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AUG 80 R T PINKER, O E THOMPSON

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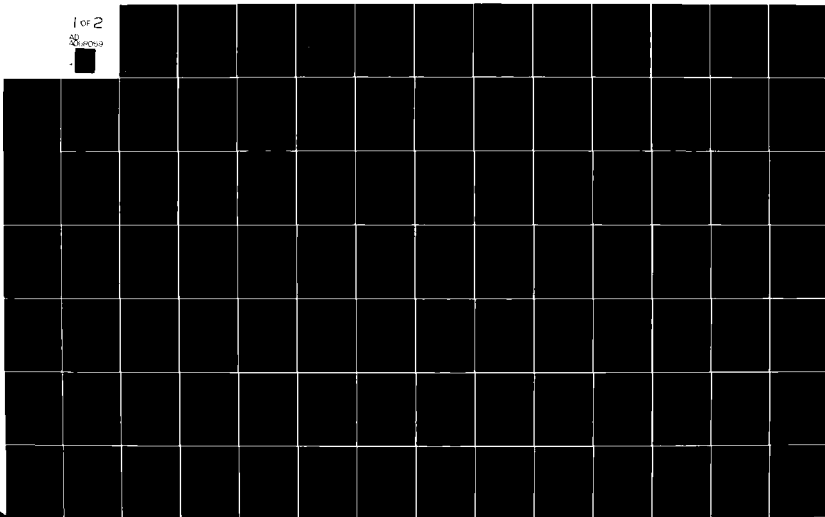
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)
Selected results of a three year project to study the climatological and micro-meteorological conditions in a tropical evergreen forest, are summarized in this report. The forest area under study is in the interior of Thailand and is influenced by a cool, dry northeast monsoonal flow in the winter and a warm, moist southwest monsoonal flow in the summer. Information collected during a three year field program included ground stations temperature, relative humidity,

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precipitation, evaporation, hours of sunshine and tower measurements of temperature, dew point temperature, wind velocity, incoming and reflected solar radiation, incoming and outgoing infra-red radiation, spectral radiation and sub-surface temperature profiles in the forest and in a cleared area within the forest.



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The MICROCLIMATE
OF
A TROPICAL EVERGREEN FOREST

by

R. T. Pinker and O. E. Thompson

Preliminary Final Report on Grant
DRXRD-GS-13660

from

The Army Research Office
Durham, N. C.

to

The Department of Meteorology
University of Maryland

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ABSTRACT

Selected results of a three year project to study the climatological and micrometeorological conditions in a tropical evergreen forest, are summarized in this report. The forest area under study is in the interior of Thailand and is influenced by a cool, dry northeast monsoonal flow in the winter and a warm, moist southwest monsoonal flow in the summer. Information was collected during a three year field program sponsored by the U.S. Army Natick Laboratories and included ground stations temperature, relative humidity, precipitation, evaporation, hours of sunshine and tower measurements of temperature, dew point temperature, wind velocity, incoming and reflected solar radiation, incoming and outgoing infra-red radiation, spectral radiation and sub-surface temperature profiles in the forest and in a cleared area within the forest.

Since the topics investigated during this three year period were of a diverse nature and too numerous to account for in detail in a single report, only a selected number of research topics will be presented here. The emphasis will be on the microclimate as evidenced by the temperature and velocity fields above and within the forest and clearing, their average seasonal characteristics, their variability, the stability conditions and the micrometeorological parameters of the site.

To put the findings in a proper framework, the general climate at the site will be briefly outlined. The results are purposefully presented in an expanded format so as to enable the reader to easily extract useful information.

A selected listing of a representative data base will appear in Appendix C.

INTRODUCTION

This report serves as a final report on Grant DRXRD-GS-13660 from the Army Research office, Durham, N.C. to the Department of Meteorology, University of Maryland. The objective of the research was to prepare an analysis of the climatological and micrometeorological data obtained during a scientific field program called TREND (Tropical Environmental Data). The TREND field experiment was under the sponsorship and management of the Earth Sciences Laboratory, U.S. Army Natick Laboratories* and carried out by the Applied Scientific Research Corporation of Thailand in collaboration with several agencies of the Thai Government. The experiments were conducted during the years 1967-1970 as an interdisciplinary study of a tropical dry evergreen forest environment and embodied surveys of soil, vegetation and surveys of micrometeorological, hydrological, and biological conditions.

The experimental design for the micrometeorological survey called for the collection and processing of temperature, dew point temperature, wind speed and direction at numerous levels along both towers, various radiation fluxes at the top of the towers and near the ground, and subsurface temperature profiles near both towers. Six satellite ground stations recorded temperature, humidity, precipitation, evaporation, and sunshine duration.

The results presented in this report emanate from efforts at the University of Maryland to extract useful climatological and micrometeorological information from the raw data available to us.

*(Dr. Paul Dalrymple: Project Supervisor).

1. Site and instrumentation

The study site for the TREND experiment is the Sakaerat Forest, an area of about 80 square kilometers in Thailand situated on the Korat Plateau at approximately 14°31'N, 101°55'E which is about 60 km south-southwest of Khorat (Nakhon Ratchasima) and about 190 km northeast of Bangkok (Figure 1). Meteorological data were taken along two towers approximately 50 m high (Fig. 2) and 450 m apart, one tower in the forest, the other in a small clearing and both based at about 535 m above sea level on a tilted slightly dissected sandstone plateau which slopes from southwest to northeast. Figure 3 shows schematically the location of the various measuring instruments along each tower. The forest includes good stands of dry evergreen forest, dry dipterocarp forest and clearings in various stages of regeneration. The immediate vicinity of the towers is comprised of a two-storied forest. The top story consists almost exclusively of Hopea ferrea, with a scattering of Shorea sericeiflora, with dense and continuous crown canopy with tree tops ranging from 20-35 m high. The second story consists of the species Hydrocarpus ilicifolius, Walsura trichostemon, Aglaia pirifera, Lagerstroemia, and Memecylon ovatum with tops ranging from 5-17 m high. The forest floor was well covered with thick undergrowth. The adjacent experimental clearing site was approximately 500 m in diameter, covered with low vegetation (mainly elephant grass), at different stages of regeneration.

A general account of the instrumentation and monitoring procedures

is given in ASRCT (1969) and Dalrymple (1975). Here, only a brief outline of the instruments and data acquisition system will be presented.

Temperature measurements at both towers were made with Hewlett - Packard quartz thermometers. The sensing element is a quartz crystal whose temperature dependent probes are placed in shielded, motored aspirators supplied by Climet (Fig. 4). Two types of temperature probes were used, one for air and one for soil.

Dewpoint temperatures were measured by a dewpoint hygrometer composed of two units: the mirrored transducer and the controller. A light beam was sensed by two separate photodiodes; one sensed the direct beam from the lamp, and the other sensed the reflected beam off the mirror. The two energy levels were continuously compared and when dew formed, the transducer output was applied to the controller circuitry where it was compared to a fixed voltage. Windspeed sensors were Climet three-up anemometers (Fig. 4) having a threshold velocity of 0.3 m/sec. Wind direction was detected by Climet wind direction transmitters and vanes.

Rainfall was measured electronically by a standard weighting-type gauge from Science Associates. The gauges were located at the top and near the base of each tower.

Atmospheric pressure was measured with a precision pressure gauge made by Texas Instruments.

There was in operation an extensive solar radiation program which included arrays of instrumentation mounted on the top of the forest tower and on the forest floor. There were also instruments placed

near the surface close to the tower in the clearing. Global radiation was measured by Eppley precision spectral pyranometers. Additional pyranometers measured the standard WMO broad band spectral regions with Schott colored glass filters:

OG1 - 280 - 2800 nm
 RG2 - 630 - 2800 nm
 RG8 - 700 - 2800 nm
 GG14 - 475 - 2800 nm
 WG7 - 280 - 2800 nm

Narrow band spectral regions were measured by interference type filters, designed to isolate relatively small wavelength intervals, 100 nm in the visible and several hundred nm in the near IR. The limits of the narrow band filters for the two TREND sets were (in nm):

Above Forest Canopy	Below Forest Canopy
290-425	290-440
335-505	380-540
505-695	495-695
650-1200	700-1050
800-2350	800-2100
1800-3000	1800-3000

Complete sets of spectral pyranometers were mounted on the forest tower platform as well as below on the forest floor. Three normal incidence pyranometers measured the total direct short wave radiation as well as the spectral regions determined by the Schott OG1 and RG2 broad band filters. Daylight illumination and UV radiation were measured with Eppley.

photometers. Both utilized Weston selenium barrier-layer photocells. The wavelength response for the UV meter was restricted to 290-380 nm.

Incoming and outgoing long-wave radiation above and below the canopy were measured by a Funk polyethylene radiometer.

2. The data and their availability

The preparation of the raw data for computer processing was a formidable task because of the condition of the tapes. The major problem in reading the tapes was related to the incremental recorder's tendency to stretch the tape (from 2400 ft to 2700 ft), resulting in poor spacing between characters. This spacing is interpreted as an inter-record gap, resulting in loss of data or loss of position on the tape drive. An older model tape drive (IBM 1401) was found to be able to read the tape better than an advanced tape drive. Subsequently, the data were repacked on a permanent storage tape in a compressed format compatible with Univac 1108 and CDC 6600, 7600 hardware.

The technical details about the repacking and use of the repacked "D" and "A" tapes will be presented in a separate "User's Manual" which will outline the extensive development of data reduction schemes which were necessary to convert the raw data into a data resource useful for analysis.

3. The climatic regime

3.1. The regional climate

Ramage (1971) defines a monsoonal region to be one in which:

1. The prevailing wind direction shifts by at least 120° between January and July.
2. The average frequency of prevailing wind directions in January and July exceeds 40%.
3. The mean resultant winds in at least one of the months exceed 3 m/sec.
4. Fewer than one cyclone-anticyclone alternation occurs every two years in either month in a 5° latitude-longitude rectangle.

Consequently, the monsoonal region would be bounded by the latitude-longitude rectangle $35^{\circ}\text{N} - 25^{\circ}\text{S}$, $30^{\circ}\text{W} - 170^{\circ}\text{E}$, and thus contain Thailand.

The beginning of the monsoon season in inland Thailand is not clearly defined. In the peninsula of Thailand, Crutcher et al. (1969) define the onset and retreat of the monsoon as a period of 3 - 5 consecutive days of rainfall (about May 5 and October 19). Usually, the Southwest monsoon is established in May and ends in September. The Northeast monsoon starts in November, and ends in February, with two transition periods. This pattern was also verified at the experimental site (Fig. 5), based on three years (1967-1970) of surface observations of climatological conditions. Accordingly, the selected periods for study span different stages of the monsoon cycle and are of approximately

two week time intervals.

3.2 Climatological conditions at the experimental site

To place the micrometeorological studies of the forest into a proper climatological context, data from the principal *surface station were summarized over the nearly three years of record to construct a climatology of the area. Computer printouts of hourly values of temperature, relative humidity, precipitation, pan evaporation and hours of sunshine were available from this field experiment. Also, derived climatological parameters were computed.

Using the average air temperature and relative humidity values for each month, values of "effective temperature" were obtained in conventional fashion (Landsberg, 1970). Basically, the effective temperature takes into account the combined effect of temperature and humidity on a person's comfort. Effective temperature is defined as a sensation in which, for a given air temperature and humidity, the state of comfort is equal to that experienced for an environment at a lower temperature with saturated conditions.

Precipitable water, U , in the atmospheric column over Sakaerat Experiment Station was computed using the method of Smith (1966) with empirical (λ) values taken from Lettau (1970). These were computed using monthly average values of temperature and relative humidity. Values of the storage of water vapor in the atmospheric column were computed by taking the differences of precipitable water from month to month, ΔU . The advection, A , of water vapor into the atmospheric

*There were 8 climatological surface stations in operation during the experiment (Fig. 6).

column was computed as a residual in the balance equation,

$$\text{Storage} = \text{Evaporation} - \text{Precipitation} + \text{Advection}$$

$$\Delta U = E - P + A$$

Table 1 gives the three year average of climatological elements and the derived climatological elements for each month of record at the forest site. Figure 5 shows a representative annual variation of each element. The number of hours of daylight were taken from the Smithsonian Meteorological Tables on Duration of Daylight for the 15th of each month.

During the cool, dry northeast monsoon, associated with high pressure over the Asian continent, the temperatures and relative humidities are comparatively low. The representative annual cycles of temperature and effective temperature show maximum values (27.5°C, 24.9°C) during the transitional month of March and minimum values (21.5°C, 20.0°C) in December. The annual average temperature at Sakaerat was 25.0°C and annual average effective temperature was 23.5°C, with only a 5-6°C variation in either during the year. The relative humidity generally falls during the winter monsoon period. The relative humidity is generally largest in October, with an annual average value of 85%, and smallest in February with annual average value of about 64%. The largest difference between air temperature and effective temperature occurred during February, 1969 when the relative humidity reached its period low value. The average air temperature during that month was 27.2°C while the effective temperature in the relatively cool dry

monsoonal air was only 23.4°C , almost 4° cooler. The northeast dry monsoon occurs during a period of relative minimum daylength yet the sunshine recorders measured relative maximum amounts of sunshine during this period which indicates smaller amounts of cloud cover. The precipitation traces are also small averaging generally less than 1 mm/day during the northeast monsoon.

The warm and moist southwest monsoon generally occurs during the period April to September corresponding to the months of maximum daylight. The temperature, precipitation and relative humidity are generally high during this period. The total rainfall during these six months was 980 mm for 1969, 939 mm for 1970 and a relatively smaller amount of 669 mm during 1968. The double maxima in precipitation during the southwest monsoon, shown in Fig. 5, is also evident in a summary of Bangkok climatological data for the period 1943-1952 from the Royal Thai Navy which was prepared by Lettau (1970).

The relative humidities are high during these monsoonal periods yet the effective temperatures are lower than the air temperatures by a greater amount than during the dry northeast monsoon where the air temperatures are much lower. The humidity generally increases during the southeast monsoon period achieving its maximum toward the end of the period.

The higher degree of cloudiness associated with the southwest monsoon is reflected in the sunshine recordings where relatively smaller amounts of sunshine occur each day than during the northeast monsoonal period. In fact, the monsoon cycle is well illustrated by the sunshine recording which is roughly 180° out of phase with the cycle of daylight

duration.

The precipitable water record tends to parallel the relative humidity record over the whole period. The evaporation tends to respond to the solar radiation available at the surface and is also controlled by the ambient relative humidity and air temperature. The evaporation is generally largest when air temperatures are high and ambient humidity is low, and generally smallest during periods of higher ambient humidity, falling temperatures and fewer hours of sunshine.

The water vapor storage term is generally small throughout the period with values within ± 10 mm/month. The advection term shows the large monsoonal influx of moist air feeding the rainfall systems of May and September with outfluxes of moist air from the region during periods of evaporation excess over precipitation during the northeast monsoon. Average rainfall during May and September is 172 mm/month and 252 mm/month respectively separated by three months of lesser rainfall with local minimum during July of 78 mm/month. The precipitation drops to near zero during the northeast monsoon season of December, January and February. For the rainfall peak of May, about 90% (146 mm) is contributed by evaporation, 17% (29 mm) is contributed by advection with 3.3 mm added to storage. During September, 62% (156 mm) is contributed by advection, 37% (93 mm) is contributed by evaporation and 1.2% (3.0 mm) is contributed by storage. During the relative minimum of July, there is a fairly vigorous advection of about 43% (57 mm) of the evaporated water out of the region leaving only about 78 mm to rain out.

During the dry months of December, January and February nearly all the evaporated water is advected out of the column with little precipitation and only minor changes in storage.

A more detailed description of the site, instrumentation and climate elements can be found in Thompson and Landsberg (1975).

4. The microclimate of the experimental site

The inventory of well established forest microclimates is meager. Relatively, little is known about the microclimates of tropical forests*. Perhaps their remoteness from research centers, and their adverse effect on the long term maintenance of the instrumentation, have restricted experimentation in such environments. The microclimates of clearings are also of interest. As already noted by Lee (1978), forest openings play important role in stand management and regeneration. The seedlings in a forest clearing are subjected to both higher radiation energy fluxes and surface temperature during the day and greater energy losses and lower temperatures at night.

In this section, the microclimatological characterization of this dry (1500 mm annual zone) tropical forest and a nearby clearing is presented. This type of characterization supplements existing studies by virtue of its geographical location vegetation type, rainfall pattern and illustration of seasonal variability.

* Updated information and extensive bibliography on coniferous forests can be found in Jarvis and Landsberg (1976); on deciduous forests in Rauner (1976); Leigh (1975) addresses himself to the ecological aspects of tropical rain forests all over the world.

4.1 Temperature time-height cross-sections in the forest

The predominantly clear winters (8 hrs of sunshine) and cloudy summers (5 hrs of sunshine) typical of a monsoonal climate regulate to a large extent the temperature field at this Thailand forest.

The two week averaged temperature time-height cross sections along the forest tower (Figs. 7, 8, 9, 10) suggest a subdivision of the canopy into three responding sublayers:

- (a) surface layer - 0 - 5 m
- (b) sub-canopy layer - 5 - 25 m
- (c) canopy layer - 25 - 35 m

In (a) the influence of the ground is dominant, and as such, it is a region of frequent and strong stratified conditions. Ground moisture and cloud cover tend to subdue the extremities of these conditions, the length of their duration, and the depth of the ground affected layer. It is most pronounced during the dry and clear winter season.

During July and September an isothermal structure prevails in sublayer (b). In January and April, isothermal structure forms primarily during the noon hours (10:00 a.m. - 4:00 p.m.). (Throughout this paper L.S.T. is used). During the remaining part of the day in January and April the (b) layer is characterized by inversions of 1-2°C/20 m.

When clear conditions prevail, the canopy layer (c) could be viewed as the response layer to the solar heating. The intensity of this response differs from month to month, depending on additional ambient variables. For January, the temperature distortion in the top canopy

layer is strongest. This is a dry period with low winds (2.4 m/sec). The moisture stress and poor mixing might be responsible for this pronounced distortion. In April, which is still relatively clear, the ambient winds increase (4.1 m/sec) and as such, the intensity of the upper disturbed layer decreases. During September (the September data were averaged over seven days only, resulting in less smooth cross sections as compared to others), the "above" canopy region (from 40 m up) is generally isothermal. The average temperature difference between the ground and canopy top around noon time is approximately 2°C in July and September, reaching 4°C in January and April.

The previously discussed cross-sections attest to the dense nature of the canopy. Direct sunlight does not generally reach the ground (this was also verified from radiation measurements taken at the forest floor (Pinker et al. (1980))). The clear conditions of the dry winter monsoon are responsible for the much higher amplitude of the diurnal temperature wave at forest air interface. During the wet summer, the heating intensity is reduced at interface, and more homogeneous conditions prevail throughout the canopy.

4.2 Temperature time-height cross sections in the clearing

The structure of the temperature time-height cross sections in the clearing also calls for a three layer response subdivision:

- (a) surface layer - 0 - 10 m
- (b) "transition" layer - 10 - 25 m
- (c) canopy affected layer - 25 - 35 m

The degree of distinction or even existence of these layers is

again a function of solar radiation intensity and mixing effectiveness.

In January, the maximal temperature difference between ground and above canopy levels amounts to 2°C. From early evening hours till sunrise, inversions in the surface layer of 1°C/15 m build up and spread to the second layer (b). They are destroyed at sunrise and a lapse condition starts to build up, reaching 2°C/30 m at noon time. The existence of grass in the clearing up to a height of 1 m caused the displacement of the warmest layer above the ground (Fig. 7b, 8b) (it was subsequently cleared). During January, the edge effect of the forest canopy on the clearing is most pronounced, affecting a 10 m layer centered around the canopy top (at 30 m).

In April, the difference between the maximum ground surface and above canopy temperatures is only 1°C due to the more turbulent structure of the wind field. Starting at the 2 m level, late evening inversions become established and expand in depth with time. After 8:00 a.m. lapse conditions prevail and increase in depth till noon time. The edge effect of the forest canopy diminished as compared to January. The "above canopy" region (from 40 m up) is generally isothermal.

In July, the influence of the surface is confined to a shallow layer. The ground inversions are almost non-existent, while lapse conditions do exist in the first 4 m from 8:00 a.m. till 5:00 p.m. During the rest of the time, isothermal conditions dominate. This is a result of the more moderate mode of heating during the prevailing cloudy conditions and smaller radiative cooling during the night.

In September, the lapse conditions close to ground are even milder

than in July. The increased moisture content of the ground regulates the heating at the ground.

4.3 Wind speed time-height cross sections in the forest and clearing

A peculiarity in the surface winds over the Khorat site was noted (based on data for seven different months). During February, July (Figs. 11, 12) April, June, and September (not illustrated here) the maximum in wind speed occurs before sunrise and mid-night. The maximum in the surface boundary layer is generally observed at noon-time, as was the case in January and December (Figs. 13,14) at the Thailand site. A satisfactory explanation of this pattern has not yet been found.

The wind speed cross sections along the forest and clearing towers will be illustrated for January, April and July (Figs. 15, 16, 17); for the other months the pattern repeats.

A comparison of the forest and clearing average wind flows indicates that:

- a) the canopy strongly reduces the wind speed (for quantitative estimates see Table 2)
- b) the amplitude of the daily cycle is diminished over the forest as compared to the clearing
- c) during January, the amplitude of the daily cycle is enhanced close to the surface in the clearing (up to 16 m), while in April and July it is drastically suppressed below the 16 m level. (The diurnal heating cycle enhances the turbulent mixing in the clearing by day and results in higher wind speeds. In January, it is in phase with the above canopy flow and so amplifies

the effect. During periods with an above-canopy nocturnal maximum the heating effect is out of phase and dampens the cycle).

