	77.9	77.3	77.0	76.6	76.1	75.6	75.2	75.0	74.9	74.5	74.1	703	69.0	75.5	81.5
	BP (0.5m)	74.1	73.8	73.8	73.6	73.4	73.4	73.5	74.9	76.6	77.6	78.1	78.4	78.4	78.0	77.5	77.2	76.7	76.3	75.9	75.4	75.1	74.9	74.7	74.4	720	69.7	75.4	80.8
	8P	.752	.739	.723	.717	.717	.727	.744	.757	.774	.781	.780	.767	.736	.720	.696	.687	.683	.693	.710	.726	.745	.762	.772	.767	720	.645	.732	.825
Albrook	P1	0.04	0.01	0.01	0.04	0.01	0.00	0.01	0.00	0.01	0.05	0.15	0.23	0.25	0.30	0.17	0.05	0.06	0.03	0.05	0.02	0.01	0.00	0.00	0.02	551	0.00	7.31	1.00
	P2	0.06	0.01	0.01	0.01	0.03	0.04	0.05	0.08	0.14	0.07	0.07	0.18	0.33	0.67	0.15	0.10	0.05	0.05	0.09	0.00	0.00	0.00	0.00	0.20	720	0.00	5.95	0.80
	P3	0.04	0.00	0.01	0.00	0.02	0.04	0.03	0.11	0.14	0.11	0.03	0.18	0.46	0.07	0.16	0.16	0.04	0.03	0.08	0.00	0.00	0.00	0.00	0.00	720	0.00	6.14	1.09
	P4	0.09	0.02	0.00	0.01	0.03	0.08	0.07	0.12	0.13	0.25	0.15	0.27	0.34	0.31	0.15	0.24	0.05	0.05	0.09	0.00	0.00	0.00	0.00	0.00	720	0.00	10.52	1.10

Note: Total (Mean) for P1 includes 6-hourly readings which are not included in hourly means.

Chiva Chiva (Open site)	ST	76.0	76.0	75.0	75.0	75.0	75.0	76.0	80.0	85.0	88.0	90.0	94.0	90.0	88.0	85.0	83.0	81.0	79.0	79.0	79.0	78.0	77.0	77.0	76.0	720	72.0	81.0	106.0
	W8 (4.0m)	73.2	73.1	72.9	72.6	72.6	72.4	74.6	75.3	76.7	76.7	76.9	76.8	77.2	76.6	76.0	75.6	76.2	76.0	75.6	75.2	74.8	74.6	74.2	73.6	715	67.5	74.9	80.2
	W8 (2.0m)	73.3	73.1	72.9	72.8	72.6	72.4	74.4	75.6	76.1	77.4	77.6	77.5	77.6	77.1	76.4	75.8	76.3	76.2	75.8	75.2	74.8	74.6	74.1	73.8	695	67.6	75.1	81.3
	W8 (0.5m)	73.7	73.3	73.2	72.9	72.8	72.5	74.0	75.9	77.4	77.5	79.0	79.1	79.4	78.7	77.5	76.5	76.4	76.2	75.7	75.2	74.7	74.6	74.4	73.9	720	68.3	75.6	82.9
	BP	.805	.788	.774	.777	.778	.768	.805	.822	.835	.840	.838	.818	.791	.769	.752	.745	.743	.755	.772	.789	.806	.824	.829	.819	720	.705	.794	.880
	PS	0.03	0.07	0.01	0.01	0.02	0.02	0.05	0.08	0.16	0.08	0.07	0.22	0.07	0.13	0.23	0.16	0.17	0.06	0.04	0.10	0.05	0.00	0.00	0.04	720	0.00	6.79	0.66

¹ ST - Soil surface temperature (°F)
W8 - Wet bulb temperature (°F)

8P - Barometric pressure (in. of Hg minus 29.0)

PS - Precipitation at 1.0 m in open area (in.)
P1 - Precipitation at 45.0 m, above canopy (in.)
P2 - Precipitation under full canopy (in.)

P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

² Monthly means of precipitation are computed for precipitation days. Precipitation totals are substituted for the mean in the monthly summary.