- d) in the forest, the amplitude of the daily cycle becomes suppressed below the 32 m level; the January case (Fig. 13) reveals a small increase in the wind speed around noon-time at the 25 m level.

According to the Sadeh (1971), the one story forest canopy flow can be divided into three distinct zones:

- (a) flow within the trunk
- (b) flow within the tree crown - canopy flow
- (c) flow above the canopy.

In this study, due to the two story nature of the forest, the distinction between (a) and (b) is not obvious. Seemingly a narrow "interaction" layer exists close to the canopy top and a "canopy flow" throughout the rest of the forested area.

Figures 15, 16, 17 imply that the layer below the 30 m level is almost impermeable to the wind flow. Yet, there is a noticeable difference between the three cases. The depth to which the 1 m/sec isotach penetrates does depend on the magnitude of the ambient wind speed.

In a previous study, Thompson and Pinker (1975) computed the roughness parameter (z_0) displacement height (d) and friction velocity (u_*) for this site. They used a set of half hourly averaged wind speed profiles in the 30 - 46 m layer above the forest canopy which were classified as neutral. Table 3 presents a summary of the

roughness parameters, datum level displacements and friction velocities as previously obtained. It seems that the values of 29 m for d in January and 27 m in July are consistent with the different depth of penetration of wind during those two periods. These rather small differences seem to have a significant effect on the diffusion processes in the canopy. The perturbed temperature structure at the canopy/air interface during January, is partially due to the low winds and poor mixing (but not entirely, as the April case indicates).

4.4 Subsurface temperatures in the forest and clearing

Exchange of radiation at the ground causes periodic variations of the surface temperature. These changes affect the temperature of the soil. Flux of heat into and out of soil is a process of conduction and is proportional to the rate of change of temperature with depth. The constant of proportionality is the thermal conductivity and depends on such soil properties like porosity, moisture content and organic matter content of soil. The ground temperature will depend not only on the amount of heat transported to it but also on its ability to absorb that heat (thermal diffusivity).

A detailed soil survey of thirty square kilometers of the forest experimental site was made by the Department of Land Development, Ministry of National Development, Thailand. Soils were studied in borings and profile pits. Majority of the soils belong to the Red-Yellow

Podzolic great soil group; the parent material is sandstone (sand, silt, clay). Soil conditions in the core area are estimated to be fairly representative for general soil condition in the hilly parts of South-east Asia and those of Thailand in particular (for details see Bos (1968)).

In all four cases studied, the amplitude of soil temperature decreases with depth in the bare and vegetation covered soil and the diurnal wave penetrates deeper in the clearing than in the forest. At 40 cm the wave is almost damped out everywhere. In September due to the large water content of the ground the insulating effect is reduced, the heat conductivity is increased and the diurnal wave is found to penetrate deeper in the clearing. In the forest on the other hand, the effect of the increased heat capacity is dominant resulting in an almost isothermal structure of the soil.

Generally, in dense stands, the diurnal and seasonal temperature waves are greatly damped in comparison to clearing and the heat flux to the ground is reduced.

5. Microclimatic variability

Information about the fluctuating nature of the temperature and velocity fields in the surface layer, over a rough terrain, is of significance to problems of local atmospheric diffusion, and for the assessment of the contributing factors to the generation of turbulence. Therefore, the available data, collected at the TREND site were analyzed

to provide a better understanding of:

- a) the wind velocity and temperature spectra in the frequency range of 10^{-2} - 10^2 cy/hr
- b) the dependence of turbulence spectra on stability in the frequency range 10 - 2×10^2 cy/hr
- c) the time-height dependence of the temperature and wind velocity variance

In this report, only the time-height dependence of the temperature and velocity variances will be discussed, while a) and b) will be presented independently.

Figures 19-22 represent the standard deviations (σ) of temperature for January, February, April and July. They were obtained by computing half hourly σ 's from three hour averages over a period of two weeks. The σ 's for wind speeds were obtained in a similar manner and are presented in Figs. 23-26.

During all the periods that were investigated, the largest σ 's of temperature were obtained before noon, during the steep change in temperature; rather than at the early afternoon when the temperature maximum is obtained.

Inspection of the temperature cross sections in Figs. 7-10 attests to the following differences in the average maximum temperatures:

	<u>Jan.</u>	<u>Feb.</u>	<u>Apr.</u>	<u>July</u>
Forest ($^{\circ}$ C)	25	30	28	27
Clearing ($^{\circ}$ C)	26	32	29	28

The higher values of temperature and heating rate (clear skies) during February and April are probably the cause for the higher σ 's for this period. Figures 11-14 provide the basis for the differences between these two months. In February, from midnight till early morning, the winds are higher than in April. The mixing is more effective and the T's are lower. During the daytime, the February winds speeds drop below the April values, resulting in less mixing and higher σ 's.

The July maximum temperature is by 2°C higher than the corresponding January value. Yet, the January Temperatures are higher, which might be due to the lower wind speeds and the prevailing clear sky conditions, which create larger temperature gradients.

The largest σ 's for the wind velocity occur during April and July when the winds are strongest. The maximum April value well fits the general pattern of the wind structure for this transition period in this monsoonal region. The lower July values agree well with the more persistent structure of the summer monsoon flow.

In February, the largest σ 's occur closer to noontime. Fig. 11 shows that the February diurnal wind velocity has a large amplitude (relative to the other periods investigated). The steepest velocity gradient occurs between 6:00 - 12:00. This is reflected in the σ 's computed around the pre-noon three hour average.

From all the illustrated examples the January σ 's are the lowest. There are two relative maxima. Once in the morning at the 46 m level and one around noon-time at a lower level (~25 m). This is probably due to the small amplitude in the wind speed at the 46 m level (Figs. 13),

while at lower levels, the amplitude is larger and the variance increases.

6. Stability characteristics of the forest and clearing

An absolute measure of stability is non-existent. The Stability criteria are based, in most cases, on the available data. The most common stability criteria became the Richardson (Ri) number.

The basic form of this parameter is the flux Richardson number defined as the ratio of buoyant production to stress production of turbulent kinetic energy

$$R_f = \frac{g}{\theta_0} \frac{\overline{w\theta}}{\overline{uw} \partial U / \partial z}$$

If the covariances are parameterized in terms of mean profiles

$$-\overline{uw} \equiv \nu_T \partial U / \partial z$$

$$-\overline{\theta w} \equiv \gamma_T \partial \bar{\theta} / \partial z$$

= >

$$R_f = \frac{\gamma_T}{\nu_T} \frac{g}{\theta_0} \frac{\partial \bar{\theta} / \partial z}{(\partial U / \partial z)^2}$$

As the eddy viscosity and conductivity are unknown parameters, the

gradient Ri number is defined and used:

$$\text{The expression } R_g \equiv \frac{g}{\theta_0} \frac{\partial \bar{\theta} / \partial z}{(\partial U / \partial z)^2}$$

defines a local Ri number. The finite difference approximation, which is used for practical evaluation, is a bulk Ri number. According to Deacon (1953), the time variation of the two is uniquely related at a fixed reference level. Therefore, the bulk Ri number can be used for profile classification purposes.

Lettau (1957) used the geometric mean height for the height assignment of the difference quotient in wind and temperature. Dyer (1967) showed that the underestimation of the true gradient by the difference quotient, at the geometric mean height, is 2% for double levels and 7.7% for fourfold intervals.

To facilitate an approximate selection of the neutral cases to be used in computations of the micrometeorological parameters z_0 , d and u_* , a bulk Richardson number was employed, suggested by Lettau (1957).

$$(Ri)_B = \frac{\sum_j Ri(z_j)}{\sum_j z_j}$$

where z_j is the geometric mean height between two levels. $(Ri)_B$ gives the overall convective stability and was found to be a useful criteria in this study. Lettau presents the following stability classification:

TABLE 4. STABILITY CLASSIFICATION OF BULK RICHARDSON GRADIENT NUMBER
(After Lettau, 1957)

Stability Class	$(Ri)_L, (10^{-3}/m)$	Stability Class	$(Ri)_L, (10^{-3}/m)$
L3 = Extreme Lapse	< than -15	I1 = Weak Inversion	5 to 6
L2 = Moderate Lapse	-15 to -10	I2 = Moderate Inversion	7 to 9
L1 = Weak Lapse	-9 to -5	I3 = Strong Inversion	10 to 19
N = Neutral	-4 to 4	I4 = Extreme Inversion	> 19

$(Ri)_B$ is only a gross indicator of stability above the forest canopy and in the two layers in the clearing. If a finer subdivision is made of the layer above the canopy, two adjacent sub-layers can have different stabilities. The plotted profiles suggested a separate classification of the following forest layers: 32 m - 36 m, 36 m - 46 m, 32 m - 46 m. For the clearing, the 1 m - 16 m and 16 m - 46 m layers were considered. The results are presented in Figs. 27,28,29.

The different scales of the figures should be noted; the January values are an order of magnitude larger than the rest.

A common feature in all the graphs is the diurnal variations of stability. During noontime it is negative, except for the 36 m - 46 m layer in January. It seems that the $(Ri)_B$ number, as represented in Fig. 19 allows a much better depiction of the average conditions in the whole layer than the use of only two measurement levels. Fig. 28 indicates that in spite of the diurnal variation in the stability parameter, all the values are well within the $-4 \times 10^{-3} m^{-1}$ -- $4 \times 10^{-3} m^{-1}$ range, which was characterized by Lettau as neutral.

Fig. 29 represents the diurnal distribution of $(Ri)_B$ number for the clearing. It is evident that a $(Ri)_B$ number for the whole 1 m - 46 m layer would be completely meaningless. The lower part is influenced by the strong insolation at the ground, the upper part being modified by the forest canopy.

7. Determination of the micrometeorological parameters z_0 , d , u_*

For near neutral conditions it is hypothesized that the wind speed variation with height above the forest canopy is represented by

$$u(z) = (u_*/k) \ln [(z-d + z_0)/z_0]$$

i.e., the determination of the micrometeorological parameters z_0 , d and u_* is necessary for profile fitting. The knowledge of z_0 would also allow estimation of the energy dissipation in the planetary boundary layer (which is of synoptic importance). Information on the displacement height is necessary for aerodynamic heat flux computation, and u_* gives the magnitude of the canopy stress.

The factors that determine the roughness parameter are not yet fully understood. The interrelation of z_0 and d with wind speed, above the forest, is still uncertain. The following represents a spectrum of opinions:

Rauner (1960) - z_0 increases and d decreases as wind increases

Tajchman (1967) - z_0 decreases and d remains constant as wind increases

Allen (1968) - No dependence of z_0 or d on wind speed
Belt (1969)

Leonard & Federer (1973) - As Allen and Belt, when d is allowed to vary. When d is fixed, z_0 shows a slight tendency to decline as wind speed increases, but only for west winds.

Deacon (1953) - z_0 decreases with increasing wind speed.

Kung (1963) - Vegetation cover rather than topography represents the most efficient roughness structure.

7.1 Methods and results

Graphical solution is frequently utilized to compute the micro-meteorological parameters z_0 , d and u_* . The method is well justified for limited amount of data as an estimate. It involves guessing a plausible d value, plotting the result for each guess, and selecting the "best" fit. Many observed that the scatter of the z_0 values computed from different profiles could be quite large. Leonard and Federer (1973) give a range of 10-743 cm for a red pine forest (average tree height 11.6 m). Belt (1969) gives a range of 18-120 cm for a loblolly pine forest (average tree height 23.4 m).

To obtain a representative average, it seemed necessary to use a large sample and therefore the graphical solution was impractical.

The method which is being presently used is an adaptation of Stearns' (1970) method. Surface roughness and displacement height are determined by an iterative technique, so that the error squares on wind

speed are minimum. E_i is the error between the measured and theoretical wind speed,

$$E_i = u_i - u_* k^{-1} \left[\ln \left(\frac{z_i - d + z_o}{z_o} \right) \right].$$

The two simultaneous conditions for a minimum are:

$$GZ = \frac{\partial}{\partial z_o} (\Sigma E_i^2) = 0$$

and

$$GD = \frac{\partial}{\partial d} (\Sigma E_i^2) = 0$$

Given two initial guesses $Z_o(1)$, $Z_o(2)$ and $d(1)$, $d(2)$ the rule of false position yields a new third approximation

$$Z_o(3) = \frac{Z_o(1)GZ(2) - Z_o(2)GZ(1)}{GZ(2) - GZ(1)}$$

where $GZ(1)$ is evaluated using $Z_o(1)$ and $d(1)$ as initial estimates of d . $GZ(2)$ is evaluated with $Z_o(2)$ and $d(1)$. If the tolerance check is not satisfactorily small, another approximation is made, replacing $Z_o(1)$ by $Z_o(2)$, $GZ(1)$ by $GZ(2)$, and $Z_o(2)$ by $Z_o(3)$.

The final value of Z_o together with $d(1)$ is now used to determine $GD(1)$. A second guess, $d(2)$ is made and used and with $Z_o(1)$ and $Z_o(2)$ for a new approximation to Z_o and subsequently $GD(2)$. Then:

$$d(3) = \frac{d(1)GD(2) - d(2)GD(1)}{GD(2) - GD(1)}$$

The iterative procedure was applied to the ensemble of 30-min averaged wind speed profiles in the 30 m - 46 m layer above the forest canopy, classified previously as neutral. The results of these computations are presented in Table 3.

z_0 and d estimates from measured profiles are used in literature to develop regression equations; especially equations which relate z_0 with vegetation height. Much caution should be exercised in using empirical regression equations. The constants in these expressions depend on such canopy characteristics as tree spacing, canopy shape and height. These equations are frequently used, because it is difficult to obtain reliable data for profile fitting.

Stanhill (1969) gives the following relation between d and canopy height, h :

$$\log d = (.9793) \log h - .1536$$

This relation is in excellent agreement with values reported in the literature for vegetation canopies of lower height.

Szeicz et al. (1969) found the following empirical relation between z_0 and h :

$$\log (z_0) = \log (h) - .98$$

Fig. 21 results from estimates of d and z_0 using these formulae (for canopy height values of 29 m - 35 m), summary of several other studies, along with our results, in which Stearns' method was used. Stanhill's formula yields a d height some 4 - 10 m smaller than the values estimated from the profiles. The Szeicz formula yields a result which is consistent with the profile estimate for September but not for January or June.

A test was run for possible correlation between z_0 and d with wind speed. Table 5 shows the results of a simple correlation-regression analysis applied to the ensemble of 384 cases in January, June, September. The z_0 is found to be an increasing function of wind speed, and d , a decreasing function of wind speed, which supports the findings of Rauner. Both parameters correlate best with the wind speed near the canopy.

SUMMARY

This report presents the results of a comprehensive climatological and micrometeorological investigation of a dry tropical evergreen forest.

The area under study is influenced by a cool, dry northeast monsoonal flow generally off the Asian continent during the period from November to February and by a warm, moist southwest monsoonal flow off the Andaman Sea and the Gulf of Thailand during the period from April to September. This latter period is characterized by two distinct rainfall surges in May and September separated by a period of lesser rainfall during June and July. The climatic regime at the forest site is somewhat similar to that at Bangkok, 190 km to the southwest. However, differences in elevation and significant differences in the heat and moisture balance in the forest yields a consistent cool bias of about 2.5°C in the forest and a more complicated interruption of the annual cycle of relative humidity compared with Bangkok. Both stations exhibit lowering temperatures and relative humidities during the cool northeast monsoon. The divergent flow around the Asian continental high pressure cell suppresses the precipitation and leads to an advective flux of moisture out of the Thailand region and relatively low precipitable water values.

During the warm, moist southwest monsoon, the temperature, relative humidity, precipitable water and precipitation are all relatively high. Sakaerat, Bangkok and several other stations in southeast Asia show double maxima in precipitation during the season, the first surge during spring being supported largely by high amounts of evaporation but the second and larger surge during late summer and fall being supported by a large advection of moisture into the region from maritime sources to the south and southwest.

The material presented in the report also depicts the seasonal variation of the microclimate of a dry evergreen tropical forest and a nearby clearing. Although the annual amplitude of ambient temperature in this part of the world is relatively small (approximately 6°C), the forest microclimate exhibits seasonal variability, induced primarily by the mode of heating and availability of moisture. The shielding effect of the canopy on the microclimate close to the ground in the "living space" is very much dependent on the prevailing cloudiness conditions which regulate the intensity of heating at the canopy top. It may be strong, amounting up to 4°C, or non-existent.

Almost independent of the ambient wind speed the ventilation in the living space would be small, although the depth of penetration of wind flow below canopy varies.

The relatively small clearing (500 m in diameter) was cut for the purpose of studying the effects of deforestation in this type of an environment. It was found that the surface temperature difference between the clearing and below the canopy during the day can reach up to 4°C. During the night, the clearing loses heat more effectively than the forest floor, resulting in temperatures which are closer to each other.

The forest has a significant effect on the wind field reduction, in particular, during weak flow. Below the canopy top, the diurnal variation is almost non-existent. In the clearing, the winds close to the ground do not exhibit a strong diurnal variation, except during January and December.

For an assessment of the mean stability characteristics of the forest site, values of the bulk gradient Richardson number were computed. A frequency distribution of the number of occurrences in each stability class was obtained. Nearly all the cases sampled for the above forest canopy during the moist, southwest monsoon period fell into the near-neutral classification. For the same layer in January, during the cool dry northeast monsoon, about 41% of the cases exhibited near-neutral conditions with slightly less than 10% falling in various of the unstable categories and slightly less than half falling in various of the stable categories. For the clearing, the lower layer exhibits a wider variation of stability than does the upper layer. Slightly less than 80% of the cases in June and about 70% of the cases in September show near-neutral stability in the upper layer of the clearing; evidence of the modifying influence of the surrounding forest.

For near neutral conditions in both monsoon periods, the winds in the microlayer above the forest canopy show a reasonable fit to a displaced logarithmic profile. The datum displacement height has an average value of about 27.6 meters but varies over a range of about $2(\frac{1}{4})$ meters from the northeast to southwest monsoon periods.

The roughness parameter for the canopy exhibits a strong seasonal variation with a mean value of 0.83 m for the January sample, 5.55 m for the June sample and 3.61 m for the September sample. The canopy stress has a mean value of $1.3 \text{ dynes-cm}^{-2}$ for January and the much larger mean values of $21.6 \text{ dynes-cm}^{-2}$ for June and $13.7 \text{ dynes-cm}^{-2}$ for September.

A test was made for possible correlation between z_0 and d with wind speed at the top of the tower (46 m). The roughness parameter was found to be an increasing function of wind speed and the datum displacement height a decreasing function of wind speed. Both parameters correlate best with the wind speed near the canopy (i.e. $u(32)$), but the correlation between d and $u(46)$ is also significant at the 5% level of significance.

APPENDIX A

Present "D" Tapes Status

Present "D" Tapes Status

In this section a report is provided on the present status of the TREND "D" data tapes at the University of Maryland.

All the tapes at our disposal are copies of the original tapes taken at the Thailand forest site. The entire set is comprised of two types of tapes: 1) digital tapes ("D" tapes) - containing information about temperature and wind velocity, measured every 10 seconds 2) analog tapes ("A" tapes) - containing information about radiation, humidity and wind direction, measured every 30 seconds. Part of the "D" tapes were reduced and packed in binary. A "Users Manual" explaining how to use the repacked binary tapes is in preparation.

In Table A1 the numerical code of the packed tapes and the corresponding final product are presented.

Table A1

No.	Packed "D" Tapes
240	237, 238, 240, 241, 243
275	273, 274, 275, 277, 278
287	285, 286, 287, 288, 290
293	291, 292, 293, 295, 296
301	298, 299, 301, 302, 304
308	305, 306, 308, 309, 310
316	312, 314, 316, 317, 318
331	328, 330, 331, 333, 334
338	335, 337, 338, 340, 341
354	351, 352, 354, 355, 356
363	363, 365, 366, 367, 369
374	
380	377, 378, 380, 381, 383
395	393, 394, 395, 397, 398

In Table A2 the conditions and dates covered by each of the reduced tapes are indicated. It is evident from Table A2 that the useful information retrieved from the raw data is not continuous, but rather in stretches of approximately two weeks length.

TABLE A2

"D" Data Tapes

	<u>Dates</u>	<u>Remarks</u>
240	Sept. 25 - Oct. 8, 1969	99% good scans
275	Dec. 1 - Dec. 12, 1969	good
287	Dec. 26. - Jan. 8, 1970	good
283	Jan. 8 - Jan. 19, 1970	very good
301	Jan. 19 - Feb. 15, 1970	good (gap in data for Jan. 21 - Feb. 5, 1970)
308	Feb. 15 - Feb. 28, 1970	very good
316	Feb. 28 - March 14, 1970	good
331	April 6 - April 20, 1970	very good
338	April 20 - May 5, 1970	good
354	May 24 - June 6, 1970	80% good
363	June 19 - July 2, 1970	99% good
374	July 2 - July 24, 1970	very good
380	July 24 - August 11, 1970	?
395	August 29 - Sept. 13, 1970	75% good

Additional "D" tapes are at our disposal. These tapes were not yet reduced because of the cost involved. Approximately, 105 tapes were not reduced.

APPENDIX B

**Description of the condensed
data tape**

From the overwhelming data base at our disposal, a "working" data set was prepared. This unit consists of half hourly averaged data obtained from the densely packed binary tapes of the ten second data. These half hourly averages were obtained for various periods of the monsoon cycle, for about two weeks each. Since the reduction process was time consuming and expensive, this useful set of data was stored on a separate tape.

From the half hourly data base described previously, two week averages were obtained. These are also stored on the same tape.

In this section, information about the tape content, and format will be presented.

Instructions for condensed tape users.

This 9-track tape (internal tape Number P10629) contains 170 files, each of which contain wind speed and temperature data. The tape is unlabeled and contains fielddata code character representation with a storage density of 6250 bpi.

Each file is 2 blocks long with the first file starting at the load point of the tape.