SEPTEMBER 1966

Exposure	Site	Monthly Ranges ² of other Elements by Hour																								Monthly Summary *
		01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
ST	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	
WB	5.5	5.5	5.5	6.0	6.3	6.8	7.0	6.6	5.9	4.2	4.7	6.2	5.3	4.5	8.0	6.5	7.0	8.0	5.5	4.5	3.5	4.5	4.5	4.9	4.2	
(4.0m)																										
WB	5.5	6.0	6.0	6.3	6.8	6.9	6.4	5.3	4.4	5.0	5.7	5.5	3.7	7.5	6.5	7.0	7.0	5.5	4.0	3.5	4.2	4.5	4.5	4.9	4.2	
(2.0m)																										
WB	4.5	5.0	5.5	5.7	6.7	6.7	6.6	6.5	4.9	5.0	5.3	5.2	5.0	7.0	7.0	7.5	5.5	5.5	4.5	4.0	4.0	4.0	4.3	4.5	4.5	
(0.5m)																										
* BP	.065	.075	.070	.075	.085	.060	.09	.100	.085	.115	.095	.080	.105	.120	.070	.065	.080	.085	.085	.060	.050	.055	.070	.075	.075	
P1	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.30	0.99	0.67	0.49	0.13	0.15	0.10	0.05	0.02	0.00	0.00	0.00	0.00	0.00	
P2	0.02	0.00	0.00	0.00	0.05	0.00	0.06	0.00	0.26	0.12	0.12	0.28	0.73	0.19	0.40	0.29	0.14	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
P3	0.03	0.00	0.00	0.00	0.01	0.07	0.04	0.00	0.23	0.00	0.04	0.22	1.07	0.29	0.39	0.54	0.09	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
P4	0.00	0.01	0.00	0.00	0.03	0.05	0.06	0.00	0.35	0.00	0.00	0.33	1.03	0.88	0.58	1.09	0.12	0.08	0.14	0.00	0.00	0.00	0.00	0.00	0.00	

* No monthly summary was computed for the ranges.

ST	4.0	4.0	5.0	5.0	6.0	6.0	5.0	12.0	19.0	22.0	26.0	24.0	26.0	24.0	25.0	16.0	14.0	8.0	8.0	8.0	4.0	4.0	3.0	3.0	4.0	
WB	5.0	6.5	7.0	7.0	7.0	8.0	5.5	6.3	5.5	6.0	7.0	6.0	6.0	5.5	6.5	7.0	8.0	7.8	5.8	3.8	4.5	3.5	4.5	7.0	5.5	
(4.0m)																										
WB	5.0	6.5	8.0	7.0	7.0	8.0	5.5	6.0	5.5	5.0	7.0	6.0	6.0	5.5	7.5	8.0	8.0	6.5	4.0	4.5	4.0	4.5	4.5	7.5	5.5	
(2.0m)																										
WB	4.5	4.9	5.5	6.0	7.0	7.4	6.2	6.4	6.0	6.1	6.9	7.4	6.9	10.0	9.6	8.9	8.2	6.0	4.2	4.0	4.0	4.0	4.0	5.0	4.0	
(0.5m)																										
BP	.070	.075	.070	.075	.090	.080	.090	.100	.080	.120	.080	.075	.100	.100	.080	.075	.060	.075	.080	.075	.060	.065	.075	.080	.080	
PS	0.04	0.04	0.00	0.00	0.04	0.01	0.06	0.13	0.18	0.11	0.00	0.50	0.14	0.31	0.54	0.30	0.61	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

¹ ST - Soil surface temperature (°F)
WB - Wet bulb temperature (°F)
BP - Barometric pressure (in. of Hg minus 29.0)

PS - Precipitation at 1.0 m in open area (in.)
P1 - Precipitation at 46.0 m, above canopy (in.)
P2 - Precipitation under full canopy (in.)

² Monthly ranges of precipitation are computed for precipitation days. Precipitation totals are substituted for the mean in the monthly summary.

P3 - Precipitation under drip canopy (in.)
P4 - Precipitation under open canopy (in.)

SEPTEMBER 1966

Exposure	Monthly Means of Wind Speed by Hour (miles/hr.)																								Monthly Summary																						
	Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No of Obs.	Min.	Mean	Max.																	
Aldbrook (Forest site)	46.0 m		1.0	1.0	1.0	1.0	2.0	1.0	1.0	2.0	2.0	2.0	2.0	4.0	5.0	5.0	4.0	2.0	3.0	1.0	2.0	2.0	2.0	2.0	2.0	1.0	719	0.0	2.0	28.0																	
	28.5 m									This level was not instrumented for wind speed at this time																																					
	26.5 m		0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	720	0.0	1.0	7.0																	
	13.5 m		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	720	0.0	0.0	4.0																	
	8.0 m									This level was not instrumented for wind speed at this time																																					
	4.0 m		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	720	0.0	0.0	2.0																	
Aldbrook (Forest site)	2.0 m		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	720	0.0	0.0	0.0																	
	1.0 m									This level was not instrumented for wind speed at this time																																					
	0.5 m									This level was not instrumented for wind speed at this time																																					

41

Chiva Chiva (Open site)	46.0 m	3.0	3.0	3.0	3.0	4.0	5.0	6.0	7.0	7.0	8.0	7.0	7.0	7.0	7.0	5.0	5.0	5.0	4.0	3.0	3.0	3.0	720	0.0	5.0	20.0
	28.5 m	This level was not instrumented for wind speed at this time																								
	26.5 m	0.0	1.0	1.0	1.0	1.0	2.0	3.0	4.0	5.0	5.0	6.0	6.0	6.0	5.0	4.0	4.0	2.0	1.0	1.0	1.0	1.0	712	0.0	2.0	22.0
	13.5 m	0.0	0.0	0.0	0.0	0.0	1.0	2.0	2.0	3.0	4.0	4.0	5.0	4.0	3.0	2.0	2.0	1.0	1.0	1.0	0.0	0.0	712	0.0	2.0	15.0
	8.0 m	This level was not instrumented for wind speed at this time																								
	4.0 m	2.0	2.0	1.0	2.0	2.0	3.0	4.0	5.0	6.0	6.0	6.0	6.0	6.0	5.0	5.0	3.0	2.0	2.0	1.0	2.0	2.0	718	0.0	3.0	14.0
	2.0 m	0.0	0.0	0.0	0.0	0.0	1.0	2.0	2.0	3.0	3.0	4.0	4.0	3.0	2.0	2.0	1.0	0.0	0.0	1.0	0.0	0.0	712	0.0	1.0	10.0
	1.0 m	This level was not instrumented for wind speed at this time																								
	0.5 m	This level was not instrumented for wind speed at this time																								

Rio	4.0 m		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	2.0	4.0	2.0	2.0	2.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	432	0.0	1.0	11.0
-----	-------	--	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------

SEPTEMBER 1966

Exposure	Monthly Ranges of Wind Speed by Hour (miles/hr.)																								Monthly Summary																						
	Site	Level	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	No. of Obs.	Min.	Mean	Max.																	
Albrook (Forest site)	46.0 m	6.0	7.0	6.0	8.0	14.0	15.0	5.0	7.0	12.0	10.0	9.0	14.0	28.0	15.0	18.0	13.0	20.0	9.0	10.0	10.0	10.0	13.0	9.0	9.0	9.0																					
	28.5 m								This level was not instrumented for wind speed at this time																																						
	26.5 m	3.0	2.0	2.0	2.0	2.0	2.0	2.0	4.0	3.0	3.0	6.0	4.0	6.0	6.0	4.0	5.0	7.0	3.0	3.0	3.0	6.0	7.0	3.0	1.0	1.0																					
	13.5 m	0.0	0.0	0.0	0.0	0.0	0.0	1.0	2.0	1.0	2.0	3.0	2.0	2.0	4.0	1.0	2.0	2.0	0.0	1.0	2.0	2.0	2.0	1.0	0.0	0.0																					
	8.0 m								This level was not instrumented for wind speed at this time																																						
	4.0 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	2.0	0.0	2.0	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0																				
	2.0 m	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0																				
	1.0 m									This level was not instrumented for wind speed at this time																																					
0.5 m									This level was not instrumented for wind speed at this time																																						

* No monthly summary was computed for the ranges.