To access any file the following procedure is suggested for use on Univac 1100 operating system:

Assign the tape:

@ASG,TJ TAPE,U9S,p10629

Assign an alternate mass storage file, NORMAL CONVENTIONS:

@ASG FILE

Move the tape to the desired file; (refer to list):

@MOVE tape., File #

Copy the tape file to the mass storage file:

@COPY Tape.,File

After the copy is produced the tape will be positioned at the beginning of the next file (after the EOF mark). Care must be taken to ensure you don't @MOVE past the end of the tape.

Now the mass storage file can be used as a standard Univac data file.

The file will consist of 48 records each of which is a ½ hourly average (240 cards total); i.e., 5 cards per record:

- 1 - Date and time
- 2,3,4 - 21 temperature levels
- 5 - 8 velocity levels

First will come the clearing tower (CT) data followed by the forest tower (FT) data.

Card Formats:

In general the card format will be as follows

I4,4X,I3,1X,2I2/10(F6.2,1X)/10(F6.2,1X)/F6.2/8(F5.2,1X)

when noted by ('*') the card format will be

3(3(I2,1X),1X)/10F(6.2,1X)/10(F6.2,1X)/F6.2/8(F5.2,1X)

(the only difference being in the date format).

The following list describes the content of each file stored on the tape. All the data stored are for 1970 except December (1969).

File #

Contents

a) The approximately two week averaged data

0	Dec. Avg. CT
1	Jan. Avg. CT *
2	Feb. Avg. CT
3	Apr. Avg. CT
4	Jun. Avg. CT
5	Jul. Avg. CT
6	Sep. Avg. CT
7	Dec. Avg. FT
8	Jan. Avg. FT *
9	Feb. Avg. FT
10	Apr. Avg. FT
11	Jun. Avg. FT
12	Jul. Avg. FT
13	Sep. Avg. FT

b) The $\frac{1}{2}$ hourly averaged data for single days

	(Julian date)		
14-16	336-338	CT	
17-21	341-345	CT	
22-24	336-338	FT	
25-29	341-345	FT	
30-44	4-18	CT	(4-8*)
45-59	4-18	FT	(4-8*)
60-71	47-58	CT	
72-83	47-58	FT	
84-85	97-98	CT	
86-95	100-109	CT	
96-97	97-98	FT	
98-107	100-109	FT	
108-116	171-179	CT	
117-118	181-182	CT	
119-127	171-179	FT	
128-129	181-182	FT	
130-131	183-184	CT	
132-136	186-190	CT	
137-141	200-204	CT	
142-143	183-184	FT	
144-148	186-190	FT	
149-153	200-204	FT	
154	224	FT	
155	224	CT	
156	247	CT	
157-162	249-254	CT	
163	247	FT	
164-169	249-254	FT	

Information about missing data

Several profiles during various periods of time were missing.

In order to obtain a complete set of data, consisting of 48 half hourly profiles for each day, limited editing was exercised. The following procedure was followed. Each missing profile was replaced by a profile from a complete day, when there was a good agreement between the data preceeding and following the missing profile.

The following list presents a full documentation of the data that were supplemented.

The replaced data in the files are as follows:

<u>Missing</u>			<u>Replaced by</u>			<u>Where</u>
Day	Year	Time	Day	Year	Time	CT&FT
338	1969	10:00	338	1969	10:30	FT&CT
342	1969	20:00	342	1969	20:30	FT&CT
345	1969	8:00	345	1969	7:30	FT&CT
345	1969	8:30	345	1969	9:00	FT&CT
7	1970	15:00-16:30	8	1970	15:00-16:30	FT&CT
11	1970	3:00- 6:30	11	1970	2:30,2:30, 2:30,2:30, 7:00,7:00, 7:00,7:00	FT&CT
175	1970	0:00		1970		CT
177	1970	7:00	177	1970	6:00	CT
178	1970	11:30	178	1970	11:00	CT&FT
181	1970	0:00	179	1970	23:30	CT&FT
183		9:30	180	1970	9:30	FT
186		0:00- 1:30	185	1970	0:00- 1:30	FT
187		18:00-23:30	186	1970	18:00-23:30	FT
188		0:00-13:00	187	1970	0:00-13:00	FT
200		13:30-16:00	201	1970	13:30-16:00	FT
202		12:00-18:30	201	1970	12:00-18:30	FT
204		8:30	208	1970	8:30	FT
247		14:30-16:00	253	1970	14:30-16:00	CT
250		23:00	246	1970	23:00	CT
252		20:00-21:30	254	1970	20:00-21:30	CT
247		14:30-16:00	251	1970	14:30-16:00	FT
250		23:00	252	1970	23:00	FT
253		20:00-21:30	254	1970	20:00-21:30	FT

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Thompson, O.E. and Landsberg, H.E., 1975. Climatological conditions in the Sakaerat Forest, Thailand. Geografiska Annaler, Vol. 3-4. Ser. A.

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Month	T (°C)	R. H. (%)	Teff (°C)	Hours sun- shine	Hours day- light	Precipita- tion (mm)		Evapora- tion (mm)		U (mm)	$\Delta U/\Delta t$ (mm)	A*
						Total	Daily	Total	Daily			
1	22.65	69.07	21.00	7.20	11.33	11.4	0.37	124.9	3.94	30.2	1.0	-112.6
2	25.12	63.67	22.87	8.03	11.67	4.1	0.16	177.8	5.33	31.5	1.3	-172.4
3	27.46	67.27	24.93	7.27	12.03	82.5	2.67	194.2	6.27	38.9	7.4	-104.3
4	26.60	73.40	24.60	6.97	12.47	116.4	3.90	168.3	5.61	40.3	1.4	-505.0
5	26.77	78.63	25.10	6.00	12.83	171.6	5.57	145.7	4.70	43.6	3.3	29.2
6	26.48	81.33	25.10	4.70	13.00	122.3	4.03	125.6	4.19	48.2	4.6	1.3
7	26.09	80.33	24.77	4.70	12.93	77.8	2.43	133.0	4.29	46.6	-1.6	-56.8
8	25.82	79.90	24.40	5.07	12.63	122.2	3.90	115.4	3.77	45.6	-1.0	5.8
9	25.19	82.20	24.13	4.80	12.22	252.2	8.70	92.9	3.10	42.6	-3.0	156.3
10	23.98	85.00	23.00	5.80	11.82	120.4	3.90	90.2	2.75	41.0	-1.6	28.6
11	22.90	81.43	21.80	6.83	11.43	51.6	1.70	101.2	3.38	36.9	-4.1	-53.7
12	21.48	71.53	20.00	7.70	11.25	0.0	0.00	133.5	4.31	29.2	-7.7	-141.2
Avg.	25.0	76.2	23.5	6.3	12.1	94.4	3.11	133.6	4.30	39.6	0.0	-39.2
Total						1132.5		1602.7			0.0	-470.2

* Residual of Average Values: $\bar{P} - \bar{E} + (\Delta\bar{U}/\Delta t)$

Table 1 Monthly average values of climatological elements at the Thailand forest experimental site. (1967-1970)

Period (in 1970)	Level m	CI		FT	
		Vel. m/sec	v_1/v_2	Vel. m/sec	v_1/v_2
December (1969)	46	5.73	1.43	3.50	5.22
	32	4.00		0.67	
January	46	2.84	1.17	2.200	3.88
	32	2.42		0.566	
February	46	6.47	1.18	4.84	2.15
	32	5.47		2.25	
April	46	4.75	1.17	3.63	2.40
	32	4.06		1.51	
July	46	6.49	1.14	4.70	2.2
	32	5.67		2.13	
September	46	5.16	1.08	3.93	2.27
	32	4.77		1.73	

Table 2. Two-week averaged wind velocities at selected levels
(V_1 - the 46 m level V_2 - the 32 m level)

Period No. of Convergent Cases	\bar{z}_o (m) [σ_{z_o} (m)]	\bar{d} (m) [σ_d (m)]	\bar{u}_* (m-s ⁻¹) [σ_{u_*} (m-s ⁻¹)]	$\tau(\bar{u}_*)$ (dynes cm ⁻²)
January 8-10, 1970 40 cases	0.83 [0.47]	29.53 [0.05]	0.33 [0.09]	1.31
June 20-26, 1970(A) 201 cases	5.48 [1.66]	27.18 [0.69]	1.42 [0.45]	24.2
June 20-26, 1970(B) 72 cases	5.62 [1.77]	27.16 [0.72]	1.26 [0.45]	19.1
Sept. 9-10, 1970 67 cases	3.61 [1.10]	28.09 [0.75]	1.07 [0.48]	13.7
July 19-23, 1970 108 cases	4.25 [.89]	27.49 [.47]	1.20 [.43]	17.28
August 11-13, 1970 68 cases	5.41 [1.9]	27.67 [.85]	1.41 [.48]	23.86
Average (weighted by No. of cases)	4.69	27.58	1.21	18.97

Table 3. Average values and standard deviations of roughness parameter, datum displacement height, friction velocity and canopy stress for the Sakaerat Forest.

Y	X	\bar{Y}	σ_y	\bar{X}	σ_x	A	B	R	F	Standard Error
		[Y]	[Y] [cm-sec ⁻¹]	[Y]	[cm-sec ⁻¹]	[Y]	[Y/X]	(Correlation)	ratio	of Estimate
UNITS	→									[Y]
z_0 (cm)	u(46)	466	214	429	139	79.3	0.900	0.586	200	173.5
z_0 (cm)	u(32)	466	214	181	78	147.4	1.758	0.639	263*	164.8
d (cm)	u(46)	2761	102	429	139	2968	-0.483	0.659	293*	770
d (cm)	u(32)	2761	102	181	78	2945	-1.017	0.774	568*	649
$\ln[z_0$ (cm)]	u(46)	5.968	0.708	429	139	4.645	0.00308	0.607	223	0.563
$\ln[z_0$ (cm)]	u(32)	5.968	0.708	181	78	4.808	0.00641	0.704	374*	0.504
$\ln[d$ (cm)]	u(46)	7.923	0.037	429	139	7.997	-0.00017	0.656	289*	0.028
$\ln[d$ (cm)]	u(32)	7.923	0.037	181	78	7.988	-0.00036	0.770	556*	0.024

* Significant at the 5% level.

Table 5. Correlation and regression statistics for 384 cases of 30-minute averaged wind profiles in January, June and September above the Thailand Forest.
[Y = A + BX]

APPENDIX C

Listing of selected data

The data presented in this section represent the following two week averages:

December (1969), January, April, June,
July, September (1970)

The data are presented first for the forest and then for the clearing in the following format:

- a) average wind speeds at eight levels*
- b) average temperatures at fifteen levels above the surface*
- c) average temperatures at six levels - surface and subsurface

*For details about the location of the various levels see Fig. 3

AVERAGE WIND SPEED (M/SEC) - CLEARING TOWER
 JANUARY 1970. 6 - LEVELS: 40, 52, 24, 16, 8, 4, 2, 1. (IN M)

	1	2	3	4	5	6	7	8
000	2.72	2.43	1.87	1.77	0.77	0.72	0.51	0.55
000	2.72	2.43	1.71	1.75	0.70	0.65	0.42	0.49
010	2.50	2.22	1.50	1.37	0.78	0.70	0.48	0.55
010	2.50	2.22	1.76	1.36	0.75	0.72	0.47	0.55
020	2.27	2.02	1.22	1.34	0.79	0.68	0.49	0.53
030	2.22	2.12	1.53	1.50	0.63	0.95	0.51	0.58
030	2.22	2.12	1.53	1.50	0.63	0.95	0.51	0.58
040	2.05	2.10	1.55	1.26	0.70	0.74	0.51	0.59
040	2.05	2.10	1.60	1.30	0.68	0.69	0.49	0.56
050	2.00	2.25	1.68	1.32	0.69	0.69	0.45	0.57
050	2.00	2.25	1.68	1.32	0.69	0.69	0.45	0.57
060	2.02	2.33	1.65	1.42	0.75	0.63	0.52	0.59
060	2.02	2.33	1.65	1.42	0.75	0.63	0.52	0.59
070	2.44	2.37	1.76	1.53	0.93	0.79	0.58	0.59
070	2.44	2.37	1.76	1.53	0.93	0.79	0.58	0.59
080	2.73	2.61	1.82	1.86	1.05	1.27	1.07	0.88
080	2.73	2.61	1.82	1.86	1.05	1.27	1.07	0.88
090	2.93	2.39	1.70	1.55	1.05	1.45	1.27	1.22
090	2.93	2.39	1.70	1.55	1.05	1.45	1.27	1.22
100	3.05	2.62	2.00	2.32	1.38	1.67	1.50	1.32
100	3.05	2.62	2.00	2.32	1.38	1.67	1.50	1.32
110	3.22	2.92	2.32	2.52	1.42	1.82	1.71	1.52
110	3.22	2.92	2.32	2.52	1.42	1.82	1.71	1.52
120	3.34	3.13	2.04	2.52	1.55	1.91	1.73	1.50
120	3.34	3.13	2.04	2.52	1.55	1.91	1.73	1.50
130	3.26	2.99	1.94	2.44	1.44	1.84	1.71	1.53
130	3.26	2.99	1.94	2.44	1.44	1.84	1.71	1.53
140	2.78	2.52	1.81	2.41	1.28	1.66	1.42	1.36
140	2.78	2.52	1.81	2.41	1.28	1.66	1.42	1.36
150	2.73	2.49	2.02	1.93	1.25	1.53	1.33	1.23
150	2.73	2.49	2.02	1.93	1.25	1.53	1.33	1.23
160	2.64	2.31	1.90	1.88	0.89	1.15	0.97	0.90
160	2.64	2.31	1.90	1.88	0.89	1.15	0.97	0.90
1700	2.68	2.22	1.78	1.39	0.73	0.59	0.50	0.44
1700	2.68	2.22	1.78	1.39	0.73	0.59	0.50	0.44
180	2.84	2.41	1.59	1.34	0.80	0.52	0.41	0.38
180	2.84	2.41	1.59	1.34	0.80	0.52	0.41	0.38
190	2.50	2.33	1.91	1.35	0.92	0.69	0.49	0.46
190	2.50	2.33	1.91	1.35	0.92	0.69	0.49	0.46
200	2.53	2.20	1.51	1.26	0.69	0.51	0.45	0.40
200	2.53	2.20	1.51	1.26	0.69	0.51	0.45	0.40
210	2.42	2.12	1.27	1.11	0.54	0.47	0.35	0.33
210	2.42	2.12	1.27	1.11	0.54	0.47	0.35	0.33
220	2.22	2.02	1.01	1.10	0.44	0.38	0.28	0.27
220	2.22	2.02	1.01	1.10	0.44	0.38	0.28	0.27
230	2.02	2.32	1.22	1.21	0.42	0.21	0.21	0.20
230	2.02	2.32	1.22	1.21	0.42	0.21	0.21	0.20

AVERAGE TEMPERATURES (C) - CLEARING TOWER
 JANUARY 1970, 15 - LEVELS: 4A, 40, 30, 32, 28, 24, 20, 16, 12, 8, 6, 4, 2, 0, 5. (IN M)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1750	17.52	17.95	18.04	18.20	18.43	18.70	19.07	19.51	20.02	20.55	20.99	19.98	18.78	18.30	18.01
1700	17.70	18.49	18.95	19.37	19.91	20.50	21.15	21.86	22.64	23.50	24.44	19.99	18.52	18.13	17.78
1650	17.92	19.37	20.25	21.17	22.17	23.26	24.45	25.75	27.17	28.64	30.17	19.99	18.46	18.00	17.67
1600	18.23	19.99	20.81	21.91	23.27	24.82	26.48	28.25	30.15	32.19	34.38	19.78	18.50	18.01	17.51
1550	18.70	19.62	19.90	19.57	19.38	19.64	19.80	19.73	19.59	19.42	19.27	18.97	18.19	17.70	17.35
1500	19.22	19.80	19.90	19.57	19.38	19.64	19.80	19.73	19.59	19.42	19.27	18.97	18.19	17.70	17.35
1450	19.77	19.85	19.89	19.85	19.77	19.60	19.43	19.26	19.10	18.97	18.85	18.68	18.32	17.95	17.60
1400	20.35	20.15	20.12	20.00	19.83	19.67	19.51	19.36	19.22	19.10	18.99	18.82	18.65	18.35	18.00
1350	21.00	20.64	20.61	20.52	20.40	20.28	20.17	20.06	19.96	19.87	19.79	19.72	19.62	19.47	19.32
1300	21.72	21.40	21.40	21.38	21.37	21.37	21.36	21.35	21.34	21.33	21.32	21.31	21.30	21.29	21.28
1250	22.52	22.40	22.40	22.38	22.37	22.37	22.36	22.35	22.34	22.33	22.32	22.31	22.30	22.29	22.28
1200	23.40	23.30	23.30	23.28	23.27	23.27	23.26	23.25	23.24	23.23	23.22	23.21	23.20	23.19	23.18
1150	24.38	24.35	24.35	24.34	24.33	24.33	24.32	24.31	24.30	24.29	24.28	24.27	24.26	24.25	24.24
1100	25.45	25.45	25.45	25.44	25.43	25.43	25.42	25.41	25.40	25.39	25.38	25.37	25.36	25.35	25.34
1050	26.60	26.60	26.60	26.59	26.58	26.58	26.57	26.56	26.55	26.54	26.53	26.52	26.51	26.50	26.49
1000	27.85	27.85	27.85	27.84	27.83	27.83	27.82	27.81	27.80	27.79	27.78	27.77	27.76	27.75	27.74
950	29.20	29.20	29.20	29.19	29.18	29.18	29.17	29.16	29.15	29.14	29.13	29.12	29.11	29.10	29.09
900	30.65	30.65	30.65	30.64	30.63	30.63	30.62	30.61	30.60	30.59	30.58	30.57	30.56	30.55	30.54
850	32.20	32.20	32.20	32.19	32.18	32.18	32.17	32.16	32.15	32.14	32.13	32.12	32.11	32.10	32.09
800	33.85	33.85	33.85	33.84	33.83	33.83	33.82	33.81	33.80	33.79	33.78	33.77	33.76	33.75	33.74
750	35.60	35.60	35.60	35.59	35.58	35.58	35.57	35.56	35.55	35.54	35.53	35.52	35.51	35.50	35.49
700	37.45	37.45	37.45	37.44	37.43	37.43	37.42	37.41	37.40	37.39	37.38	37.37	37.36	37.35	37.34
650	39.40	39.40	39.40	39.39	39.38	39.38	39.37	39.36	39.35	39.34	39.33	39.32	39.31	39.30	39.29
600	41.45	41.45	41.45	41.44	41.43	41.43	41.42	41.41	41.40	41.39	41.38	41.37	41.36	41.35	41.34
550	43.60	43.60	43.60	43.59	43.58	43.58	43.57	43.56	43.55	43.54	43.53	43.52	43.51	43.50	43.49
500	45.85	45.85	45.85	45.84	45.83	45.83	45.82	45.81	45.80	45.79	45.78	45.77	45.76	45.75	45.74
450	48.20	48.20	48.20	48.19	48.18	48.18	48.17	48.16	48.15	48.14	48.13	48.12	48.11	48.10	48.09
400	50.65	50.65	50.65	50.64	50.63	50.63	50.62	50.61	50.60	50.59	50.58	50.57	50.56	50.55	50.54
350	53.20	53.20	53.20	53.19	53.18	53.18	53.17	53.16	53.15	53.14	53.13	53.12	53.11	53.10	53.09
300	55.85	55.85	55.85	55.84	55.83	55.83	55.82	55.81	55.80	55.79	55.78	55.77	55.76	55.75	55.74
250	58.60	58.60	58.60	58.59	58.58	58.58	58.57	58.56	58.55	58.54	58.53	58.52	58.51	58.50	58.49
200	61.45	61.45	61.45	61.44	61.43	61.43	61.42	61.41	61.40	61.39	61.38	61.37	61.36	61.35	61.34
150	64.40	64.40	64.40	64.39	64.38	64.38	64.37	64.36	64.35	64.34	64.33	64.32	64.31	64.30	64.29
100	67.45	67.45	67.45	67.44	67.43	67.43	67.42	67.41	67.40	67.39	67.38	67.37	67.36	67.35	67.34
50	70.60	70.60	70.60	70.59	70.58	70.58	70.57	70.56	70.55	70.54	70.53	70.52	70.51	70.50	70.49
0	73.85	73.85	73.85	73.84	73.83	73.83	73.82	73.81	73.80	73.79	73.78	73.77	73.76	73.75	73.74

AVERAGE SURFACE AND SUBSURFACE TEMPERATURES (C) - BELOW CLEARING TOWER
 JANUARY 1970, 6 - LEVELS: 0+5, 10+20, 50+100. (IN CM)

L.S.T.	16	17	1F	10	20	21
050	19.71	19.85	20.73	21.58	21.84	21.92
050	19.53	19.75	20.66	21.50	21.91	21.92
050	19.85	19.65	20.58	21.43	21.84	21.92
050	19.85	19.57	20.51	21.35	21.82	21.92
050	19.32	19.44	20.45	21.28	21.83	21.92
050	19.33	19.41	20.39	21.21	21.81	21.92
050	19.16	19.34	20.34	21.15	21.81	21.92
050	19.26	19.25	20.26	21.03	21.91	21.92
050	19.27	19.17	20.20	21.03	21.81	21.92
050	19.24	19.07	20.14	20.93	21.81	21.92
050	19.91	19.50	20.08	20.87	21.80	21.92
050	19.77	19.96	20.03	20.87	21.80	21.92
050	19.71	18.92	19.98	20.75	21.80	21.92
050	19.63	18.68	19.94	20.70	21.80	21.92
050	19.76	18.83	19.90	20.66	21.81	21.92
050	19.21	19.06	19.77	20.46	21.86	21.92
050	19.31	19.36	19.84	20.44	21.86	21.92
090	19.78	19.93	19.84	20.37	21.83	21.92
090	19.51	19.38	19.27	20.29	21.85	21.92
100	20.09	20.40	20.16	20.47	21.82	21.92
100	21.29	21.19	20.37	20.58	21.81	21.92
110	22.42	21.29	20.54	20.72	21.80	21.92
120	22.76	22.29	20.70	20.86	21.79	21.92
120	22.95	23.16	20.85	21.05	21.78	21.92
130	23.16	23.16	21.31	21.26	21.77	21.92
130	23.71	23.22	21.52	21.36	21.77	21.92
140	24.29	23.99	21.86	21.85	21.84	21.92
140	24.29	23.29	22.03	22.04	21.84	21.92
150	24.29	23.36	22.15	22.30	21.84	21.92
150	24.29	23.32	22.24	22.34	21.84	21.92
160	24.29	23.08	22.29	22.34	21.84	21.92
160	24.29	22.98	22.29	22.34	21.84	21.92
170	24.29	22.79	22.22	22.60	21.85	21.92
170	24.29	22.43	22.22	22.60	21.85	21.92
180	24.29	24.19	22.13	22.69	21.87	21.92
180	24.29	23.49	22.13	22.69	21.87	21.92
190	24.29	21.63	21.89	22.54	21.89	21.92
190	24.29	21.28	21.67	22.39	21.85	21.92
200	24.29	20.91	21.56	22.23	21.86	21.92
200	24.29	20.72	21.42	22.15	21.86	21.92
210	24.29	20.90	21.29	22.00	21.86	21.92
210	24.29	20.63	21.12	21.85	21.86	21.92
220	24.29	20.53	21.12	21.69	21.86	21.92
220	24.29	20.42	21.12	21.54	21.86	21.92
230	24.29	20.31	21.03	21.46	21.86	21.92
230	24.29	20.20	20.94	21.31	21.86	21.92

February 1970. 8 - LEVELS: 46, 32, 24, 16, 8, 4, 2, 1. (IN M)
 AVERAGE WIND SPEED (M/SEC) - (CLEARING TOWER)

Level	1	2	3	4	5	6	7	8
000	7.47	6.81	3.92	4.23	3.15	3.87	2.49	2.69
010	7.17	5.57	4.53	3.95	3.04	2.82	2.38	1.92
020	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
030	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
040	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
050	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
060	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
070	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
080	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
090	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
100	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
110	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
120	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
130	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
140	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
150	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
160	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
170	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
180	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
190	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
200	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
210	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
220	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
230	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
240	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
250	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
260	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
270	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
280	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
290	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92
300	7.14	5.54	4.53	3.95	3.04	2.82	2.38	1.92

February 1970, 15 - LEVELS: -6.4,0.36,3.6,7.9,12.2,16.5,20.8,25.1,29.4,33.7,38.0 (in M)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1575	28.80	28.87	28.94	29.01	29.08	29.15	29.22	29.29	29.36	29.43	29.50	29.57	29.64	29.71	29.78
1580	29.10	29.17	29.24	29.31	29.38	29.45	29.52	29.59	29.66	29.73	29.80	29.87	29.94	30.01	30.08
1585	29.40	29.47	29.54	29.61	29.68	29.75	29.82	29.89	29.96	30.03	30.10	30.17	30.24	30.31	30.38
1590	29.70	29.77	29.84	29.91	29.98	30.05	30.12	30.19	30.26	30.33	30.40	30.47	30.54	30.61	30.68
1595	30.00	30.07	30.14	30.21	30.28	30.35	30.42	30.49	30.56	30.63	30.70	30.77	30.84	30.91	30.98
1600	30.30	30.37	30.44	30.51	30.58	30.65	30.72	30.79	30.86	30.93	31.00	31.07	31.14	31.21	31.28
1605	30.60	30.67	30.74	30.81	30.88	30.95	31.02	31.09	31.16	31.23	31.30	31.37	31.44	31.51	31.58
1610	30.90	30.97	31.04	31.11	31.18	31.25	31.32	31.39	31.46	31.53	31.60	31.67	31.74	31.81	31.88
1615	31.20	31.27	31.34	31.41	31.48	31.55	31.62	31.69	31.76	31.83	31.90	31.97	32.04	32.11	32.18
1620	31.50	31.57	31.64	31.71	31.78	31.85	31.92	31.99	32.06	32.13	32.20	32.27	32.34	32.41	32.48
1625	31.80	31.87	31.94	32.01	32.08	32.15	32.22	32.29	32.36	32.43	32.50	32.57	32.64	32.71	32.78
1630	32.10	32.17	32.24	32.31	32.38	32.45	32.52	32.59	32.66	32.73	32.80	32.87	32.94	33.01	33.08
1635	32.40	32.47	32.54	32.61	32.68	32.75	32.82	32.89	32.96	33.03	33.10	33.17	33.24	33.31	33.38
1640	32.70	32.77	32.84	32.91	32.98	33.05	33.12	33.19	33.26	33.33	33.40	33.47	33.54	33.61	33.68
1645	33.00	33.07	33.14	33.21	33.28	33.35	33.42	33.49	33.56	33.63	33.70	33.77	33.84	33.91	33.98
1650	33.30	33.37	33.44	33.51	33.58	33.65	33.72	33.79	33.86	33.93	34.00	34.07	34.14	34.21	34.28
1655	33.60	33.67	33.74	33.81	33.88	33.95	34.02	34.09	34.16	34.23	34.30	34.37	34.44	34.51	34.58
1660	33.90	33.97	34.04	34.11	34.18	34.25	34.32	34.39	34.46	34.53	34.60	34.67	34.74	34.81	34.88
1665	34.20	34.27	34.34	34.41	34.48	34.55	34.62	34.69	34.76	34.83	34.90	34.97	35.04	35.11	35.18
1670	34.50	34.57	34.64	34.71	34.78	34.85	34.92	34.99	35.06	35.13	35.20	35.27	35.34	35.41	35.48
1675	34.80	34.87	34.94	35.01	35.08	35.15	35.22	35.29	35.36	35.43	35.50	35.57	35.64	35.71	35.78
1680	35.10	35.17	35.24	35.31	35.38	35.45	35.52	35.59	35.66	35.73	35.80	35.87	35.94	36.01	36.08
1685	35.40	35.47	35.54	35.61	35.68	35.75	35.82	35.89	35.96	36.03	36.10	36.17	36.24	36.31	36.38
1690	35.70	35.77	35.84	35.91	35.98	36.05	36.12	36.19	36.26	36.33	36.40	36.47	36.54	36.61	36.68
1695	36.00	36.07	36.14	36.21	36.28	36.35	36.42	36.49	36.56	36.63	36.70	36.77	36.84	36.91	36.98
1700	36.30	36.37	36.44	36.51	36.58	36.65	36.72	36.79	36.86	36.93	37.00	37.07	37.14	37.21	37.28
1705	36.60	36.67	36.74	36.81	36.88	36.95	37.02	37.09	37.16	37.23	37.30	37.37	37.44	37.51	37.58
1710	36.90	36.97	37.04	37.11	37.18	37.25	37.32	37.39	37.46	37.53	37.60	37.67	37.74	37.81	37.88
1715	37.20	37.27	37.34	37.41	37.48	37.55	37.62	37.69	37.76	37.83	37.90	37.97	38.04	38.11	38.18
1720	37.50	37.57	37.64	37.71	37.78	37.85	37.92	37.99	38.06	38.13	38.20	38.27	38.34	38.41	38.48
1725	37.80	37.87	37.94	38.01	38.08	38.15	38.22	38.29	38.36	38.43	38.50	38.57	38.64	38.71	38.78
1730	38.10	38.17	38.24	38.31	38.38	38.45	38.52	38.59	38.66	38.73	38.80	38.87	38.94	39.01	39.08
1735	38.40	38.47	38.54	38.61	38.68	38.75	38.82	38.89	38.96	39.03	39.10	39.17	39.24	39.31	39.38
1740	38.70	38.77	38.84	38.91	38.98	39.05	39.12	39.19	39.26	39.33	39.40	39.47	39.54	39.61	39.68
1745	39.00	39.07	39.14	39.21	39.28	39.35	39.42	39.49	39.56	39.63	39.70	39.77	39.84	39.91	39.98
1750	39.30	39.37	39.44	39.51	39.58	39.65	39.72	39.79	39.86	39.93	40.00	40.07	40.14	40.21	40.28
1755	39.60	39.67	39.74	39.81	39.88	39.95	40.02	40.09	40.16	40.23	40.30	40.37	40.44	40.51	40.58
1760	39.90	39.97	40.04	40.11	40.18	40.25	40.32	40.39	40.46	40.53	40.60	40.67	40.74	40.81	40.88
1765	40.20	40.27	40.34	40.41	40.48	40.55	40.62	40.69	40.76	40.83	40.90	40.97	41.04	41.11	41.18
1770	40.50	40.57	40.64	40.71	40.78	40.85	40.92	40.99	41.06	41.13	41.20	41.27	41.34	41.41	41.48
1775	40.80	40.87	40.94	41.01	41.08	41.15	41.22	41.29	41.36	41.43	41.50	41.57	41.64	41.71	41.78
1780	41.10	41.17	41.24	41.31	41.38	41.45	41.52	41.59	41.66	41.73	41.80	41.87	41.94	42.01	42.08
1785	41.40	41.47	41.54	41.61	41.68	41.75	41.82	41.89	41.96	42.03	42.10	42.17	42.24	42.31	42.38
1790	41.70	41.77	41.84	41.91	41.98	42.05	42.12	42.19	42.26	42.33	42.40	42.47	42.54	42.61	42.68
1795	42.00	42.07	42.14	42.21	42.28	42.35	42.42	42.49	42.56	42.63	42.70	42.77	42.84	42.91	42.98
1800	42.30	42.37	42.44	42.51	42.58	42.65	42.72	42.79	42.86	42.93	43.00	43.07	43.14	43.21	43.28

AVERAGE SURFACE AND SUBSURFACE WATER TEMPERATURES (C) - BELO - CLEARING T-C-EP
 February 1970. 6 - LEVELS: 0.5, 10, 20, 50, 100. (IN CM)

L.S.T.	15	17	18	19	20	21
0030	27.33	27.24	27.15	27.05	26.93	26.82
0130	27.29	27.21	27.12	27.02	26.90	26.79
0230	27.25	27.17	27.08	26.98	26.86	26.75
0330	27.21	27.13	27.04	26.94	26.82	26.71
0430	27.17	27.09	27.00	26.90	26.78	26.67
0530	27.13	27.05	26.96	26.86	26.74	26.63
0630	27.09	27.01	26.92	26.82	26.70	26.59
0730	27.05	26.97	26.88	26.78	26.66	26.55
0830	27.01	26.93	26.84	26.74	26.62	26.51
0930	26.97	26.89	26.80	26.70	26.58	26.47
1030	26.93	26.85	26.76	26.66	26.54	26.43
1130	26.89	26.81	26.72	26.62	26.50	26.39
1230	26.85	26.77	26.68	26.58	26.46	26.35
1330	26.81	26.73	26.64	26.54	26.42	26.31
1430	26.77	26.69	26.60	26.50	26.38	26.27
1530	26.73	26.65	26.56	26.46	26.34	26.23
1630	26.69	26.61	26.52	26.42	26.30	26.19
1730	26.65	26.57	26.48	26.38	26.26	26.15
1830	26.61	26.53	26.44	26.34	26.22	26.11
1930	26.57	26.49	26.40	26.30	26.18	26.07
2030	26.53	26.45	26.36	26.26	26.14	26.03
2130	26.49	26.41	26.32	26.22	26.10	25.99
2230	26.45	26.37	26.28	26.18	26.06	25.95
2330	26.41	26.33	26.24	26.14	26.02	25.91
2430	26.37	26.29	26.20	26.10	25.98	25.87
2530	26.33	26.25	26.16	26.06	25.94	25.83
2630	26.29	26.21	26.12	26.02	25.90	25.79
2730	26.25	26.17	26.08	25.98	25.86	25.75
2830	26.21	26.13	26.04	25.94	25.82	25.71
2930	26.17	26.09	26.00	25.90	25.78	25.67
3030	26.13	26.05	25.96	25.86	25.74	25.63
3130	26.09	26.01	25.92	25.82	25.70	25.59
3230	26.05	25.97	25.88	25.78	25.66	25.55
3330	26.01	25.93	25.84	25.74	25.62	25.51
3430	25.97	25.89	25.80	25.70	25.58	25.47
3530	25.93	25.85	25.76	25.66	25.54	25.43
3630	25.89	25.81	25.72	25.62	25.50	25.39
3730	25.85	25.77	25.68	25.58	25.46	25.35
3830	25.81	25.73	25.64	25.54	25.42	25.31
3930	25.77	25.69	25.60	25.50	25.38	25.27
4030	25.73	25.65	25.56	25.46	25.34	25.23
4130	25.69	25.61	25.52	25.42	25.30	25.19
4230	25.65	25.57	25.48	25.38	25.26	25.15
4330	25.61	25.53	25.44	25.34	25.22	25.11
4430	25.57	25.49	25.40	25.30	25.18	25.07
4530	25.53	25.45	25.36	25.26	25.14	25.03
4630	25.49	25.41	25.32	25.22	25.10	24.99
4730	25.45	25.37	25.28	25.18	25.06	24.95
4830	25.41	25.33	25.24	25.14	25.02	24.91
4930	25.37	25.29	25.20	25.10	24.98	24.87
5030	25.33	25.25	25.16	25.06	24.94	24.83
5130	25.29	25.21	25.12	25.02	24.90	24.79
5230	25.25	25.17	25.08	24.98	24.86	24.75
5330	25.21	25.13	25.04	24.94	24.82	24.71
5430	25.17	25.09	25.00	24.90	24.78	24.67
5530	25.13	25.05	24.96	24.86	24.74	24.63
5630	25.09	25.01	24.92	24.82	24.70	24.59
5730	25.05	24.97	24.88	24.78	24.66	24.55
5830	25.01	24.93	24.84	24.74	24.62	24.51
5930	24.97	24.89	24.80	24.70	24.58	24.47
6030	24.93	24.85	24.76	24.66	24.54	24.43
6130	24.89	24.81	24.72	24.62	24.50	24.39
6230	24.85	24.77	24.68	24.58	24.46	24.35
6330	24.81	24.73	24.64	24.54	24.42	24.31
6430	24.77	24.69	24.60	24.50	24.38	24.27
6530	24.73	24.65	24.56	24.46	24.34	24.23
6630	24.69	24.61	24.52	24.42	24.30	24.19
6730	24.65	24.57	24.48	24.38	24.26	24.15
6830	24.61	24.53	24.44	24.34	24.22	24.11
6930	24.57	24.49	24.40	24.30	24.18	24.07
7030	24.53	24.45	24.36	24.26	24.14	24.03
7130	24.49	24.41	24.32	24.22	24.10	23.99
7230	24.45	24.37	24.28	24.18	24.06	23.95
7330	24.41	24.33	24.24	24.14	24.02	23.91
7430	24.37	24.29	24.20	24.10	23.98	23.87
7530	24.33	24.25	24.16	24.06	23.94	23.83
7630	24.29	24.21	24.12	24.02	23.90	23.79
7730	24.25	24.17	24.08	23.98	23.86	23.75
7830	24.21	24.13	24.04	23.94	23.82	23.71
7930	24.17	24.09	24.00	23.90	23.78	23.67
8030	24.13	24.05	23.96	23.86	23.74	23.63
8130	24.09	24.01	23.92	23.82	23.70	23.59
8230	24.05	23.97	23.88	23.78	23.66	23.55
8330	24.01	23.93	23.84	23.74	23.62	23.51
8430	23.97	23.89	23.80	23.70	23.58	23.47
8530	23.93	23.85	23.76	23.66	23.54	23.43
8630	23.89	23.81	23.72	23.62	23.50	23.39
8730	23.85	23.77	23.68	23.58	23.46	23.35
8830	23.81	23.73	23.64	23.54	23.42	23.31
8930	23.77	23.69	23.60	23.50	23.38	23.27
9030	23.73	23.65	23.56	23.46	23.34	23.23
9130	23.69	23.61	23.52	23.42	23.30	23.19
9230	23.65	23.57	23.48	23.38	23.26	23.15
9330	23.61	23.53	23.44	23.34	23.22	23.11
9430	23.57	23.49	23.40	23.30	23.18	23.07
9530	23.53	23.45	23.36	23.26	23.14	23.03
9630	23.49	23.41	23.32	23.22	23.10	22.99
9730	23.45	23.37	23.28	23.18	23.06	22.95
9830	23.41	23.33	23.24	23.14	23.02	22.91
9930	23.37	23.29	23.20	23.10	22.98	22.87
10030	23.33	23.25	23.16	23.06	22.94	22.83

AVERAGE WIND SPEED (M/SEC) - CLEARING TOWER
 APRIL 1973, 4 - LEVELS: 40, 37, 24, 16, 8, 6, 2, 1. (CM W)

LS.T.	1	2	3	4	5	6	7	8
0600	5.25	4.50	3.50	3.75	2.70	2.10	1.81	1.57
0630	5.25	4.50	3.50	3.75	2.70	2.10	1.81	1.57
0700	5.12	4.44	3.53	2.92	2.28	2.00	1.66	1.49
0730	5.12	4.44	3.53	2.92	2.28	2.00	1.66	1.49
0800	5.12	4.44	3.53	3.05	2.34	2.09	1.73	1.55
0830	5.12	4.44	3.53	3.05	2.34	2.09	1.73	1.55
0900	5.12	4.44	3.53	3.34	2.60	2.35	1.96	1.78
0930	5.12	4.44	3.53	3.70	2.95	2.58	2.17	1.88
1000	5.12	4.44	3.53	3.78	2.95	2.57	2.17	1.88
1030	5.12	4.44	3.53	3.56	2.70	2.36	1.97	1.71
1100	5.12	4.44	3.53	3.28	2.48	2.16	1.86	1.60
1130	5.12	4.44	3.53	3.12	2.30	2.06	1.73	1.51
1200	4.54	3.79	2.86	2.86	2.16	1.91	1.60	1.40
1230	4.54	3.79	2.86	2.48	1.91	1.62	1.41	1.22
1300	3.55	3.46	2.68	2.55	1.99	1.82	1.58	1.41
1330	3.55	3.46	2.68	2.77	1.98	1.82	1.58	1.41
1400	3.70	3.47	2.71	2.66	2.23	1.99	1.76	1.60
1430	3.70	3.47	2.68	2.67	2.23	1.99	1.76	1.60
1500	3.66	3.32	2.62	2.67	2.24	2.04	1.85	1.65
1530	3.66	3.32	2.62	2.57	2.14	1.93	1.79	1.60
1600	3.48	3.12	2.55	2.52	2.14	1.89	1.73	1.66
1630	3.48	3.12	2.39	2.41	2.03	1.82	1.69	1.61
1700	3.48	3.12	2.39	2.33	2.03	1.76	1.64	1.57
1730	3.48	3.12	2.39	2.34	2.02	1.72	1.63	1.56
1800	3.48	3.12	2.39	2.28	1.82	1.67	1.55	1.50
1830	3.48	3.12	2.39	2.36	1.88	1.74	1.62	1.56
1900	4.27	3.84	2.74	2.87	2.16	2.09	1.79	1.63
1930	4.27	3.70	2.59	2.87	2.16	2.09	1.79	1.63
2000	3.93	3.25	2.27	2.42	1.82	1.72	1.56	1.40
2030	3.93	3.25	2.27	2.42	1.82	1.72	1.56	1.40
2100	3.93	3.25	2.27	2.42	1.82	1.72	1.56	1.40
2130	4.07	3.83	3.74	2.59	1.68	1.57	1.42	1.26
2200	4.07	3.83	3.74	2.59	1.68	1.57	1.42	1.26
2230	4.07	3.83	3.74	2.52	1.80	1.55	1.41	1.25
2300	4.07	3.83	3.74	2.52	1.80	1.55	1.41	1.25
2330	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
2400	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
2430	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
2500	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
2530	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
2600	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
2630	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
2700	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
2730	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
2800	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
2830	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
2900	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
2930	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
3000	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46
3030	4.07	3.83	3.74	3.01	2.32	2.06	1.63	1.46



1
 AVERAGE SURFACE AND SUBSURFACE TEMPERATURES (C) - BELOW CLEARING TOWER
 APRIL 1970, 6 - LEVELS: 0.5, 10, 20, 50, 100, (1M CM)

L.S.T.	16	17	18	19	20	21
0600	24.42	24.47	25.10	25.56	25.43	25.35
0700	24.30	24.34	24.84	25.42	25.43	25.35
0800	24.17	24.28	24.86	25.37	25.43	25.34
0900	24.74	24.81	24.81	25.31	25.43	25.34
1000	24.33	24.14	24.74	25.25	25.43	25.34
1100	24.44	24.01	24.66	25.12	25.43	25.33
1200	24.26	23.65	24.44	25.07	25.43	25.34
1300	24.12	23.71	24.34	24.95	25.42	25.33
1400	24.14	23.62	24.27	24.89	25.42	25.34
1500	24.03	23.50	24.20	24.84	25.41	25.34
1600	24.19	23.63	24.13	24.77	25.41	25.34
1700	24.20	24.25	24.11	24.63	25.39	25.35
1800	24.30	24.64	24.36	24.61	25.37	25.35
1900	24.67	24.95	25.00	24.66	25.35	25.35
2000	24.45	24.08	24.72	24.81	25.32	25.35
2100	24.32	24.81	24.65	25.10	25.31	25.35
2200	24.54	24.94	27.22	25.44	25.29	25.35
2300	24.74	24.16	27.51	25.63	25.28	25.35
2400	24.79	24.37	27.76	25.72	25.36	25.35
2500	24.38	24.81	27.87	24.13	25.37	25.35
2600	24.74	24.77	27.73	24.22	25.35	25.35
2700	24.64	24.94	27.31	24.31	25.27	25.35
2800	24.50	24.60	27.14	24.33	25.28	25.35
2900	24.25	24.43	24.98	24.33	25.27	25.35
3000	24.74	24.23	24.63	24.31	25.31	25.35
3100	24.43	24.72	24.65	24.25	25.23	25.35
3200	24.14	24.47	24.14	24.15	25.19	25.35
3300	24.73	24.25	24.74	24.09	25.19	25.35
3400	24.33	24.05	24.66	24.00	25.41	25.35
3500	24.47	24.97	24.59	24.84	25.42	25.35
3600	24.47	24.97	24.57	24.78	25.42	25.35