Chiva Chiva (Open site)	46.0 m	9.0	8.0	7.0	8.0	10.0	8.0	6.0	10.0	10.0	9.0	20.0	15.0	17.0	11.0	13.0	10.0	15.0	8.0	11.0	16.0	19.0	9.0	10.0	8.0				
	28.5 m								This level was not instrumented for wind speed at this time																				
	26.5 m	2.0	7.0	5.0	5.0	6.0	4.0	5.0	8.0	8.0	7.0	15.0	13.0	18.0	11.0	15.0	12.0	15.0	7.0	7.0	15.0	22.0	7.0	6.0	4.0				
	13.5 m	1.0	3.0	3.0	3.0	2.0	4.0	5.0	7.0	7.0	7.0	13.0	12.0	15.0	9.0	7.0	7.0	19.0	3.0	3.0	5.0	15.0	2.0	2.0	2.0				
	8.0 m								This level was not instrumented for wind speed at this time																				
	4.0 m	4.0	6.0	8.0	5.0	6.0	5.0	5.0	8.0	7.0	8.0	7.0	10.0	14.0	8.0	9.0	10.0	9.0	6.0	6.0	8.0	11.0	4.0	6.0	4.0				
	2.0 m	2.0	2.0	2.0	2.0	2.0	2.0	4.0	4.0	5.0	5.0	8.0	8.0	10.0	8.0	8.0	8.0	10.0	3.0	2.0	3.0	10.0	1.0	3.0	1.0				
	1.0 m								This level was not instrumented for wind speed at this time																				
	0.5 m								This level was not instrumented for wind speed at this time																				

Rio Hato	4.0 m	0.0	1.0	2.0	1.0	3.0	3.0	5.0	3.0	1.0	3.0	6.0	7.0	11.0	4.0	6.0	2.0	2.0	3.0	1.0	1.0	1.0	1.0	1.0	0.0				
----------	-------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	--	--	--	--

ALBROOK (Forest site) SEPTEMBER 1966

Relative Frequencies* of Wind Directions by Hour at 46.0 m. (%)																								
Hr Dir.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N	3.3				3.3		3.3	3.3	3.3	3.3	3.3		3.6	3.3	6.7	3.3	3.3	3.3			3.3	3.3		
NNE		6.7		3.3		3.3						3.6	3.6					3.3						
NE	3.3				6.7		3.3	3.3	3.3		6.7		3.6					3.3		3.3	3.3	3.3	5.7	6.7
ENE			3.3		3.3									3.3										
E								3.3	3.3	3.3	3.6	3.6	3.6		3.3		6.7			3.3	3.3			
ESE												3.6	3.6											
SE									6.7	10.0	3.3	3.6	3.6	3.3	10.0			3.3						3.3
SSE										10.0	10.0	3.6	6.9	3.3	3.3									
S								6.7	6.7	3.3	6.7	23.5	30.3	20.0	20.0	23.3	3.3							
SSW													3.6	3.3										
SW												6.9		3.3	3.3		6.7							
WSW												3.6				3.3								
W	3.3	3.3		3.3	3.3		6.7	10.0	6.7	3.3	13.3	3.6	6.9	3.3	6.7	10.0	3.3	3.3	3.3	3.3	6.7	3.3	6.7	3.3
WNW	3.3	3.3	3.3	6.7	6.7	3.3	13.3		6.7	3.3		3.6	3.6	6.7			6.7		6.7		3.3	3.3		
NW	16.7	16.7	10.0	13.3	10.0	23.3	13.3	6.7		13.3	3.3	3.6	3.6	6.7	13.3	16.7	23.3	10.0	20.0	6.7	20.0	13.3	16.7	13.3
NNW			6.7		3.3					3.3		3.6		3.3				6.7	6.7	10.0		3.3	6.7	3.3
CALM	70.0	70.0	73.3	73.3	63.3	70.0	60.0	66.7	63.3	46.7	50.0	33.6	26.6	36.7	33.3	43.3	46.7	55.7	63.3	73.3	60.0	70.0	63.3	70.0

* Note: Due to rounding, percentage totals do not equal 100%.

ALBROOK (Forest site) SEPTEMBER 1966

		Relative Frequencies* of Wind Directions by Hour at 4.0 m (%)																							
Hr.	Dir.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	N																								
	NNE																								
	NE																								
	ENE																								
	E																	12.5							
	ESE																								
	SE								14.3	14.3	14.3			14.3											
	SSE															12.5									
	S											14.3													
	SSW																								
	SW																								
	WSW																								
	W																12.5								
	WNW																								
	NW																								
	NNW																								
	CALM	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	55.7	85.7	85.7	100.0	85.7	100.0	87.5	87.5	100.0	87.5	100.0	100.0	100.0	100.0	100.0	100.0

* Note: Due to rounding, percentage totals do not equal 100%.

CHIVA CHIVA (Open site) SEPTEMBER 1960

		Relative Frequencies* of Wind Directions by Hour at 46.0 m (%)																							
Dir.	HR	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N			6.7	10.0	3.3	10.0	16.7	6.7	6.7	16.7	3.3	6.7	6.7	6.7	3.3	6.7	13.3		16.7	16.7	13.3	16.7	13.3	10.0	
NNE		6.7	3.3		3.3	10.0		3.3				3.3	3.3			10.0	6.7	3.3	3.3	10.0	13.3	3.3	3.3		3.3
NNE		3.3	3.3	3.3		3.3		3.3	3.3		3.3	6.7	6.7	3.3	3.3	3.3	3.3	3.3	6.7		3.3	3.3	3.3	10.0	
ENE				3.3	3.3	3.3	6.7				3.3				3.3	3.3					3.3	3.3	3.3	6.7	3.3
E			3.3			6.7	3.3	10.0	10.0	3.3	3.3					3.3		3.3	10.0	6.7	3.3		10.0	3.3	
ESE				3.3	3.3	3.3	3.3			3.3			3.3	3.3	3.3				3.3	6.7	10.0	6.7	3.3		
ESE							3.3		3.3	3.3	3.3	10.0	13.3	13.3	3.3	3.3	13.3	10.3	3.3	6.7	3.3		3.3	3.3	3.3
SE										3.3	3.3	6.7	6.7	6.7	13.3	13.3	13.3		3.3						
SSE	3.3									3.3	3.3	6.7	6.7	6.7	13.3	13.3	13.3								3.3
S				3.3	3.3				6.7	13.3	26.7	20.0	30.0	30.0	40.0	26.7	6.7	16.7	10.0						
SSW					3.3			3.3								3.3	3.3				3.3			3.3	
SW	3.3				3.3				6.7	3.3	6.7	6.7			6.7	3.3	6.7	3.3	3.3			3.3			
WSW			3.3			3.3	3.3				3.3							3.3			6.7			3.3	3.3
W	6.7	10.0	23.3	13.3	3.3	10.0	13.3	3.3	10.0	6.7	16.7	6.7	6.7	3.3	3.3	3.3	3.3	3.3	6.7	3.3	6.7	13.3		10.0	3.3
WNW	10.0	16.7	10.0		10.0	6.7	6.7	6.7	16.7	10.0	6.7	3.3	10.0	16.7	6.7	6.7	13.3	13.3	16.7	10.0	10.0	13.3	16.0	13.3	3.3
NW	30.0	23.3	10.0	23.3	26.7	30.0	26.7	6.7	20.0	16.7	10.0	10.0	10.0	10.0	13.3	3.3	13.3	26.7	6.7	23.3	23.3	13.3	23.3	23.3	26.7
NNW	20.0	23.3	16.7	16.7	13.3	6.7	6.7	20.0	5.7	3.3	3.3	0	3.3		3.3	6.7	3.3	6.7	23.3	13.3	6.7	10.0	16.7	6.7	16.7
CALM	16.7	6.7	20.0	16.7	13.3	16.7	10.0	16.7	16.7			3.3	3.3			5.3		3.3			3.3	13.3	10.0	10.0	13.3

* Note: Due to rounding, percentage totals do not equal 100%.