AVG. WIND SPEED (M/SEC) - CLEARING TOWER

JUNE 1970, 8 - LEVELS: 46.72, 24.16, 9.4, 2.1, (14 M)

Level	1	2	3	4	5	6	7	8
0000	7.00	6.90	5.19	4.25	3.63	3.20	2.72	2.27
0005	6.90	6.80	5.09	4.15	3.53	3.10	2.62	2.17
0100	6.80	6.70	5.00	4.06	3.44	3.01	2.53	2.08
0105	6.70	6.60	4.90	3.96	3.34	2.91	2.43	1.98
0200	6.70	6.60	4.90	3.96	3.34	2.91	2.43	1.98
0205	6.60	6.50	4.80	3.86	3.24	2.81	2.33	1.88
0300	6.50	6.40	4.70	3.76	3.14	2.71	2.23	1.78
0305	6.40	6.30	4.60	3.66	3.04	2.61	2.13	1.68
0400	6.30	6.20	4.50	3.56	2.94	2.51	2.03	1.58
0405	6.20	6.10	4.40	3.46	2.84	2.41	1.93	1.48
0500	6.10	6.00	4.30	3.36	2.74	2.31	1.83	1.38
0505	6.00	5.90	4.20	3.26	2.64	2.21	1.73	1.28
0600	5.90	5.80	4.10	3.16	2.54	2.11	1.63	1.18
0605	5.80	5.70	4.00	3.06	2.44	2.01	1.53	1.08
0700	5.70	5.60	3.90	2.96	2.34	1.91	1.43	0.98
0705	5.60	5.50	3.80	2.86	2.24	1.81	1.33	0.88
0800	5.50	5.40	3.70	2.76	2.14	1.71	1.23	0.78
0805	5.40	5.30	3.60	2.66	2.04	1.61	1.13	0.68
0900	5.30	5.20	3.50	2.56	1.94	1.51	1.03	0.58
0905	5.20	5.10	3.40	2.46	1.84	1.41	0.93	0.48
1000	5.10	5.00	3.30	2.36	1.74	1.31	0.83	0.38
1005	5.00	4.90	3.20	2.26	1.64	1.21	0.73	0.28
1100	4.90	4.80	3.10	2.16	1.54	1.11	0.63	0.18
1105	4.80	4.70	3.00	2.06	1.44	1.01	0.53	0.08
1200	4.70	4.60	2.90	1.96	1.34	0.91	0.43	0.00
1205	4.60	4.50	2.80	1.86	1.24	0.81	0.33	0.00
1300	4.50	4.40	2.70	1.76	1.14	0.71	0.23	0.00
1305	4.40	4.30	2.60	1.66	1.04	0.61	0.13	0.00
1400	4.30	4.20	2.50	1.56	0.94	0.51	0.03	0.00
1405	4.20	4.10	2.40	1.46	0.84	0.41	0.00	0.00
1500	4.10	4.00	2.30	1.36	0.74	0.31	0.00	0.00
1505	4.00	3.90	2.20	1.26	0.64	0.21	0.00	0.00
1600	3.90	3.80	2.10	1.16	0.54	0.11	0.00	0.00
1605	3.80	3.70	2.00	1.06	0.44	0.01	0.00	0.00
1700	3.70	3.60	1.90	0.96	0.34	0.00	0.00	0.00
1705	3.60	3.50	1.80	0.86	0.24	0.00	0.00	0.00
1800	3.50	3.40	1.70	0.76	0.14	0.00	0.00	0.00
1805	3.40	3.30	1.60	0.66	0.04	0.00	0.00	0.00
1900	3.30	3.20	1.50	0.56	0.00	0.00	0.00	0.00
1905	3.20	3.10	1.40	0.46	0.00	0.00	0.00	0.00
2000	3.10	3.00	1.30	0.36	0.00	0.00	0.00	0.00
2005	3.00	2.90	1.20	0.26	0.00	0.00	0.00	0.00
2100	2.90	2.80	1.10	0.16	0.00	0.00	0.00	0.00
2105	2.80	2.70	1.00	0.06	0.00	0.00	0.00	0.00
2200	2.70	2.60	0.90	0.00	0.00	0.00	0.00	0.00
2205	2.60	2.50	0.80	0.00	0.00	0.00	0.00	0.00
2300	2.50	2.40	0.70	0.00	0.00	0.00	0.00	0.00
2305	2.40	2.30	0.60	0.00	0.00	0.00	0.00	0.00

AVERAGE WIND SPEED (M/SEC) - CLEARING TOWER

JULY 1970, P - LEVELS: 0.7, 2.2, 4.1, 6.1, 8.1, 10.1, 12.1, 14.1, 16.1, 18.1, 20.1, 22.1, 24.1, 26.1, 28.1, 30.1, 32.1, 34.1, 36.1, 38.1, 40.1, 42.1, 44.1, 46.1, 48.1, 50.1, 52.1, 54.1, 56.1, 58.1, 60.1, 62.1, 64.1, 66.1, 68.1, 70.1, 72.1, 74.1, 76.1, 78.1, 80.1, 82.1, 84.1, 86.1, 88.1, 90.1, 92.1, 94.1, 96.1, 98.1, 100.1

LEVEL	1	2	3	4	5	6	7	8
0.00	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
0.10	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
0.20	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
0.30	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
0.40	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
0.50	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
0.60	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
0.70	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
0.80	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
0.90	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
1.00	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
1.10	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
1.20	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
1.30	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
1.40	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
1.50	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
1.60	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
1.70	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
1.80	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
1.90	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
2.00	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
2.10	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
2.20	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
2.30	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
2.40	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
2.50	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
2.60	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
2.70	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
2.80	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
2.90	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
3.00	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
3.10	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
3.20	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
3.30	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
3.40	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
3.50	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
3.60	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
3.70	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
3.80	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
3.90	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
4.00	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
4.10	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
4.20	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
4.30	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
4.40	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
4.50	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
4.60	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
4.70	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
4.80	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
4.90	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08
5.00	2.00	3.02	3.17	3.34	3.52	3.72	3.90	4.08

AVERAGE SURFACE AND SUBSURFACE TEMPERATURES (C) - BFLOW CLEARING TOWER
 JULY 1971 - 6 - LEVELS: 0.5, 1.0, 2.0, 5.0, 10.0. (14 CM)

L.S.T.	15	17	18	19	20	21
0000	24.71	25.98	25.54	26.28	26.13	26.38
0030	24.75	25.90	25.51	26.24	26.14	26.38
0100	24.69	25.74	25.44	26.14	26.14	26.38
0130	24.69	25.74	25.46	26.07	26.14	26.38
0200	24.54	25.56	25.35	25.91	26.15	26.39
0230	24.50	25.42	25.12	25.85	26.15	26.39
0300	24.50	25.35	25.00	25.73	26.14	26.39
0430	24.23	25.28	24.92	25.64	26.14	26.39
0500	24.12	25.23	24.87	25.62	26.13	26.39
0530	24.12	25.15	24.82	25.57	26.13	26.39
0600	24.17	25.08	24.74	25.51	26.12	26.39
0630	24.17	25.08	24.74	25.51	26.12	26.39
0700	24.22	25.11	24.67	25.47	26.10	26.39
0730	24.22	25.26	24.67	25.47	26.10	26.39
0800	24.70	25.47	24.71	25.34	26.09	26.39
0830	25.70	25.76	24.90	25.34	26.08	26.39
0900	25.70	26.14	24.95	25.34	26.07	26.39
0930	25.70	26.53	25.13	25.37	26.06	26.39
1000	24.50	26.92	25.31	25.52	26.04	26.39
1030	27.22	27.77	25.82	25.93	26.02	26.39
1100	27.22	28.15	26.07	25.96	26.01	26.39
1200	27.37	28.58	26.33	26.03	26.00	26.39
1300	27.37	28.94	26.57	26.03	26.00	26.39
1330	27.27	29.30	26.81	26.22	25.99	26.40
1350	27.27	29.44	27.01	26.22	25.98	26.40
1400	27.27	29.00	27.29	26.84	26.00	26.39
1430	27.27	29.00	27.29	26.84	26.00	26.39
1500	27.27	29.91	27.52	26.92	25.99	26.40
1530	27.27	29.91	27.52	26.92	25.99	26.40
1600	27.80	29.37	27.49	27.05	25.97	26.40
1630	27.80	29.13	27.49	27.05	25.97	26.40
1700	27.35	28.79	27.44	27.23	25.93	26.40
1730	27.42	28.47	27.39	27.23	25.93	26.40
1800	24.89	29.15	27.23	27.37	26.03	26.39
1830	24.89	29.97	27.23	27.37	26.03	26.39
1900	24.89	27.39	26.91	27.16	26.05	26.39
1930	24.89	27.39	26.91	27.16	26.05	26.39
2000	25.20	27.13	26.59	27.01	26.02	26.39
2030	25.20	26.93	26.59	27.01	26.02	26.39
2100	25.14	26.61	26.30	26.84	26.10	26.39
2130	25.14	26.61	26.30	26.84	26.10	26.39
2200	25.14	26.55	26.05	26.67	26.12	26.39
2230	25.14	26.55	26.05	26.67	26.12	26.39
2300	24.71	26.31	25.82	26.42	26.15	26.39
2330	24.71	26.31	25.82	26.42	26.15	26.39

AV. PAUL WIND SPEED (M/SEC) - CLEARING TOWPH
 SEPTEMBER 1970, 6 - LEVELS: 4, 3, 2, 1, 0.4, 0.2, 0.1, (10 M)

LEVEL	1	2	3	4	5	6	7	8
0.20	7.71	5.64	5.77	4.83	3.88	3.49	3.05	2.65
0.25	7.74	5.61	5.24	4.32	3.53	3.10	2.78	2.45
0.30	6.72	5.00	5.05	4.07	3.38	3.03	2.69	2.36
0.35	6.53	5.02	5.05	4.10	3.38	3.03	2.69	2.36
0.40	7.52	5.25	5.43	4.50	3.76	3.37	2.93	2.59
0.45	7.11	5.27	5.10	4.15	3.43	3.11	2.63	2.34
0.50	6.52	5.26	4.83	3.99	3.30	2.98	2.58	2.33
0.55	6.02	5.26	4.95	3.80	3.10	2.87	2.46	2.12
0.60	6.02	5.23	4.95	3.84	3.10	2.87	2.46	2.12
0.65	6.42	5.49	4.73	3.86	3.21	2.90	2.42	2.12
0.70	6.54	5.55	4.84	3.95	3.22	2.90	2.42	2.12
0.75	7.14	5.98	5.16	4.21	3.53	3.17	2.72	2.30
0.80	7.14	5.98	5.16	4.21	3.53	3.17	2.72	2.30
0.85	5.12	4.43	3.83	3.10	2.54	2.25	1.99	1.69
0.90	5.22	4.40	3.83	3.10	2.54	2.25	1.99	1.69
0.95	4.64	4.06	3.75	2.97	2.60	2.31	1.97	1.76
1.00	4.64	4.06	3.75	2.97	2.60	2.31	1.97	1.76
1.05	3.98	3.80	3.42	2.70	2.51	2.25	1.95	1.75
1.10	3.74	3.53	3.39	2.64	2.41	2.25	1.96	1.88
1.15	3.74	3.53	3.39	2.64	2.41	2.25	1.96	1.88
1.20	3.20	3.63	3.43	2.81	2.52	2.30	1.98	1.57
1.25	3.24	3.56	3.28	2.78	2.35	2.25	1.92	1.51
1.30	4.24	4.04	3.50	3.10	2.35	2.25	1.92	1.51
1.35	3.74	3.67	3.39	2.88	2.35	2.25	1.89	1.71
1.40	3.64	4.03	3.80	3.20	2.32	2.20	1.89	1.84
1.45	4.54	4.03	3.80	3.20	2.32	2.20	1.89	1.94
1.50	4.54	4.03	3.80	3.20	2.32	2.20	1.89	1.94
1.55	3.22	4.01	3.91	3.22	2.31	2.20	1.87	1.87
1.60	4.02	4.01	4.02	3.41	2.73	2.39	2.03	1.82
1.65	4.02	4.01	4.02	3.41	2.73	2.39	2.03	1.82
1.70	4.12	4.12	3.90	3.52	2.63	2.38	1.93	1.65
1.75	4.12	4.12	3.90	3.52	2.63	2.38	1.93	1.65
1.80	5.23	4.01	4.19	3.43	2.67	2.35	2.01	1.74
1.85	5.23	4.01	4.19	3.43	2.67	2.35	2.01	1.74
1.90	5.02	4.02	4.02	3.40	2.49	2.21	1.89	1.67
1.95	5.02	4.02	4.02	3.40	2.49	2.21	1.89	1.67
2.00	5.11	4.02	4.20	3.44	2.77	2.40	2.19	1.94
2.05	4.55	4.02	3.72	3.25	2.60	2.36	2.03	1.82
2.10	4.24	4.44	3.82	3.20	2.63	2.33	2.03	1.73
2.15	4.24	4.44	3.82	3.20	2.63	2.33	2.03	1.73
2.20	4.52	4.07	4.23	3.20	3.02	2.70	2.33	1.68
2.25	4.52	4.07	4.23	3.20	3.02	2.70	2.33	1.68
2.30	5.25	5.25	4.63	3.77	3.02	2.74	2.33	2.06

AVERAGE SURFACE AND SUBSURFACE TEMPERATURES (C) - BELOW CLEARING TOWER
 SEPTEMBER 1977, 6 - LEVELS: (.5, 1.0, 2.0, 5.0, 10C. (IN CP)

L.S.T.	16	17	18	19	20	21
0500	26.14	24.91	25.51	26.04	26.12	26.05
0600	26.14	24.52	25.41	25.95	26.15	26.05
0700	26.11	24.45	25.33	25.80	26.15	26.05
0800	26.07	24.38	25.26	25.76	26.15	26.05
0900	26.04	24.31	25.19	25.72	26.14	26.05
1000	26.01	24.24	25.12	25.68	26.14	26.05
1100	25.97	24.17	25.05	25.64	26.14	26.05
1200	25.94	24.10	24.98	25.60	26.14	26.05
1300	25.90	24.03	24.91	25.56	26.14	26.05
1400	25.87	23.96	24.84	25.52	26.14	26.05
1500	25.84	23.89	24.77	25.48	26.14	26.05
1600	25.81	23.82	24.70	25.44	26.14	26.05
1700	25.78	23.75	24.63	25.40	26.14	26.05
1800	25.75	23.68	24.56	25.36	26.14	26.05
1900	25.72	23.61	24.49	25.32	26.14	26.05
2000	25.69	23.54	24.42	25.28	26.14	26.05
2100	25.66	23.47	24.35	25.24	26.14	26.05
2200	25.63	23.40	24.28	25.20	26.14	26.05
2300	25.60	23.33	24.21	25.16	26.14	26.05
2400	25.57	23.26	24.14	25.12	26.14	26.05
2500	25.54	23.19	24.07	25.08	26.14	26.05
2600	25.51	23.12	24.00	25.04	26.14	26.05
2700	25.48	23.05	23.93	25.00	26.14	26.05
2800	25.45	22.98	23.86	24.96	26.14	26.05
2900	25.42	22.91	23.79	24.92	26.14	26.05
3000	25.39	22.84	23.72	24.88	26.14	26.05
3100	25.36	22.77	23.65	24.84	26.14	26.05
3200	25.33	22.70	23.58	24.80	26.14	26.05
3300	25.30	22.63	23.51	24.76	26.14	26.05
3400	25.27	22.56	23.44	24.72	26.14	26.05
3500	25.24	22.49	23.37	24.68	26.14	26.05
3600	25.21	22.42	23.30	24.64	26.14	26.05
3700	25.18	22.35	23.23	24.60	26.14	26.05
3800	25.15	22.28	23.16	24.56	26.14	26.05
3900	25.12	22.21	23.09	24.52	26.14	26.05
4000	25.09	22.14	23.02	24.48	26.14	26.05
4100	25.06	22.07	22.95	24.44	26.14	26.05
4200	25.03	22.00	22.88	24.40	26.14	26.05
4300	25.00	21.93	22.81	24.36	26.14	26.05
4400	24.97	21.86	22.74	24.32	26.14	26.05
4500	24.94	21.79	22.67	24.28	26.14	26.05
4600	24.91	21.72	22.60	24.24	26.14	26.05
4700	24.88	21.65	22.53	24.20	26.14	26.05
4800	24.85	21.58	22.46	24.16	26.14	26.05
4900	24.82	21.51	22.39	24.12	26.14	26.05
5000	24.79	21.44	22.32	24.08	26.14	26.05
5100	24.76	21.37	22.25	24.04	26.14	26.05
5200	24.73	21.30	22.18	24.00	26.14	26.05
5300	24.70	21.23	22.11	23.96	26.14	26.05
5400	24.67	21.16	22.04	23.92	26.14	26.05
5500	24.64	21.09	21.97	23.88	26.14	26.05
5600	24.61	21.02	21.90	23.84	26.14	26.05
5700	24.58	20.95	21.83	23.80	26.14	26.05
5800	24.55	20.88	21.76	23.76	26.14	26.05
5900	24.52	20.81	21.69	23.72	26.14	26.05
6000	24.49	20.74	21.62	23.68	26.14	26.05
6100	24.46	20.67	21.55	23.64	26.14	26.05
6200	24.43	20.60	21.48	23.60	26.14	26.05
6300	24.40	20.53	21.41	23.56	26.14	26.05
6400	24.37	20.46	21.34	23.52	26.14	26.05
6500	24.34	20.39	21.27	23.48	26.14	26.05
6600	24.31	20.32	21.20	23.44	26.14	26.05
6700	24.28	20.25	21.13	23.40	26.14	26.05
6800	24.25	20.18	21.06	23.36	26.14	26.05
6900	24.22	20.11	20.99	23.32	26.14	26.05
7000	24.19	20.04	20.92	23.28	26.14	26.05
7100	24.16	19.97	20.85	23.24	26.14	26.05
7200	24.13	19.90	20.78	23.20	26.14	26.05
7300	24.10	19.83	20.71	23.16	26.14	26.05
7400	24.07	19.76	20.64	23.12	26.14	26.05
7500	24.04	19.69	20.57	23.08	26.14	26.05
7600	24.01	19.62	20.50	23.04	26.14	26.05
7700	23.98	19.55	20.43	23.00	26.14	26.05
7800	23.95	19.48	20.36	22.96	26.14	26.05
7900	23.92	19.41	20.29	22.92	26.14	26.05
8000	23.89	19.34	20.22	22.88	26.14	26.05
8100	23.86	19.27	20.15	22.84	26.14	26.05
8200	23.83	19.20	20.08	22.80	26.14	26.05
8300	23.80	19.13	20.01	22.76	26.14	26.05
8400	23.77	19.06	19.94	22.72	26.14	26.05
8500	23.74	18.99	19.87	22.68	26.14	26.05
8600	23.71	18.92	19.80	22.64	26.14	26.05
8700	23.68	18.85	19.73	22.60	26.14	26.05
8800	23.65	18.78	19.66	22.56	26.14	26.05
8900	23.62	18.71	19.59	22.52	26.14	26.05
9000	23.59	18.64	19.52	22.48	26.14	26.05
9100	23.56	18.57	19.45	22.44	26.14	26.05
9200	23.53	18.50	19.38	22.40	26.14	26.05
9300	23.50	18.43	19.31	22.36	26.14	26.05
9400	23.47	18.36	19.24	22.32	26.14	26.05
9500	23.44	18.29	19.17	22.28	26.14	26.05
9600	23.41	18.22	19.10	22.24	26.14	26.05
9700	23.38	18.15	19.03	22.20	26.14	26.05
9800	23.35	18.08	18.96	22.16	26.14	26.05
9900	23.32	18.01	18.89	22.12	26.14	26.05

Level	1	2	3	4	5	6	7	8
0.70	3.59	3.16	0.66	1.59	0.99	1.00	0.85	0.97
0.70	3.07	3.05	0.76	1.76	0.75	1.04	0.85	0.79
0.70	2.09	3.17	0.77	1.87	0.70	1.00	0.92	0.82
0.70	4.52	3.53	0.72	1.95	0.84	1.14	0.97	0.85
0.70	2.03	3.36	0.57	1.76	0.81	1.18	0.73	0.78
0.70	4.77	3.65	0.91	1.78	0.72	1.21	1.05	0.85
0.70	4.00	3.54	0.85	1.82	1.03	1.33	1.15	0.87
0.70	4.33	3.58	0.76	1.70	1.01	1.20	1.05	0.97
0.70	4.17	3.59	0.81	1.85	1.11	1.23	1.02	0.90
0.70	4.13	3.24	1.02	2.02	1.24	1.75	1.60	1.34
0.70	5.45	3.45	0.89	3.16	1.88	2.31	2.02	1.81
0.70	3.70	3.82	1.02	3.19	1.58	2.34	2.16	1.88
0.70	5.39	4.02	2.40	3.36	1.61	2.68	2.42	2.11
0.70	5.17	4.02	2.16	3.27	1.42	2.68	2.42	2.11
0.70	5.25	4.02	2.08	3.42	1.33	2.54	2.33	2.05
0.70	5.10	4.23	2.23	3.02	1.22	2.61	2.40	2.09
0.70	5.11	4.71	2.33	3.53	0.79	2.44	2.29	1.98
0.70	5.12	4.55	2.01	3.35	0.91	2.36	2.14	1.86
0.70	5.05	4.37	1.65	3.30	0.95	2.31	2.10	1.83
0.70	4.74	4.03	1.42	3.01	0.52	2.10	1.77	1.41
0.70	4.74	4.03	0.78	2.88	0.31	1.43	1.10	0.89
0.70	5.17	4.09	0.96	3.26	0.31	1.21	1.09	0.77
0.70	5.09	3.84	0.65	3.05	0.25	1.07	0.86	0.63
0.70	4.77	3.73	0.35	1.97	0.25	0.89	0.72	0.54
0.70	4.03	3.72	0.67	1.97	0.34	0.82	0.76	0.61
0.70	4.03	3.47	0.74	2.15	0.59	1.14	0.89	0.78
0.70	4.03	3.70	0.70	3.03	0.58	1.19	0.87	0.76