CHIVA CHIVA (Open site) SEPTEMBER 1966

Relative Frequencies* of Wind Directions by Hour at 4.0 m (%)																									
Hr. Dir.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
N	6.7	6.7	6.7	10.0	6.7	3.3	10.0	6.7		10.0		3.3	3.3	6.7	13.3	13.3	3.3	6.7	6.7				3.6	3.6	
NNE	3.3		3.3	6.7	10.0	6.7		3.3				3.3			3.3	3.3		6.7	10.0	6.7	3.3	10.0		10.3	
NE	13.3	10.0	6.7		6.7	6.7	6.7	3.3			3.3	3.3	3.3	6.7	3.3			3.3	3.3			6.7	7.0	10.3	
ENE				6.7	10.0	3.3	3.3				3.3		3.3				3.3					3.3			
E	3.3		6.7						6.7	6.7	3.3		3.3				6.7	20.0		3.3			7.0		
ESE					3.3		3.3	3.3	3.3					3.3	3.3	6.7	6.7		3.3			6.7		3.6	
SE	3.3						3.3	6.7	3.3	3.3	10.0	16.7	13.3	6.7	13.3	16.7	3.3	6.7				3.3	3.6	3.3	
SSF							3.3	3.3		6.7	6.7	13.3	6.7	10.0	6.7	6.7	3.3		3.3						
S	6.7	3.3		3.3		3.3	6.7	6.7	16.7	33.3	23.3	23.3	30.0	3.3	23.3	6.7	10.0	6.7	3.3					7.0	
SSW			3.3											3.3	3.3	3.3	6.7	3.3							
SW		6.7	3.3							3.3	6.7	3.3				3.3	6.7	3.3	3.3		3.3				
WSW	3.3		3.3				6.7		3.3				3.3	6.7		10.0			3.3	6.7	3.3		10.4		
W	3.3	3.3	6.7	20.0	10.0	10.0	16.7	10.0	10.0	3.3	13.3	6.7	10.0	10.0	10.0	3.3	3.3	13.3	3.3	6.7	10.0	6.7	3.6	7.0	
WNW		3.3	3.3		6.7	3.3	3.3	10.0	6.7	6.7	6.7	10.0	6.7	3.3	6.7	6.7	20.0	13.3	13.3	13.3	16.7	16.7	10.4	7.0	
NW	30.0	26.7	10.0	13.3	16.7	20.0	3.3	10.0	23.3	20.0	16.7	10.0	6.7	6.7	3.3	13.3	20.0	10.0	6.7	10.0	10.0	3.3	10.4	10.3	
NNW	3.3	6.7	6.7	10.0	3.3	3.3		10.0	6.7	3.3	6.7		6.7	3.3	10.0	3.3	6.7	3.3	16.7	10.0	3.3	10.0	7.0	13.6	
CALM	23.3	33.3	40.0	30.0	26.7	36.7	33.3	30.0	20.0	3.3		6.7	3.3			3.3		3.3	23.3	26.7	50.0	33.3	37.0	23.6	

* Note: Due to rounding, percentage totals do not equal 100%.

RIO HATO SEPTEMBER 1966

Relative Frequencies* of Wind Directions by Hour a. 4.0 m (%)																								
Hr. Dir.	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
N						5.5	5.5	12.0		5.8		11.9		5.5	16.8			5.0	5.0	10.6	5.2			
NNE			5.3	5.3	11.5			5.8	6.6				5.5	5.5			5.1				5.2			
NE																					5.2			
ENE																						5.2		
E																5.5								
ESE										12.0	6.2	11.9	11.2		5.5	5.5								
SE									6.6	5.8	31.2	36.0	11.2		5.5	11.2								
SSE										18.0	12.5	5.8	22.3	28.4	16.8	16.8	10.5							
S										12.0	19.0	18.0	28.2	39.6	11.2	5.5	10.5							
SSW														5.5	11.2	11.2								
SW																								
WSW											6.2		11.2	5.5										
W							5.5	5.8		5.8	6.2			5.5		5.5								
WNW					5.3	11.5	5.5			5.8							5.0							
NW			5.0	5.3		5.5	11.2					5.8							5.0				5.1	
NNW					5.5				13.0		6.2		5.5					5.0	5.0	5.2			5.1	4.8
CALM	100.0	95.0	90.7	90.7	72.3	85.0	77.9	77.8	73.4	36.0	12.5	11.9	5.5	5.5	28.2	45.0	74.5	85.0	85.0	85.2	85.2	95.8	90.5	95.4

* Note: Due to rounding, percentage totals do not equal 100%.

SEPTEMBER 1966

Summary of Elements with Non-hourly Frequencies of Observation						
Site	Element, Units and Exposure	Description	Number of Obs.	Minimum Value	Mean or Total Value	Maximum Value
Albrook (Coast site)	WBG Index ¹ (at 1.5 meters)	Index value	420	69.3	77.2	82.1
		Dry bulb temp.	420	70.0	78.0	87.5
		Wet bulb temp.	420	69.0	76.7	81.0
		Black bulb temp.	420	70.0	78.7	88.5
	Evaporation ³ (in. at 3 levels)	Piche (46.0 m)	30	0.000	4.785*	0.433
		Piche (26.5 m)	30	0.000	3.381*	0.274
		Piche (0.5 m)	28	0.000	0.367*	0.043
	Precipitation from Raingauge Network ² (in. at 1.0 meters)	Gauge # 1	120	0.00	8.17*	1.76
		Gauge # 2	120	0.00	9.19*	1.72
		Gauge # 3	120	0.00	8.09*	1.62
		Gauge # 4	120	0.00	6.70*	1.11
		Gauge # 5	120	0.00	6.94*	1.28
		Gauge # 6	120	0.00	6.93*	0.95
		Gauge # 7	120	0.00	8.30*	1.44
Gauge # 8		120	0.00	6.46*	1.09	
Stem Flow ² (in. at 2.0 meters)	Small tree	120	0.00	5.94*	1.25	
	Medium tree	120	0.00	32.59*	15.42	
	Large tree	120	0.00	173.22*	68.97	
Chiva Chiva (Open site)	WBG Index ¹ (at 1.5 meters)	Index value	420	67.9	80.0	90.0
		Dry bulb temp.	420	68.0	80.8	98.0
		Wet bulb temp.	420	68.0	77.1	82.2
		Black bulb temp.	420	67.5	89.7	122.0
	Evaporation ³ (in. at 0.5 meters)	Piche	30	0.000	3.200*	0.207
Pan		29	0.000	4.034*	0.299	
	Minimum Grass temp ³ (°F at grass tips)	None	30	69.0	72.0	75.0
Albrook **	Maximum temp. (°F at 1.5m)	In open area Under canopy	23	78.0	83.5	87.0
	Minimum temp. (°F at 1.5m)		23	71.0	73.9	76.5
	Maximum R. H. (% at 1.5m)		23	94.0	98.0	100.0
	Minimum R. H. (% at 1.5m)		23	62.0	84.0	100.0
	Precipitation ³ (in. at 1.0m)		25	0.00	7.41*	1.22
			25	0.00	7.29*	1.47
Ft. Kobbe **	Maximum temp. (°F at 1.5m)	In open area Under canopy	22	78.0	82.3	85.0
	Minimum temp. (°F at 1.5m)		22	72.0	73.7	75.0
	Maximum R. H. (% at 1.5m)		22	85.0	97.0	100.0
	Minimum R. H. (% at 1.5m)		22	65.0	83.0	8.0
	Precipitation ³ (in. at 1.0m)		25	0.00	5.58*	1.20
			25	0.00	2.87*	0.62
Ft. Sherman **	Maximum temp. (°F at 1.5m)	In open area Under canopy	26	76.5	80.7	84.0
	Minimum temp. (°F at 1.5m)		26	70.5	74.2	76.0
	Maximum R. H. (% at 1.5m)		26	98.0	99.0	100.0
	Minimum R. H. (% at 1.5m)		26	70.0	88.0	99.0
	Precipitation ³ (in. at 1.0m)		27	0.00	12.45*	1.74
			27	0.00	8.59*	1.46

- 1 - Hourly observations between 0600 and 1900 hours inclusive
 2 - Six hourly observations
 3 - Daily observations

* Total Values
 ** Satellite

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) US Army Tropic Test Center Fort Clayton, Canal Zone		2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED	
		2b. GROUP	
3. REPORT TITLE Monthly Microclimatic Summary, September 1966: Environmental Data Base for Regional Studies in the Humid Tropics			
4. DESCRIPTIVE NOTE (Type of report and inclusive dates) Data Summary, September 1966			
5. AUTHOR(S) (Last name, first name, initial)			
6. REPORT DATE November 1966		7a. TOTAL NO. OF PAGES 28	7b. NO. OF REFS
8a. CONTRACT OR GRANT NO. A. PROJECT NO. 2M025001A724-01 C. USATECOM NO. 9-4-0013-01 d. Work Unit: USATTC #001		8b. ORIGINATOR'S REPORT NUMBER(S) 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
10. AVAILABILITY/LIMITATION NOTICES Distribution of this document is unlimited			
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY Advanced Research Projects Agency Army Research Projects Office, OCRD	
13. ABSTRACT This report contains detailed microclimatic data for September 1966 from specific sites in the Panama Canal Zone and vicinity. The data are presented in tabular form, summarized for hourly and/or daily observations from surface to 46-meter levels. Elements listed are: temperature, pressure, precipitation, wind speed and direction, relative humidity, and evaporation.			