AVERAGE TEMPERATURES (C) - CLEARING TOWER
 DECEMBER 1970 - LEVELS: 4.40, 5.32, 2P, 24, 20, 16, 12, P, 6.4, 2, C, S. (IN M)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1000	11.55	14.03	14.34	17.39	17.73	18.26	19.12	18.07	17.95	17.79	17.64	17.17	16.65	16.25	16.00
1050	11.55	14.03	14.34	17.39	17.73	18.26	19.12	18.07	17.95	17.79	17.64	17.17	16.65	16.25	16.00
1100	12.77	17.25	17.56	17.54	17.54	17.54	17.54	17.54	17.54	17.54	17.54	17.54	16.07	15.62	15.38
1150	12.52	17.55	17.50	17.54	17.54	17.54	17.54	17.54	17.54	17.54	17.54	17.54	16.81	16.43	16.28
1200	12.57	17.51	17.53	17.53	17.53	17.53	17.53	17.53	17.53	17.53	17.53	17.53	16.57	16.26	16.05
1250	12.68	16.67	16.65	16.61	16.35	16.57	16.43	16.23	16.11	16.15	16.04	15.79	15.07	14.98	14.81
1300	13.42	16.55	16.20	15.69	15.91	16.12	16.02	15.99	15.88	15.74	15.63	15.42	14.84	14.43	14.22
1350	13.72	15.70	15.71	15.50	15.51	15.65	15.57	15.53	15.44	15.32	15.20	15.06	14.63	14.39	14.28
1400	13.55	15.54	15.54	15.44	15.40	15.49	15.47	15.37	15.27	15.11	15.00	14.82	14.63	14.60	14.94
1450	13.39	15.36	15.38	15.39	15.35	15.33	15.24	15.22	15.13	14.89	14.79	14.57	14.35	14.09	13.87
1500	13.54	15.71	15.73	15.84	15.84	15.71	15.78	15.95	15.58	15.40	15.26	14.93	14.34	14.03	13.92
1550	12.64	16.41	16.41	16.29	16.25	16.27	16.51	16.35	16.41	16.31	16.40	16.37	16.24	15.80	15.48
1600	12.44	16.41	16.41	16.29	16.25	16.27	16.51	16.35	16.41	16.31	16.40	16.37	16.24	15.80	15.48
1650	12.78	18.20	18.22	18.45	18.44	18.60	19.14	18.89	19.36	19.44	19.83	17.63	18.09	18.08	19.75
1700	13.38	19.08	19.08	19.31	19.31	19.32	19.71	19.74	19.63	19.49	20.20	20.08	20.80	21.62	22.28
1750	13.79	19.59	19.59	19.81	19.80	19.87	20.11	20.17	20.36	20.67	20.73	21.08	21.70	22.40	23.09
1800	20.16	20.26	20.41	20.60	20.73	20.65	20.85	20.93	21.10	21.24	21.74	22.05	22.35	23.00	23.51
1850	20.78	20.89	21.03	21.23	21.38	21.23	21.49	21.59	21.76	21.88	22.19	22.29	22.95	23.67	23.91
1900	21.11	21.12	21.19	21.42	21.52	21.51	21.66	21.71	21.81	21.92	22.02	22.34	22.85	23.28	23.68
1950	21.14	21.10	21.15	21.41	21.47	21.31	21.50	21.53	21.60	21.64	21.75	21.91	22.25	22.50	23.48
2000	20.53	20.83	20.65	20.84	20.89	20.82	20.79	20.77	20.72	20.69	20.69	20.72	20.83	20.88	20.65
2050	20.49	20.98	20.15	20.09	20.02	19.99	19.75	19.67	19.48	19.32	19.20	19.00	18.52	18.23	19.03
2100	19.09	19.77	19.50	19.42	19.31	19.31	19.30	19.20	19.00	18.83	18.68	18.43	17.59	17.45	17.38
2150	19.32	19.44	19.37	19.22	19.20	19.13	19.05	18.86	18.64	18.44	18.29	18.03	17.35	16.98	16.78
2200	19.41	19.15	19.10	18.91	18.94	18.97	18.73	18.65	18.46	18.24	18.15	17.92	17.18	16.80	16.56
2250	19.60	18.76	18.72	18.40	18.52	18.56	18.41	18.37	18.23	18.04	17.84	17.73	17.09	16.61	16.40
2300	19.16	18.16	18.12	18.02	18.04	18.04	17.90	17.84	17.71	17.55	17.44	17.23	16.63	16.28	16.02

AVERAGE WIND SPEED (M/SEC) - FOREST TOWER
 JANUARY 1970. 8 - LEVELS: 46, 40, 36, 32, 30, 25, 16, 4. (11. M)

Level	1	2	3	4	5	6	7	8
0.0	2.24	2.45	1.44	0.51	0.34	0.25	0.25	0.25
0.0	2.11	2.22	1.21	0.47	0.31	0.26	0.25	0.25
0.1	2.12	2.23	1.22	0.48	0.32	0.26	0.25	0.25
0.2	2.13	2.24	1.23	0.49	0.33	0.27	0.26	0.26
0.3	2.14	2.25	1.24	0.50	0.34	0.27	0.26	0.26
0.4	2.15	2.26	1.25	0.51	0.35	0.27	0.27	0.27
0.5	2.16	2.27	1.26	0.52	0.36	0.27	0.27	0.27
0.6	2.17	2.28	1.27	0.53	0.37	0.27	0.27	0.27
0.7	2.18	2.29	1.28	0.54	0.38	0.27	0.27	0.27
0.8	2.19	2.30	1.29	0.55	0.39	0.27	0.27	0.27
0.9	2.20	2.31	1.30	0.56	0.40	0.27	0.27	0.27
1.0	2.21	2.32	1.31	0.57	0.41	0.27	0.27	0.27
1.1	2.22	2.33	1.32	0.58	0.42	0.27	0.27	0.27
1.2	2.23	2.34	1.33	0.59	0.43	0.27	0.27	0.27
1.3	2.24	2.35	1.34	0.60	0.44	0.27	0.27	0.27
1.4	2.25	2.36	1.35	0.61	0.45	0.27	0.27	0.27
1.5	2.26	2.37	1.36	0.62	0.46	0.27	0.27	0.27
1.6	2.27	2.38	1.37	0.63	0.47	0.27	0.27	0.27
1.7	2.28	2.39	1.38	0.64	0.48	0.27	0.27	0.27
1.8	2.29	2.40	1.39	0.65	0.49	0.27	0.27	0.27
1.9	2.30	2.41	1.40	0.66	0.50	0.27	0.27	0.27
2.0	2.31	2.42	1.41	0.67	0.51	0.27	0.27	0.27
2.1	2.32	2.43	1.42	0.68	0.52	0.27	0.27	0.27
2.2	2.33	2.44	1.43	0.69	0.53	0.27	0.27	0.27
2.3	2.34	2.45	1.44	0.70	0.54	0.27	0.27	0.27
2.4	2.35	2.46	1.45	0.71	0.55	0.27	0.27	0.27
2.5	2.36	2.47	1.46	0.72	0.56	0.27	0.27	0.27
2.6	2.37	2.48	1.47	0.73	0.57	0.27	0.27	0.27
2.7	2.38	2.49	1.48	0.74	0.58	0.27	0.27	0.27
2.8	2.39	2.50	1.49	0.75	0.59	0.27	0.27	0.27
2.9	2.40	2.51	1.50	0.76	0.60	0.27	0.27	0.27
3.0	2.41	2.52	1.51	0.77	0.61	0.27	0.27	0.27
3.1	2.42	2.53	1.52	0.78	0.62	0.27	0.27	0.27
3.2	2.43	2.54	1.53	0.79	0.63	0.27	0.27	0.27
3.3	2.44	2.55	1.54	0.80	0.64	0.27	0.27	0.27
3.4	2.45	2.56	1.55	0.81	0.65	0.27	0.27	0.27
3.5	2.46	2.57	1.56	0.82	0.66	0.27	0.27	0.27
3.6	2.47	2.58	1.57	0.83	0.67	0.27	0.27	0.27
3.7	2.48	2.59	1.58	0.84	0.68	0.27	0.27	0.27
3.8	2.49	2.60	1.59	0.85	0.69	0.27	0.27	0.27
3.9	2.50	2.61	1.60	0.86	0.70	0.27	0.27	0.27
4.0	2.51	2.62	1.61	0.87	0.71	0.27	0.27	0.27
4.1	2.52	2.63	1.62	0.88	0.72	0.27	0.27	0.27
4.2	2.53	2.64	1.63	0.89	0.73	0.27	0.27	0.27
4.3	2.54	2.65	1.64	0.90	0.74	0.27	0.27	0.27
4.4	2.55	2.66	1.65	0.91	0.75	0.27	0.27	0.27
4.5	2.56	2.67	1.66	0.92	0.76	0.27	0.27	0.27
4.6	2.57	2.68	1.67	0.93	0.77	0.27	0.27	0.27
4.7	2.58	2.69	1.68	0.94	0.78	0.27	0.27	0.27
4.8	2.59	2.70	1.69	0.95	0.79	0.27	0.27	0.27
4.9	2.60	2.71	1.70	0.96	0.80	0.27	0.27	0.27
5.0	2.61	2.72	1.71	0.97	0.81	0.27	0.27	0.27
5.1	2.62	2.73	1.72	0.98	0.82	0.27	0.27	0.27
5.2	2.63	2.74	1.73	0.99	0.83	0.27	0.27	0.27
5.3	2.64	2.75	1.74	1.00	0.84	0.27	0.27	0.27
5.4	2.65	2.76	1.75	1.01	0.85	0.27	0.27	0.27
5.5	2.66	2.77	1.76	1.02	0.86	0.27	0.27	0.27
5.6	2.67	2.78	1.77	1.03	0.87	0.27	0.27	0.27
5.7	2.68	2.79	1.78	1.04	0.88	0.27	0.27	0.27
5.8	2.69	2.80	1.79	1.05	0.89	0.27	0.27	0.27
5.9	2.70	2.81	1.80	1.06	0.90	0.27	0.27	0.27
6.0	2.71	2.82	1.81	1.07	0.91	0.27	0.27	0.27
6.1	2.72	2.83	1.82	1.08	0.92	0.27	0.27	0.27
6.2	2.73	2.84	1.83	1.09	0.93	0.27	0.27	0.27
6.3	2.74	2.85	1.84	1.10	0.94	0.27	0.27	0.27
6.4	2.75	2.86	1.85	1.11	0.95	0.27	0.27	0.27
6.5	2.76	2.87	1.86	1.12	0.96	0.27	0.27	0.27
6.6	2.77	2.88	1.87	1.13	0.97	0.27	0.27	0.27
6.7	2.78	2.89	1.88	1.14	0.98	0.27	0.27	0.27
6.8	2.79	2.90	1.89	1.15	0.99	0.27	0.27	0.27
6.9	2.80	2.91	1.90	1.16	1.00	0.27	0.27	0.27
7.0	2.81	2.92	1.91	1.17	1.01	0.27	0.27	0.27
7.1	2.82	2.93	1.92	1.18	1.02	0.27	0.27	0.27
7.2	2.83	2.94	1.93	1.19	1.03	0.27	0.27	0.27
7.3	2.84	2.95	1.94	1.20	1.04	0.27	0.27	0.27
7.4	2.85	2.96	1.95	1.21	1.05	0.27	0.27	0.27
7.5	2.86	2.97	1.96	1.22	1.06	0.27	0.27	0.27
7.6	2.87	2.98	1.97	1.23	1.07	0.27	0.27	0.27
7.7	2.88	2.99	1.98	1.24	1.08	0.27	0.27	0.27
7.8	2.89	3.00	1.99	1.25	1.09	0.27	0.27	0.27
7.9	2.90	3.01	2.00	1.26	1.10	0.27	0.27	0.27
8.0	2.91	3.02	2.01	1.27	1.11	0.27	0.27	0.27
8.1	2.92	3.03	2.02	1.28	1.12	0.27	0.27	0.27
8.2	2.93	3.04	2.03	1.29	1.13	0.27	0.27	0.27
8.3	2.94	3.05	2.04	1.30	1.14	0.27	0.27	0.27
8.4	2.95	3.06	2.05	1.31	1.15	0.27	0.27	0.27
8.5	2.96	3.07	2.06	1.32	1.16	0.27	0.27	0.27
8.6	2.97	3.08	2.07	1.33	1.17	0.27	0.27	0.27
8.7	2.98	3.09	2.08	1.34	1.18	0.27	0.27	0.27
8.8	2.99	3.10	2.09	1.35	1.19	0.27	0.27	0.27
8.9	3.00	3.11	2.10	1.36	1.20	0.27	0.27	0.27
9.0	3.01	3.12	2.11	1.37	1.21	0.27	0.27	0.27
9.1	3.02	3.13	2.12	1.38	1.22	0.27	0.27	0.27
9.2	3.03	3.14	2.13	1.39	1.23	0.27	0.27	0.27
9.3	3.04	3.15	2.14	1.40	1.24	0.27	0.27	0.27
9.4	3.05	3.16	2.15	1.41	1.25	0.27	0.27	0.27
9.5	3.06	3.17	2.16	1.42	1.26	0.27	0.27	0.27
9.6	3.07	3.18	2.17	1.43	1.27	0.27	0.27	0.27
9.7	3.08	3.19	2.18	1.44	1.28	0.27	0.27	0.27
9.8	3.09	3.20	2.19	1.45	1.29	0.27	0.27	0.27
9.9	3.10	3.21	2.20	1.46	1.30	0.27	0.27	0.27
10.0	3.11	3.22	2.21	1.47	1.31	0.27	0.27	0.27

AVERAGE TEMPERATURES (C) - FOREST TOWER
 JANUARY 1970, 15 - LEVELS: 40, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150 (IN M)

Level	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
500	25.70	25.80	25.92	26.03	26.11	26.23	26.36	26.48	26.61	26.76	26.92	27.10	27.30	27.50	27.76
530	24.05	24.16	24.28	24.40	24.52	24.64	24.76	24.88	25.00	25.12	25.24	25.36	25.48	25.60	25.72
560	22.40	22.51	22.63	22.75	22.87	22.99	23.11	23.23	23.35	23.47	23.59	23.71	23.83	23.95	24.07
590	20.75	20.86	20.98	21.10	21.22	21.34	21.46	21.58	21.70	21.82	21.94	22.06	22.18	22.30	22.42
620	19.10	19.21	19.33	19.45	19.57	19.69	19.81	19.93	20.05	20.17	20.29	20.41	20.53	20.65	20.77
650	17.45	17.56	17.68	17.80	17.92	18.04	18.16	18.28	18.40	18.52	18.64	18.76	18.88	19.00	19.12
680	15.80	15.91	16.03	16.15	16.27	16.39	16.51	16.63	16.75	16.87	16.99	17.11	17.23	17.35	17.47
710	14.15	14.26	14.38	14.50	14.62	14.74	14.86	14.98	15.10	15.22	15.34	15.46	15.58	15.70	15.82
740	12.50	12.61	12.73	12.85	12.97	13.09	13.21	13.33	13.45	13.57	13.69	13.81	13.93	14.05	14.17
770	10.85	10.96	11.08	11.20	11.32	11.44	11.56	11.68	11.80	11.92	12.04	12.16	12.28	12.40	12.52
800	9.20	9.31	9.43	9.55	9.67	9.79	9.91	10.03	10.15	10.27	10.39	10.51	10.63	10.75	10.87
830	7.55	7.66	7.78	7.90	8.02	8.14	8.26	8.38	8.50	8.62	8.74	8.86	8.98	9.10	9.22
860	5.90	6.01	6.13	6.25	6.37	6.49	6.61	6.73	6.85	6.97	7.09	7.21	7.33	7.45	7.57
890	4.25	4.36	4.48	4.60	4.72	4.84	4.96	5.08	5.20	5.32	5.44	5.56	5.68	5.80	5.92
920	2.60	2.71	2.83	2.95	3.07	3.19	3.31	3.43	3.55	3.67	3.79	3.91	4.03	4.15	4.27
950	0.95	1.06	1.18	1.30	1.42	1.54	1.66	1.78	1.90	2.02	2.14	2.26	2.38	2.50	2.62
980	-0.70	-0.81	-0.93	-1.05	-1.17	-1.29	-1.41	-1.53	-1.65	-1.77	-1.89	-2.01	-2.13	-2.25	-2.37
1010	-2.35	-2.46	-2.58	-2.70	-2.82	-2.94	-3.06	-3.18	-3.30	-3.42	-3.54	-3.66	-3.78	-3.90	-4.02
1040	-4.00	-4.11	-4.23	-4.35	-4.47	-4.59	-4.71	-4.83	-4.95	-5.07	-5.19	-5.31	-5.43	-5.55	-5.67
1070	-5.65	-5.76	-5.88	-6.00	-6.12	-6.24	-6.36	-6.48	-6.60	-6.72	-6.84	-6.96	-7.08	-7.20	-7.32
1100	-7.30	-7.41	-7.53	-7.65	-7.77	-7.89	-8.01	-8.13	-8.25	-8.37	-8.49	-8.61	-8.73	-8.85	-8.97
1130	-8.95	-9.06	-9.18	-9.30	-9.42	-9.54	-9.66	-9.78	-9.90	-10.02	-10.14	-10.26	-10.38	-10.50	-10.62
1160	-10.60	-10.71	-10.83	-10.95	-11.07	-11.19	-11.31	-11.43	-11.55	-11.67	-11.79	-11.91	-12.03	-12.15	-12.27
1190	-12.25	-12.36	-12.48	-12.60	-12.72	-12.84	-12.96	-13.08	-13.20	-13.32	-13.44	-13.56	-13.68	-13.80	-13.92
1220	-13.90	-14.01	-14.13	-14.25	-14.37	-14.49	-14.61	-14.73	-14.85	-14.97	-15.09	-15.21	-15.33	-15.45	-15.57
1250	-15.55	-15.66	-15.78	-15.90	-16.02	-16.14	-16.26	-16.38	-16.50	-16.62	-16.74	-16.86	-16.98	-17.10	-17.22
1280	-17.20	-17.31	-17.43	-17.55	-17.67	-17.79	-17.91	-18.03	-18.15	-18.27	-18.39	-18.51	-18.63	-18.75	-18.87
1310	-18.85	-18.96	-19.08	-19.20	-19.32	-19.44	-19.56	-19.68	-19.80	-19.92	-20.04	-20.16	-20.28	-20.40	-20.52
1340	-20.50	-20.61	-20.73	-20.85	-20.97	-21.09	-21.21	-21.33	-21.45	-21.57	-21.69	-21.81	-21.93	-22.05	-22.17
1370	-22.15	-22.26	-22.38	-22.50	-22.62	-22.74	-22.86	-22.98	-23.10	-23.22	-23.34	-23.46	-23.58	-23.70	-23.82
1400	-23.80	-23.91	-24.03	-24.15	-24.27	-24.39	-24.51	-24.63	-24.75	-24.87	-24.99	-25.11	-25.23	-25.35	-25.47
1430	-25.62	-25.73	-25.85	-25.97	-26.09	-26.21	-26.33	-26.45	-26.57	-26.69	-26.81	-26.93	-27.05	-27.17	-27.29
1460	-27.44	-27.55	-27.67	-27.79	-27.91	-28.03	-28.15	-28.27	-28.39	-28.51	-28.63	-28.75	-28.87	-28.99	-29.11
1490	-29.56	-29.67	-29.79	-29.91	-30.03	-30.15	-30.27	-30.39	-30.51	-30.63	-30.75	-30.87	-30.99	-31.11	-31.23
1520	-31.68	-31.79	-31.91	-32.03	-32.15	-32.27	-32.39	-32.51	-32.63	-32.75	-32.87	-32.99	-33.11	-33.23	-33.35
1550	-33.77	-33.88	-34.00	-34.12	-34.24	-34.36	-34.48	-34.60	-34.72	-34.84	-34.96	-35.08	-35.20	-35.32	-35.44
1580	-35.83	-35.94	-36.06	-36.18	-36.30	-36.42	-36.54	-36.66	-36.78	-36.90	-37.02	-37.14	-37.26	-37.38	-37.50
1610	-37.92	-38.03	-38.15	-38.27	-38.39	-38.51	-38.63	-38.75	-38.87	-38.99	-39.11	-39.23	-39.35	-39.47	-39.59
1640	-39.95	-40.06	-40.18	-40.30	-40.42	-40.54	-40.66	-40.78	-40.90	-41.02	-41.14	-41.26	-41.38	-41.50	-41.62
1670	-42.03	-42.14	-42.26	-42.38	-42.50	-42.62	-42.74	-42.86	-42.98	-43.10	-43.22	-43.34	-43.46	-43.58	-43.70
1700	-44.57	-44.68	-44.80	-44.92	-45.04	-45.16	-45.28	-45.40	-45.52	-45.64	-45.76	-45.88	-46.00	-46.12	-46.24
1730	-46.66	-46.77	-46.89	-47.01	-47.13	-47.25	-47.37	-47.49	-47.61	-47.73	-47.85	-47.97	-48.09	-48.21	-48.33
1760	-48.81	-48.92	-49.04	-49.16	-49.28	-49.40	-49.52	-49.64	-49.76	-49.88	-49.99	-50.11	-50.23	-50.35	-50.47
1790	-50.91	-51.02	-51.14	-51.26	-51.38	-51.50	-51.62	-51.74	-51.86	-51.98	-52.10	-52.22	-52.34	-52.46	-52.58
1820	-53.03	-53.14	-53.26	-53.38	-53.50	-53.62	-53.74	-53.86	-53.98	-54.10	-54.22	-54.34	-54.46	-54.58	-54.70
1850	-55.66	-55.77	-55.89	-56.01	-56.13	-56.25	-56.37	-56.49	-56.61	-56.73	-56.85	-56.97	-57.09	-57.21	-57.33