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Climate Microclimatology Tropic Environment Humid Tropics Panama Canal Zone Microclimatology Data Base						

INSTRUCTIONS

1. **ORIGINATING ACTIVITY:** Enter the name and address of the contractor, subcontractor, grantee, Department of Defense activity or other organization (corporate author) issuing the report.

2a. **REPORT SECURITY CLASSIFICATION:** Enter the overall security classification of the report. Indicate whether "Restricted Data" is included. Marking is to be in accordance with appropriate security regulations.

2b. **GROUP:** Automatic downgrading is specified in DoD Directive 5200.10 and Armed Forces Industrial Manual. Enter the group number. Also, when applicable, show that optional markings have been used for Group 3 and Group 4 as authorized.

3. **REPORT TITLE:** Enter the complete report title in all capital letters. Titles in all cases should be unclassified. If a meaningful title cannot be selected without classification, show title classification in all capitals in parenthesis immediately following the title.

4. **DESCRIPTIVE NOTES:** If appropriate, enter the type of report, e.g., interim, progress, summary, annual, or final. Give the inclusive dates when a specific reporting period is covered.

5. **AUTHOR(S):** Enter the name(s) of author(s) as shown on or in the report. Enter last name, first name, middle initial. If military, show rank and branch of service. The name of the principal author is an absolute minimum requirement.

6. **REPORT DATE:** Enter the date of the report in day, month, year, or month, year. If more than one date appears on the report, use date of publication.

7a. **TOTAL NUMBER OF PAGES:** The total page count should follow normal pagination procedures, i.e., enter the number of pages containing information.

7b. **NUMBER OF REFERENCES:** Enter the total number of references cited in the report.

8a. **CONTRACT OR GRANT NUMBER:** If appropriate, enter the applicable number of the contract or grant under which the report was written.

8b, 8c, & 8d. **PROJECT NUMBER:** Enter the appropriate military department identification, such as project number, subproject number, system numbers, task number, etc.

9a. **ORIGINATOR'S REPORT NUMBER(S):** Enter the official report number by which the document will be identified and controlled by the originating activity. This number must be unique to this report.

9b. **OTHER REPORT NUMBER(S):** If the report has been assigned any other report numbers (either by the originator or by the sponsor), also enter this number(s).

10. **AVAILABILITY/LIMITATION NOTICES:** Enter any limitations on further dissemination of the report, other than those imposed by security classification, using standard statements such as:

- (1) "Qualified requesters may obtain copies of this report from DDC."
- (2) "Foreign announcement and dissemination of this report by DDC is not authorized."
- (3) "U. S. Government agencies may obtain copies of this report directly from DDC. Other qualified DDC users shall request through _____."
- (4) "U. S. military agencies may obtain copies of this report directly from DDC. Other qualified users shall request through _____."
- (5) "All distribution of this report is controlled. Qualified DDC users shall request through _____."

If the report has been furnished to the Office of Technical Services, Department of Commerce, for sale to the public, indicate this fact and enter the price, if known.

11. **SUPPLEMENTARY NOTES:** Use for additional explanatory notes.

12. **SPONSORING MILITARY ACTIVITY:** Enter the name of the departmental project office or laboratory sponsoring (paying for) the research and development. Include address.

13. **ABSTRACT:** Enter an abstract giving a brief and factual summary of the document indicative of the report, even though it may also appear elsewhere in the body of the technical report. If additional space is required, a continuation sheet shall be attached.

It is highly desirable that the abstract of classified reports be unclassified. Each paragraph of the abstract shall end with an indication of the military security classification of the information in the paragraph, represented as (TS), (S), (C), or (U).

There is no limitation on the length of the abstract. However, the suggested length is from 150 to 225 words.

14. **KEY WORDS:** Key words are technically meaningful terms or short phrases that characterize a report and may be used as index entries for cataloging the report. Key words must be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location, may be used as key words but will be followed by an indication of technical context. The assignment of links, rules, and weights is optional.