WINDS AND SURFACE TEMPERATURES (C) - PELUM FOREST TOWER
 JANUARY 1970, 6 - LEVELS: 0.5, 1.0, 2.0, 5.0, 10.0, (21' CM)

LEVEL	16	17	18	19	20	21
0.50	19.17	19.29	19.74	19.84	20.19	20.88
1.00	19.11	19.19	19.70	19.80	20.20	20.88
2.00	19.05	19.14	19.67	19.80	20.20	20.88
5.00	19.09	19.19	19.65	19.78	20.21	20.88
10.00	18.95	19.00	19.60	19.79	20.21	20.88
0.50	18.83	18.94	19.55	19.70	20.20	20.88
1.00	18.78	18.89	19.52	19.69	20.20	20.88
2.00	18.71	18.84	19.50	19.67	20.20	20.88
5.00	18.65	18.79	19.47	19.65	20.20	20.88
10.00	18.61	18.75	19.45	19.65	20.20	20.88
0.50	18.52	18.71	19.26	19.62	20.20	20.88
1.00	18.45	18.61	19.39	19.61	20.23	20.88
2.00	18.47	18.61	19.36	19.61	20.23	20.88
5.00	18.40	18.57	19.26	19.53	20.20	20.88
10.00	18.61	18.66	19.24	19.51	20.19	20.88
0.50	18.73	18.72	19.18	19.58	20.18	20.88
1.00	18.95	18.88	19.19	19.43	20.17	20.88
2.00	19.17	19.05	19.21	19.43	20.17	20.88
5.00	19.63	19.49	19.32	19.45	20.17	20.88
10.00	20.52	19.64	19.32	19.45	20.16	20.88
0.50	20.04	19.80	19.40	19.47	20.16	20.88
1.00	20.21	19.99	19.46	19.49	20.16	20.88
2.00	20.35	20.12	19.52	19.53	20.15	20.88
5.00	20.43	20.22	19.58	19.53	20.15	20.88
10.00	20.82	20.39	19.85	19.95	20.23	20.88
0.50	20.95	20.70	19.97	19.79	20.20	20.88
1.00	20.93	20.69	19.97	19.82	20.20	20.88
2.00	20.89	20.66	20.03	19.86	20.20	20.88
5.00	20.77	20.57	20.03	19.86	20.20	20.88
10.00	20.66	20.49	20.08	19.91	20.20	20.88
0.50	20.51	20.39	20.08	19.91	20.20	20.88
1.00	20.39	20.32	20.09	19.98	20.21	20.88
2.00	20.32	20.32	20.08	19.98	20.22	20.88
5.00	19.92	19.89	19.97	19.95	20.20	20.88
10.00	19.83	19.83	19.97	19.95	20.20	20.88
0.50	19.70	19.73	19.93	19.95	20.20	20.88
1.00	19.70	19.70	19.93	19.95	20.20	20.88
2.00	19.64	19.65	19.93	19.95	20.21	20.88
5.00	19.53	19.55	19.83	19.93	20.21	20.88
10.00	19.53	19.55	19.83	19.93	20.21	20.88
0.50	19.47	19.47	19.90	19.92	20.22	20.88
1.00	19.47	19.47	19.90	19.92	20.22	20.88

AVG. WIND SPEED (MPH) - FOREST TOWER
 FEBRUARY 1970 - 8 - LEVELS: 40, 60, 80, 100, 120, 140, 160, 180 (IN M)

1	2	3	4	5	6	7	8
6:00	5:34	4:58	3:42	1:46	0:65	0:72	0:45
6:10	5:34	4:58	3:42	1:46	0:66	0:76	0:50
6:20	5:32	4:55	3:32	1:44	0:64	0:73	0:46
6:30	5:25	4:47	3:24	1:38	0:68	0:81	0:55
6:40	5:29	4:51	3:29	1:53	0:76	0:82	0:63
6:50	5:14	4:22	2:71	1:07	0:79	0:82	0:52
7:00	5:11	4:17	2:58	1:00	0:77	0:85	0:54
7:10	5:23	4:27	2:62	1:27	0:62	0:80	0:61
7:20	5:19	4:24	2:70	1:06	0:70	0:84	0:62
7:30	5:12	4:22	2:64	1:01	0:59	0:82	0:48
7:40	4:54	4:02	2:40	1:07	0:55	0:84	0:65
7:50	4:23	3:46	2:22	1:02	0:56	0:83	0:60
8:00	3:50	3:24	1:58	1:03	0:44	0:87	0:56
8:10	3:54	3:22	1:95	1:05	0:51	0:82	0:52
8:20	3:47	3:19	1:83	1:15	0:44	0:84	0:55
8:30	3:45	3:17	1:81	1:12	0:44	0:86	0:44
8:40	3:05	2:40	1:52	1:19	0:44	0:88	0:44
8:50	3:20	2:52	1:84	1:05	0:43	0:82	0:40
9:00	3:27	2:82	1:81	1:02	0:43	0:80	0:38
9:10	3:11	2:55	1:72	1:01	0:38	0:83	0:39
9:20	3:04	2:52	1:64	1:15	0:38	0:86	0:30
9:30	2:55	2:40	1:52	1:23	0:42	0:81	0:24
9:40	2:51	2:37	1:47	1:21	0:52	0:86	0:25
9:50	2:50	2:36	1:47	1:22	0:52	0:85	0:24
10:00	2:50	2:36	1:47	1:22	0:52	0:85	0:24
10:10	2:50	2:36	1:47	1:22	0:52	0:85	0:24
10:20	2:50	2:36	1:47	1:22	0:52	0:85	0:24
10:30	2:50	2:36	1:47	1:22	0:52	0:85	0:24
10:40	2:50	2:36	1:47	1:22	0:52	0:85	0:24
10:50	2:50	2:36	1:47	1:22	0:52	0:85	0:24
11:00	2:50	2:36	1:47	1:22	0:52	0:85	0:24
11:10	2:50	2:36	1:47	1:22	0:52	0:85	0:24
11:20	2:50	2:36	1:47	1:22	0:52	0:85	0:24
11:30	2:50	2:36	1:47	1:22	0:52	0:85	0:24
11:40	2:50	2:36	1:47	1:22	0:52	0:85	0:24
11:50	2:50	2:36	1:47	1:22	0:52	0:85	0:24
12:00	2:50	2:36	1:47	1:22	0:52	0:85	0:24

AVERAGE TEMPERATURES (C) - FOREST TOWER
 FEBRUARY 1970, 15 - LEVELS: -6.40, 16.32, 28.24, 42.0, 16.12, 8.6, 4.2, 0.5, (11 M)

Level	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1000	21.07	21.07	21.17	21.17	21.17	21.17	21.14	21.19	21.12	21.09	21.05	21.05	21.05	21.05	21.05
900	21.07	21.07	21.17	21.17	21.17	21.17	21.14	21.19	21.12	21.09	21.05	21.05	21.05	21.05	21.05
800	21.07	21.07	21.17	21.17	21.17	21.17	21.14	21.19	21.12	21.09	21.05	21.05	21.05	21.05	21.05
700	21.07	21.07	21.17	21.17	21.17	21.17	21.14	21.19	21.12	21.09	21.05	21.05	21.05	21.05	21.05
600	21.07	21.07	21.17	21.17	21.17	21.17	21.14	21.19	21.12	21.09	21.05	21.05	21.05	21.05	21.05
500	21.07	21.07	21.17	21.17	21.17	21.17	21.14	21.19	21.12	21.09	21.05	21.05	21.05	21.05	21.05
400	21.07	21.07	21.17	21.17	21.17	21.17	21.14	21.19	21.12	21.09	21.05	21.05	21.05	21.05	21.05
300	21.07	21.07	21.17	21.17	21.17	21.17	21.14	21.19	21.12	21.09	21.05	21.05	21.05	21.05	21.05
200	21.07	21.07	21.17	21.17	21.17	21.17	21.14	21.19	21.12	21.09	21.05	21.05	21.05	21.05	21.05
100	21.07	21.07	21.17	21.17	21.17	21.17	21.14	21.19	21.12	21.09	21.05	21.05	21.05	21.05	21.05

AVERAGE SURFACE AND SUBSURFACE TEMPERATURES (C) - BELOW FOREST TOWER
 FEBRUARY 1970. 6 - LEVELS: 0.5, 1.0, 2.0, 5.0, 10.0. (1M CM)

U.S.T.	1c	17	18	19	20	21
0050	22.54	22.55	22.54	22.54	22.15	22.03
0100	22.54	22.54	22.54	22.54	22.16	22.03
0150	22.54	22.54	22.54	22.54	22.17	22.03
0200	22.54	22.54	22.54	22.54	22.18	22.02
0250	22.54	22.54	22.54	22.54	22.19	22.02
0300	22.54	22.54	22.54	22.54	22.20	22.02
0350	22.54	22.54	22.54	22.54	22.20	22.02
0400	22.54	22.54	22.54	22.54	22.21	22.02
0450	22.54	22.54	22.54	22.54	22.21	22.02
0500	22.54	22.54	22.54	22.54	22.21	22.02
0550	22.54	22.54	22.54	22.54	22.21	22.02
0600	22.54	22.54	22.54	22.54	22.21	22.02
0650	22.54	22.54	22.54	22.54	22.21	22.02
0700	22.54	22.54	22.54	22.54	22.21	22.02
0750	22.54	22.54	22.54	22.54	22.21	22.02
0800	22.54	22.54	22.54	22.54	22.21	22.02
0850	22.54	22.54	22.54	22.54	22.21	22.02
0900	22.54	22.54	22.54	22.54	22.21	22.02
0950	22.54	22.54	22.54	22.54	22.21	22.02
1000	22.54	22.54	22.54	22.54	22.21	22.02
1050	22.54	22.54	22.54	22.54	22.21	22.02
1100	22.54	22.54	22.54	22.54	22.21	22.02
1150	22.54	22.54	22.54	22.54	22.21	22.02
1200	22.54	22.54	22.54	22.54	22.21	22.02
1250	22.54	22.54	22.54	22.54	22.21	22.02
1300	22.54	22.54	22.54	22.54	22.21	22.02
1350	22.54	22.54	22.54	22.54	22.21	22.02
1400	22.54	22.54	22.54	22.54	22.21	22.02
1450	22.54	22.54	22.54	22.54	22.21	22.02
1500	22.54	22.54	22.54	22.54	22.21	22.02
1550	22.54	22.54	22.54	22.54	22.21	22.02
1600	22.54	22.54	22.54	22.54	22.21	22.02
1650	22.54	22.54	22.54	22.54	22.21	22.02
1700	22.54	22.54	22.54	22.54	22.21	22.02
1750	22.54	22.54	22.54	22.54	22.21	22.02
1800	22.54	22.54	22.54	22.54	22.21	22.02
1850	22.54	22.54	22.54	22.54	22.21	22.02
1900	22.54	22.54	22.54	22.54	22.21	22.02
1950	22.54	22.54	22.54	22.54	22.21	22.02
2000	22.54	22.54	22.54	22.54	22.21	22.02
2050	22.54	22.54	22.54	22.54	22.21	22.02
2100	22.54	22.54	22.54	22.54	22.21	22.02
2150	22.54	22.54	22.54	22.54	22.21	22.02
2200	22.54	22.54	22.54	22.54	22.21	22.02
2250	22.54	22.54	22.54	22.54	22.21	22.02
2300	22.54	22.54	22.54	22.54	22.21	22.02
2350	22.54	22.54	22.54	22.54	22.21	22.02
2400	22.54	22.54	22.54	22.54	22.21	22.02
2450	22.54	22.54	22.54	22.54	22.21	22.02
2500	22.54	22.54	22.54	22.54	22.21	22.02
2550	22.54	22.54	22.54	22.54	22.21	22.02
2600	22.54	22.54	22.54	22.54	22.21	22.02
2650	22.54	22.54	22.54	22.54	22.21	22.02
2700	22.54	22.54	22.54	22.54	22.21	22.02
2750	22.54	22.54	22.54	22.54	22.21	22.02
2800	22.54	22.54	22.54	22.54	22.21	22.02
2850	22.54	22.54	22.54	22.54	22.21	22.02
2900	22.54	22.54	22.54	22.54	22.21	22.02
2950	22.54	22.54	22.54	22.54	22.21	22.02
3000	22.54	22.54	22.54	22.54	22.21	22.02

APRIL 1970, E - LEVELS: 4.40, 3.30, 2.20, 1.10. (IN M)

Level	1	2	3	4	5	6	7	P
3.70	4.15	3.54	3.07	1.87	1.08	0.40	0.54	0.49
3.50	4.20	3.59	3.12	1.87	1.08	0.40	0.56	0.40
3.30	4.15	3.54	3.07	1.84	1.06	0.40	0.55	0.47
3.10	4.15	3.54	3.07	1.84	1.06	0.44	0.57	0.47
2.90	4.22	3.54	3.11	1.85	1.09	0.53	0.64	0.41
2.70	4.22	3.60	3.10	1.77	1.05	0.53	0.63	0.43
2.50	4.40	3.74	3.25	1.84	1.06	0.53	0.66	0.44
2.30	4.63	3.90	3.38	1.90	1.13	0.53	0.68	0.48
2.10	4.72	4.02	3.48	2.01	1.15	0.53	0.67	0.46
1.90	4.90	4.23	3.50	2.09	1.24	0.59	0.69	0.47
1.70	4.90	4.23	3.50	1.88	1.13	0.59	0.69	0.41
1.50	4.17	3.53	3.09	1.71	1.02	0.60	0.57	0.40
1.30	4.10	3.44	2.97	1.66	1.03	0.61	0.57	0.40
1.10	3.59	3.09	2.63	1.53	0.92	0.49	0.48	0.42
0.90	3.23	2.78	2.50	1.59	0.92	0.51	0.54	0.41
0.70	3.17	2.69	2.47	1.44	0.89	0.45	0.55	0.34
0.50	3.51	3.09	2.69	1.47	0.92	0.49	0.60	0.41
0.30	2.75	2.65	2.32	1.37	0.81	0.44	0.64	0.47
0.10	2.76	2.64	2.39	1.27	0.82	0.42	0.57	0.41
0.00	2.57	2.30	2.05	1.13	0.73	0.40	0.56	0.37
0.00	2.79	2.62	2.32	1.30	0.83	0.37	0.54	0.40
0.00	3.21	2.82	2.63	1.52	0.89	0.43	0.53	0.40
0.00	2.92	2.54	2.35	1.16	0.76	0.38	0.42	0.33
0.00	2.83	2.49	2.21	1.12	0.67	0.37	0.35	0.27
0.00	3.10	2.68	2.43	1.08	0.69	0.32	0.36	0.27
0.00	3.59	3.07	2.82	1.19	0.72	0.30	0.38	0.29
0.00	3.27	2.77	2.69	1.21	0.60	0.34	0.37	0.35
0.00	4.14	3.59	3.26	1.51	0.86	0.45	0.48	0.44
0.00	4.22	3.74	3.49	1.67	1.00	0.43	0.53	0.44
0.00	4.27	3.74	3.49	1.67	1.00	0.43	0.53	0.44
0.00	4.27	3.74	3.49	1.67	1.00	0.43	0.53	0.44

AVERAGE SURFACE AND SUBSURFACE TEMPERATURES (C) - BELOW FOREST TOWER
 MEAS. 7.27.6 - LEVELS: 4.5, 10.2, 20.5, 50.100. (IN CM)

L.S.H.	L.S.H.				
	15	17	19	27	29
0.0	22.26	22.27	22.29	22.35	22.41
0.5	22.26	22.27	22.29	22.35	22.41
1.0	22.26	22.27	22.29	22.35	22.41
1.5	22.26	22.27	22.29	22.35	22.41
2.0	22.26	22.27	22.29	22.35	22.41
2.5	22.26	22.27	22.29	22.35	22.41
3.0	22.26	22.27	22.29	22.35	22.41
3.5	22.26	22.27	22.29	22.35	22.41
4.0	22.26	22.27	22.29	22.35	22.41
4.5	22.26	22.27	22.29	22.35	22.41
5.0	22.26	22.27	22.29	22.35	22.41
5.5	22.26	22.27	22.29	22.35	22.41
6.0	22.26	22.27	22.29	22.35	22.41
6.5	22.26	22.27	22.29	22.35	22.41
7.0	22.26	22.27	22.29	22.35	22.41
7.5	22.26	22.27	22.29	22.35	22.41
8.0	22.26	22.27	22.29	22.35	22.41
8.5	22.26	22.27	22.29	22.35	22.41
9.0	22.26	22.27	22.29	22.35	22.41
9.5	22.26	22.27	22.29	22.35	22.41
10.0	22.26	22.27	22.29	22.35	22.41
10.5	22.26	22.27	22.29	22.35	22.41
11.0	22.26	22.27	22.29	22.35	22.41
11.5	22.26	22.27	22.29	22.35	22.41
12.0	22.26	22.27	22.29	22.35	22.41
12.5	22.26	22.27	22.29	22.35	22.41
13.0	22.26	22.27	22.29	22.35	22.41
13.5	22.26	22.27	22.29	22.35	22.41
14.0	22.26	22.27	22.29	22.35	22.41
14.5	22.26	22.27	22.29	22.35	22.41
15.0	22.26	22.27	22.29	22.35	22.41
15.5	22.26	22.27	22.29	22.35	22.41
16.0	22.26	22.27	22.29	22.35	22.41
16.5	22.26	22.27	22.29	22.35	22.41
17.0	22.26	22.27	22.29	22.35	22.41
17.5	22.26	22.27	22.29	22.35	22.41
18.0	22.26	22.27	22.29	22.35	22.41
18.5	22.26	22.27	22.29	22.35	22.41
19.0	22.26	22.27	22.29	22.35	22.41
19.5	22.26	22.27	22.29	22.35	22.41
20.0	22.26	22.27	22.29	22.35	22.41
20.5	22.26	22.27	22.29	22.35	22.41
21.0	22.26	22.27	22.29	22.35	22.41
21.5	22.26	22.27	22.29	22.35	22.41
22.0	22.26	22.27	22.29	22.35	22.41
22.5	22.26	22.27	22.29	22.35	22.41
23.0	22.26	22.27	22.29	22.35	22.41
23.5	22.26	22.27	22.29	22.35	22.41
24.0	22.26	22.27	22.29	22.35	22.41
24.5	22.26	22.27	22.29	22.35	22.41
25.0	22.26	22.27	22.29	22.35	22.41
25.5	22.26	22.27	22.29	22.35	22.41
26.0	22.26	22.27	22.29	22.35	22.41
26.5	22.26	22.27	22.29	22.35	22.41
27.0	22.26	22.27	22.29	22.35	22.41
27.5	22.26	22.27	22.29	22.35	22.41
28.0	22.26	22.27	22.29	22.35	22.41
28.5	22.26	22.27	22.29	22.35	22.41
29.0	22.26	22.27	22.29	22.35	22.41
29.5	22.26	22.27	22.29	22.35	22.41
30.0	22.26	22.27	22.29	22.35	22.41

AVERAGE 100 SPECIES (75 C) - FOREST TUMF -
 June 1972. - LEVELS: 0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0 (10 M)

	1	2	3	4	5	6	7	8
0.00	5.59	4.51	3.50	2.17	1.38	0.48	0.83	0.49
0.01	4.79	4.02	3.50	2.06	1.29	0.48	0.73	0.47
0.02	5.12	4.43	3.81	2.27	1.37	0.50	0.85	0.56
0.03	4.52	4.13	3.61	1.53	72.1	0.44	0.70	0.52
0.04	4.87	4.14	3.51	2.10	1.26	0.44	0.80	0.52
0.05	4.87	4.05	3.57	2.09	1.33	0.40	0.74	0.50
0.06	4.16	3.59	3.09	1.75	1.01	0.34	0.63	0.39
0.07	4.17	3.57	3.07	1.77	1.02	0.37	0.60	0.35
0.08	4.17	3.57	3.07	1.76	1.02	0.34	0.59	0.35
0.09	4.17	3.55	3.05	1.68	0.99	0.36	0.59	0.35
0.10	3.98	3.28	2.83	1.64	0.96	0.34	0.57	0.37
0.11	3.55	3.10	2.72	1.60	0.91	0.34	0.63	0.38
0.12	3.49	3.11	2.69	1.89	1.11	0.41	0.75	0.41
0.13	3.47	3.02	2.70	1.76	1.04	0.40	0.69	0.40
0.14	3.22	3.02	2.70	1.69	1.01	0.38	0.64	0.38
0.15	3.09	2.75	2.42	1.82	1.20	0.42	0.56	0.42
0.16	3.09	2.86	2.54	1.63	1.03	0.38	0.57	0.39
0.17	3.00	2.92	2.69	1.69	1.07	0.43	0.58	0.40
0.18	3.09	3.09	2.72	1.58	0.89	0.44	0.53	0.38
0.19	3.25	3.27	2.97	1.78	1.04	0.47	0.59	0.42
0.20	3.49	3.45	3.01	1.85	1.02	0.50	0.61	0.46
0.21	4.08	3.91	3.29	1.97	1.16	0.54	0.65	0.52
0.22	4.08	3.90	3.28	1.99	1.15	0.58	0.67	0.52
0.23	4.08	3.90	3.28	1.99	1.15	0.42	0.68	0.49
0.24	4.08	3.90	3.28	2.08	1.18	0.49	0.69	0.51
0.25	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.26	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.27	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.28	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.29	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.30	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.31	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.32	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.33	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.34	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.35	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.36	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.37	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.38	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.39	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.40	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.41	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.42	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.43	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.44	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.45	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.46	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.47	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.48	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.49	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.50	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.51	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.52	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.53	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.54	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.55	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.56	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.57	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.58	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.59	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.60	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.61	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.62	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.63	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.64	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.65	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.66	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.67	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.68	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.69	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.70	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.71	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.72	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.73	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.74	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.75	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.76	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.77	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.78	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.79	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.80	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.81	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.82	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.83	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.84	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.85	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.86	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.87	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.88	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.89	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.90	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.91	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.92	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.93	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.94	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.95	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.96	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.97	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.98	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
0.99	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51
1.00	4.08	3.90	3.28	2.01	1.11	0.49	0.69	0.51

AVERAGE SURFACE AND SUB-SURFACE TEMPERATURES (C) - PELON FOREST TOWER
 June 1970 - LEVELS: 0.5, 1.0, 2.5, 5.0, 10.0, (IN CM)

L.S.T.	10	17	19	20	21
0600	23.07	23.05	24.18	24.27	24.20
0630	23.09	23.07	24.16	24.24	24.21
0700	23.10	23.05	24.17	24.24	24.20
0730	23.10	23.05	24.18	24.24	24.20
0800	23.10	23.07	24.18	24.24	24.20
0830	23.10	23.07	24.18	24.24	24.20
0900	23.10	23.07	24.18	24.24	24.20
0930	23.10	23.07	24.18	24.24	24.20
1000	23.10	23.07	24.18	24.24	24.20
1030	23.10	23.07	24.18	24.24	24.20
1100	23.10	23.07	24.18	24.24	24.20
1130	23.10	23.07	24.18	24.24	24.20
1200	23.10	23.07	24.18	24.24	24.20
1230	23.10	23.07	24.18	24.24	24.20
1300	23.10	23.07	24.18	24.24	24.20
1330	23.10	23.07	24.18	24.24	24.20
1400	23.10	23.07	24.18	24.24	24.20
1430	23.10	23.07	24.18	24.24	24.20
1500	23.10	23.07	24.18	24.24	24.20
1530	23.10	23.07	24.18	24.24	24.20
1600	23.10	23.07	24.18	24.24	24.20
1630	23.10	23.07	24.18	24.24	24.20
1700	23.10	23.07	24.18	24.24	24.20
1730	23.10	23.07	24.18	24.24	24.20
1800	23.10	23.07	24.18	24.24	24.20
1830	23.10	23.07	24.18	24.24	24.20
1900	23.10	23.07	24.18	24.24	24.20
1930	23.10	23.07	24.18	24.24	24.20
2000	23.10	23.07	24.18	24.24	24.20
2030	23.10	23.07	24.18	24.24	24.20
2100	23.10	23.07	24.18	24.24	24.20
2130	23.10	23.07	24.18	24.24	24.20
2200	23.10	23.07	24.18	24.24	24.20
2230	23.10	23.07	24.18	24.24	24.20
2300	23.10	23.07	24.18	24.24	24.20
2330	23.10	23.07	24.18	24.24	24.20

AVERAGE WIND SPEED (M/SEC) - FOREST TOWER
 JULY 1960 - LEVELS: 40, 30, 20, 10, 4. (11. M)

	1	2	3	4	5	6	7	8
0500	4.71	4.09	3.55	3.10	1.28	0.73	0.65	0.45
0530	4.32	4.29	3.70	3.19	1.30	0.77	0.68	0.47
0600	5.23	4.77	3.97	3.38	1.38	0.84	0.76	0.51
0630	4.97	4.32	3.77	3.24	1.33	0.81	0.74	0.47
0700	5.19	4.69	3.89	3.34	1.34	0.75	0.78	0.46
0730	5.23	4.82	4.02	3.44	1.35	0.88	0.78	0.53
0800	5.00	4.70	4.07	3.50	1.48	0.89	0.80	0.53
0830	5.00	4.74	4.07	3.50	1.48	0.83	0.81	0.54
0900	4.73	4.02	3.51	3.10	1.22	0.76	0.69	0.43
0930	4.51	3.92	3.41	2.95	1.19	0.75	0.69	0.42
1000	4.50	3.90	3.42	2.98	1.23	0.74	0.71	0.43
1030	4.95	3.85	3.35	3.02	1.25	0.71	0.71	0.44
1100	3.74	3.22	2.84	1.79	1.10	0.63	0.59	0.42
1130	3.95	3.29	3.02	1.87	1.14	0.89	0.63	0.45
1200	3.90	3.47	3.02	1.94	1.18	0.91	0.63	0.45
1230	3.80	3.30	2.88	1.79	1.06	0.89	0.61	0.39
1300	4.15	3.60	3.15	2.15	1.21	0.74	0.61	0.40
1330	4.22	3.75	3.23	2.04	1.25	0.65	0.63	0.37
1400	4.27	3.69	3.00	1.80	1.09	0.73	0.57	0.34
1430	4.11	3.54	3.02	1.81	1.03	0.72	0.59	0.34
1500	4.43	3.84	3.29	1.86	1.13	0.74	0.60	0.32
1530	4.92	4.13	3.36	2.05	1.21	0.87	0.64	0.32
1600	4.29	4.22	3.73	2.17	1.27	0.85	0.69	0.36
1630	4.27	4.05	3.46	2.27	1.34	0.88	0.77	0.40
1700	5.22	4.57	3.95	2.36	1.47	0.92	0.80	0.44
1730	5.29	4.91	4.11	2.49	1.47	0.93	0.85	0.53
1800	5.34	4.77	4.14	2.50	1.47	0.83	0.80	0.54

AVERAGE SURFACE AND SUB-SURFACE TEMPERATURES (C) - BELOW FOREST TOWER
 JULY 1970, C - LEVELS: 0, 5, 11, 20, 50, 100. (1N CM)

L.S.T.	16	17	18	19	20	21
000	23.92	23.69	23.91	23.97	23.91	23.92
010	23.92	23.69	23.91	23.97	23.91	23.92
020	23.92	23.69	23.91	23.97	23.91	23.92
030	23.92	23.69	23.91	23.97	23.91	23.92
040	23.92	23.69	23.91	23.97	23.91	23.92
050	23.92	23.69	23.91	23.97	23.91	23.92
060	23.92	23.69	23.91	23.97	23.91	23.92
070	23.92	23.69	23.91	23.97	23.91	23.92
080	23.92	23.69	23.91	23.97	23.91	23.92
090	23.92	23.69	23.91	23.97	23.91	23.92
100	23.92	23.69	23.91	23.97	23.91	23.92
110	23.92	23.69	23.91	23.97	23.91	23.92
120	23.92	23.69	23.91	23.97	23.91	23.92
130	23.92	23.69	23.91	23.97	23.91	23.92
140	23.92	23.69	23.91	23.97	23.91	23.92
150	23.92	23.69	23.91	23.97	23.91	23.92
160	23.92	23.69	23.91	23.97	23.91	23.92
170	23.92	23.69	23.91	23.97	23.91	23.92
180	23.92	23.69	23.91	23.97	23.91	23.92
190	23.92	23.69	23.91	23.97	23.91	23.92
200	23.92	23.69	23.91	23.97	23.91	23.92
210	23.92	23.69	23.91	23.97	23.91	23.92
220	23.92	23.69	23.91	23.97	23.91	23.92
230	23.92	23.69	23.91	23.97	23.91	23.92
240	23.92	23.69	23.91	23.97	23.91	23.92
250	23.92	23.69	23.91	23.97	23.91	23.92
260	23.92	23.69	23.91	23.97	23.91	23.92
270	23.92	23.69	23.91	23.97	23.91	23.92
280	23.92	23.69	23.91	23.97	23.91	23.92
290	23.92	23.69	23.91	23.97	23.91	23.92
300	23.92	23.69	23.91	23.97	23.91	23.92

AVERAGE WIND SPEED (M/SEC) - FOREST TRAP
 SEPTEMBER 1970 - 9 LEVELS: 4, 6, 10, 16, 32, 50, 100, 160, 250, 310, 400 (IN M)

Level	1	2	3	4	5	6	7	8
0.50	3.69	3.57	3.93	3.43	1.41	0.94	0.90	0.44
0.75	3.62	3.36	3.70	3.28	1.26	0.87	0.82	0.45
1.00	4.00	3.26	3.09	2.87	1.24	0.86	0.82	0.44
1.25	4.01	3.25	3.02	2.82	1.23	0.84	0.78	0.44
1.50	3.32	3.52	3.09	2.84	1.22	0.80	0.80	0.47
1.75	3.30	3.55	3.05	2.82	1.22	0.80	0.80	0.47
2.00	3.70	3.24	3.01	2.80	1.21	0.84	0.79	0.46
2.25	3.70	3.00	3.01	2.76	1.21	0.83	0.80	0.46
2.50	4.01	3.02	3.30	2.95	1.02	0.80	0.78	0.49
2.75	4.00	3.02	3.45	2.93	1.02	0.80	0.78	0.49
3.00	4.72	3.01	3.34	2.91	1.09	0.80	0.81	0.51
3.25	4.72	3.02	3.34	2.91	1.05	0.81	0.81	0.51
3.50	5.11	3.32	3.26	2.82	1.01	0.90	0.87	0.50
3.75	4.54	3.32	3.26	2.82	1.01	0.90	0.87	0.50
4.00	3.95	3.39	2.79	1.69	0.94	0.66	0.59	0.35
4.25	3.95	3.32	2.79	1.69	0.94	0.66	0.59	0.35
4.50	3.50	3.01	2.57	1.60	0.88	0.64	0.58	0.32
4.75	3.41	2.93	2.53	1.57	0.88	0.64	0.58	0.32
5.00	3.31	2.84	2.46	1.53	0.81	0.62	0.61	0.35
5.25	3.35	2.86	2.46	1.54	0.90	0.65	0.61	0.36
5.50	3.40	3.05	2.64	1.60	0.85	0.68	0.73	0.38
5.75	3.11	2.76	2.42	1.54	0.81	0.64	0.68	0.37
6.00	2.00	2.23	2.32	1.38	0.85	0.62	0.69	0.38
6.25	2.00	2.23	2.45	1.41	0.85	0.62	0.69	0.38
6.50	3.02	3.09	2.35	1.45	0.75	0.56	0.64	0.39
6.75	3.02	3.13	2.68	1.46	0.87	0.62	0.71	0.41
7.00	3.12	2.82	2.47	1.53	0.76	0.59	0.69	0.40
7.25	3.26	2.82	2.50	1.54	0.76	0.59	0.68	0.40
7.50	3.70	3.02	2.61	1.61	0.81	0.63	0.69	0.39
7.75	3.69	3.02	2.61	1.61	0.82	0.65	0.75	0.40
8.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
8.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
8.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
8.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
9.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
9.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
9.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
9.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
10.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
10.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
10.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
10.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
11.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
11.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
11.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
11.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
12.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
12.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
12.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
12.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
13.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
13.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
13.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
13.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
14.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
14.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
14.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
14.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
15.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
15.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
15.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
15.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
16.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
16.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
16.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
16.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
17.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
17.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
17.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
17.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
18.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
18.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
18.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
18.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
19.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
19.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
19.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
19.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
20.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
20.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
20.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
20.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
21.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
21.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
21.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
21.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
22.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
22.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
22.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
22.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
23.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
23.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
23.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
23.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
24.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
24.25	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
24.50	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
24.75	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39
25.00	3.69	3.02	2.61	1.61	0.76	0.60	0.69	0.39

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MARYLAND UNIV COLLEGE PARK DEPT OF METEOROLOGY
THE MICROCLIMATE OF A TROPICAL EVERGREEN FOREST. (U)
AUG 80 R T PINKER, O E THOMPSON

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AVERAGE SURFACE AND SURFACE TEMPERATURES (C) - BELOW FOREST TOWEN
 SEPTEMBER 1975, 6 - LEVELS: 0.5, 10, 20, 50, 100, (14 CM)

L.S.T.	15	17	18	19	20	21
000	27.80	25.26	25.65	25.49	25.77	25.84
005	27.80	25.26	25.65	25.49	25.77	25.83
010	27.80	25.27	25.61	25.61	25.77	25.83
015	27.80	25.25	25.59	25.61	25.77	25.83
020	27.81	25.33	25.58	25.60	25.77	25.82
025	27.81	25.33	25.58	25.60	25.77	25.82
030	27.82	25.17	25.52	25.60	25.77	25.82
035	27.82	25.17	25.52	25.60	25.77	25.82
040	27.81	25.11	25.50	25.39	25.77	25.84
045	27.07	25.08	25.48	25.39	25.77	25.84
050	27.02	25.05	25.44	25.39	25.77	25.84
055	27.02	25.05	25.44	25.39	25.77	25.84
060	27.02	25.00	25.42	25.38	25.76	25.84
065	27.02	25.00	25.42	25.38	25.76	25.84
070	27.00	25.00	25.37	25.38	25.75	25.84
075	27.00	25.00	25.37	25.38	25.75	25.84
080	27.01	25.02	25.36	25.37	25.75	25.84
085	27.01	25.02	25.36	25.37	25.75	25.84
090	27.02	25.29	25.38	25.37	25.75	25.84
095	27.02	25.29	25.38	25.37	25.75	25.84
100	27.02	25.31	25.43	25.37	25.74	25.84
105	27.02	25.31	25.43	25.37	25.74	25.84
110	27.00	25.05	25.51	25.37	25.73	25.84
115	27.00	25.05	25.51	25.37	25.73	25.84
120	27.00	25.05	25.51	25.37	25.73	25.84
125	27.00	25.05	25.51	25.37	25.73	25.84
130	27.00	24.00	25.64	25.38	25.72	25.84
135	27.00	24.00	25.64	25.38	25.71	25.84
140	27.00	24.00	25.75	25.38	25.71	25.84
145	27.00	24.00	25.82	25.38	25.70	25.84
150	27.00	24.00	25.86	25.38	25.70	25.84
155	27.00	24.00	25.86	25.38	25.70	25.84
160	27.00	24.00	25.93	25.43	25.70	25.84
165	27.00	24.00	25.93	25.43	25.70	25.84
170	27.00	23.97	25.90	25.43	25.71	25.84
175	27.00	23.97	25.90	25.43	25.71	25.84
180	27.00	23.97	25.90	25.43	25.71	25.84
185	27.00	23.97	25.90	25.43	25.71	25.84
190	27.00	23.97	25.90	25.43	25.71	25.84
195	27.00	23.97	25.90	25.43	25.71	25.84
200	27.00	23.97	25.90	25.43	25.71	25.84
205	27.00	23.97	25.90	25.43	25.71	25.84
210	27.00	23.97	25.90	25.43	25.71	25.84
215	27.00	23.97	25.90	25.43	25.71	25.84
220	27.00	23.97	25.90	25.43	25.71	25.84
225	27.00	23.97	25.90	25.43	25.71	25.84
230	27.00	23.97	25.90	25.43	25.71	25.84
235	27.00	23.97	25.90	25.43	25.71	25.84
240	27.00	23.97	25.90	25.43	25.71	25.84
245	27.00	23.97	25.90	25.43	25.71	25.84
250	27.00	23.97	25.90	25.43	25.71	25.84
255	27.00	23.97	25.90	25.43	25.71	25.84
260	27.00	23.97	25.90	25.43	25.71	25.84
265	27.00	23.97	25.90	25.43	25.71	25.84
270	27.00	23.97	25.90	25.43	25.71	25.84
275	27.00	23.97	25.90	25.43	25.71	25.84
280	27.00	23.97	25.90	25.43	25.71	25.84
285	27.00	23.97	25.90	25.43	25.71	25.84
290	27.00	23.97	25.90	25.43	25.71	25.84
295	27.00	23.97	25.90	25.43	25.71	25.84
300	27.00	23.97	25.90	25.43	25.71	25.84

AVG WIND SPEED (M/SEC) - FOREST TO-EP
 RECORDS 1770, 3 - LEVELS: 46.40, 30.32, 10.25, 10.6, (IN M)

Level	1	2	3	4	5	6	7	8
0024	2.67	1.67	1.77	0.67	0.53	0.49	0.38	0.28
0030	2.67	1.67	1.77	0.67	0.53	0.51	0.41	0.31
0130	2.70	1.72	1.62	0.59	0.57	0.52	0.42	0.35
0430	2.74	1.67	2.10	0.57	0.58	0.54	0.48	0.37
0530	3.20	2.09	2.71	0.61	0.56	0.56	0.50	0.33
0600	3.50	2.60	2.65	0.61	0.61	0.66	0.52	0.38
0530	3.42	2.83	2.45	0.64	0.65	0.69	0.54	0.36
0600	3.13	2.19	2.31	0.78	0.77	0.53	0.47	0.32
0720	3.07	2.12	2.32	0.71	0.55	0.60	0.43	0.30
0800	3.46	2.68	2.72	0.81	0.78	0.76	0.59	0.44
0900	4.03	3.18	3.10	0.97	0.93	0.89	0.75	0.55
1030	4.48	3.68	3.61	1.01	1.07	1.09	0.92	0.67
1130	4.55	4.04	3.68	0.92	1.12	1.12	0.90	0.68
1200	4.22	3.88	3.50	0.88	1.09	1.06	0.88	0.74
1330	4.22	3.74	3.33	0.80	0.99	1.02	0.83	0.71
1430	4.31	3.75	3.20	0.83	0.97	0.93	0.81	0.66
1500	4.15	3.72	3.31	0.82	0.98	0.94	0.78	0.64
1600	3.70	3.37	2.99	0.61	0.79	0.80	0.58	0.47
1700	3.42	3.02	2.62	0.55	0.64	0.65	0.49	0.39
1800	3.30	2.73	2.32	0.42	0.44	0.52	0.32	0.28
1900	3.01	2.42	2.23	0.34	0.43	0.51	0.34	0.28
2000	2.70	2.12	2.09	0.24	0.40	0.42	0.28	0.26
2100	2.05	1.52	2.03	0.35	0.47	0.45	0.28	0.25
2200	2.00	1.44	1.83	0.44	0.48	0.56	0.34	0.29
2330	2.11	1.41	1.53	0.42	0.50	0.50	0.35	0.29

AVERAGE SURFACE AND SURFSURFACE TEMPERATURES (C) - BELOW FOREST TOWER
 DECEMBER 1970, 0 - LEVELS: 7.5, 10, 20, 50, 100, (1M, CM)

L.S.T.	16	17	18	19	20	21
0000	19.07	18.31	19.04	19.27	20.15	21.01
0100	17.79	18.24	19.02	19.26	20.16	21.01
0200	17.48	18.16	19.00	19.25	20.16	21.01
0300	17.77	18.08	18.97	19.24	20.16	21.01
0400	17.62	17.99	18.93	19.23	20.16	21.00
0500	17.54	17.86	18.87	19.20	20.17	21.00
0600	17.37	17.71	18.80	19.14	20.17	21.00
0700	17.30	17.64	18.72	19.12	20.17	21.00
0800	17.23	17.57	18.68	19.10	20.17	21.00
0900	17.14	17.43	18.65	19.08	20.17	21.00
1000	16.97	17.33	18.61	19.05	20.17	21.00
1100	16.89	17.29	18.53	19.03	20.17	21.59
1200	16.93	17.29	18.53	19.03	20.17	21.59
1300	17.03	17.33	18.50	19.08	20.17	21.59
1400	17.16	17.41	18.47	18.96	20.17	21.59
1500	17.35	17.50	18.45	18.94	20.16	21.59
1600	17.55	17.65	18.45	18.94	20.16	21.59
1700	17.73	17.87	18.46	18.89	20.15	21.59
1800	18.27	18.10	18.50	18.87	20.14	21.59
1900	18.62	18.38	18.58	18.88	20.13	21.59
2000	18.82	18.53	18.62	18.89	20.12	21.59
2100	18.77	18.66	18.62	18.90	20.11	21.58
2200	18.63	18.75	18.62	18.92	20.11	21.58
2300	19.00	18.87	18.72	18.96	20.11	21.58
0000	19.03	18.94	18.83	18.96	20.10	21.58
0100	19.17	19.09	18.87	18.99	20.09	21.58
0200	19.14	19.06	18.92	19.01	20.09	21.58
0300	19.11	19.03	18.96	19.03	20.09	21.58
0400	19.04	19.02	18.99	19.06	20.09	21.58
0500	18.79	18.96	19.02	19.08	20.09	21.58
0600	18.75	18.85	19.04	19.11	20.09	21.58
0700	18.61	18.73	19.04	19.13	20.09	21.58
0800	18.35	18.52	19.03	19.15	20.09	21.57
0900	18.25	18.43	19.02	19.15	20.09	21.57
1000	18.17	18.29	18.99	19.16	20.09	21.57
1100	18.03	18.20	18.97	19.16	20.09	21.57
1200	18.00	18.21	18.95	19.15	20.10	21.57
1300	18.00	18.21	18.95	19.15	20.10	21.57
1400	17.92	18.14	18.90	19.12	20.10	21.57
1500	17.92	18.14	18.88	19.12	20.10	21.57
1600	17.94	18.15	18.87	19.13	20.11	21.57
1700	17.94	18.15	18.87	19.13	20.11	21.57