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NORTH AMERICAN TUNGSTEN CORPORATION LTD.

MACTUNG PROJECT

2006 HYDROMETEOROLOGICAL SURVEY

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EXECUTIVE SUMMARY

North American Tungsten Corp. Ltd. is conducting baseline environmental studies on its MacTung project site to assist in developing a new mine in the area. In 2005, EBA Engineering Consultants Limited was retained by North American Tungsten Corp. Ltd. to execute the necessary baseline environmental study program.

This report is a continuation of the baseline studies and consists of a summary of the hydrometeorological data collected at the MacTung Project site during the summer of 2006. The survey was conducted by Hay and Company Consultants, A division of EBA Engineering Consultants Ltd.

The hydrology component started on July 7, 2006 and involved the determination of a time history of discharge and water temperatures for Dale Creek (NWT) and Tributary C (Yukon). Both creeks flow off the MacTung property.

The 2006 data indicate that Tributary C has a base summer flow of 0.9 m^3/s, with a variance of ±0.3 m^3/s, due to precipitation events. The peak measured flow of >1.8 m^3/s occurred in early July, 2006. By the third week of July, the creek flow had reduced to the summer base flow. Starting in the second week of September, the creek flow began to reduce. By the end of the data record in the last week of September, the flow was less than 0.5 m^3/s.

Dale Creek had a summer base flow of 1.3 m^3/s with a variance of ±0.5 m^3/s due to precipitation events. A peak flow of 3.0 m^3/s was recorded on July 15, 2006. By mid September, creek flows began to reduce in volume with the onset of winter.

Creek water temperatures exhibited a diurnal variance of approximately ±5°C, about the mean summer temperature of 8°C. In early September, creek water temperatures began to reduce over time to a mean average daily temperature of 3°C, recorded near the end of the data record.

The objective of the meteorological component of the study was to continually record weather conditions at the MacTung property site. In July 2005, a meteorological station was installed at the MacTung Camp. It has been operating continuously since the installation, recording the weather parameters of wind speed and direction, air temperature, relative humidity and solar incident radiation. Typical winds are in the range of 7 m/s, but wind speeds greater than 23 m/s have been recorded by the station. Air temperatures at camp are typically 5 to 10°C during the summer with a maximum recorded temperature of 20°C. Typical winter temperatures are –15.0°C but have been recorded as low as -30°C. Relative humidity is typically near 90%, but frequently can drop as low as 30 % for periods of up to a day. Peak solar incident radiation during the summer is in the vicinity of 900 W/m^2. However, during the winter period (Dec to Jan) the radiation is near 50 W/m^2.

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1 INTRODUCTION

North American Tungsten Corp. Ltd. is conducting baseline environmental studies on its MacTung project site to assist in developing a new mine in the area. In 2005, EBA Engineering Consultants Limited was retained by North American Tungsten Corp. Ltd. to undertake the necessary baseline environmental study program. The project is located on the boundary between the Yukon and Northwest Territories see Figure 1.0.

During the period from July 2005 to September 2006, Hay and Company Consultants, a division of EBA, conducted the hydrology and meteorology components of the overall study program for the MacTung project.

The objective of the meteorological component of the study was to continually record weather conditions at the MacTung property site. The hydrology component involved the determination of discharge and water temperatures for two of the creeks flowing off the MacTung property.

The first phase of this study was the installation of a meteorological station at the MacTung Campsite during July 2005.

The hydrology portion of the study began with a site visit starting on July 7, 2006. The purpose of this trip was to become familiar with the area and choose appropriate hydrological station sites. Once a site was determined, the protective housings were installed and the pressure transducer/data logger placed within the housing. The function of the pressure transducer/data logger is to record creek stage and water temperature four times per hour. A staff gauge was also installed at each site. During this initial visit, stage-discharge information was collected on the selected creeks.

Second and third site visits were conducted on Aug. 4, 2006 and Sep. 19, 2006, for the purpose of collecting further stage-discharge data and to inspect and download stage and temperature data from the hydrometric stations. During the latter visit the instrumentation was removed from the housings and put into storage to prevent freezing water from damaging the sensitive pressure transducer diaphragm.

The two hydrometric stations and the meteorological station sites are listed below, with the main objective for each station. Figure 1.1 is a site location map and shows a portion of a 1:250,000 scale NTS topographic map of the area, on which the sites are indicated. Table 1.0 lists the GPS positions for the four hydrometeorlogical sites near the MacTung project site.

- Site 1 – Tributary A, collect flow data, stage-discharge data and water temperatures.
- Site 2 – Dale Creek, collect flow data, stage-discharge data and water temperatures.
- Met – MacTung Camp Meteorological Station, record site meteorological parameters.
- MacPas – MSC MacMillan Pass Meteorological Station

Further detailed information on these sites is provided in the site description documents included in Appendix A.

Section 2 of this report presents the hydrological component of the baseline study program. Section 3 discusses the meteorological component and Section 4 includes recommendations.

2 HYDROLOGY

2.1 Method

To gain an understanding of the hydrological conditions present in the MacTung project study area, hydrometric stations were installed at the two sites identified above. For each hydrometric station, a standard method was employed to determine time history of discharge for the creek. First an appropriate hydrometric site was chosen, which represented all the flow from the drainage basin of interest. A staff gauge was installed to enable the manual recording of water surface elevations. The pressure transducer/data logger instrumentation and protective housing were also installed in the creek. Each time hydrology personnel were at site, the data loggers were downloaded and creek velocity data were recorded to enable the development of a stage-discharge relationship for each site.

To develop a stage-discharge relationship, the most common and precise practice is to measure creek discharge and stage simultaneously.

The method used to determine creek discharge requires the measurement of no less than 10 sets of water velocities along a transect spanning the creek width. The measured velocities are multiplied by a representative flow area determined from the creek depth at the location of the velocity measurement and the horizontal distance to the flanking velocity measurements.

The stage and discharge data collected are plotted on a graph relating discharge to creek stage. The stage-discharge function is developed as the best-fit curve through the observed stage-discharge measurements. The stages recorded by the data logger are then used in the stage-discharge relationship to determine a time history of creek discharge.

2.2 Tributary A (Site 1)

Tributary A basin, including Tributary B and Tributary C, is approximately 10 km by 11 km and has a catchment area of 80.2 km^2. The elevation of the hydrometric station is 1133 m above sea level (asl). The highest basin elevation is 1951 m (asl). Inflows to Tributary A at the location of the hydrological station consist of flows from two smaller creeks, Tributary B to the west and Tributary C to the East

The eastern tributary, Tributary C, originating close to the territorial border and within the MacTung property is the basin of interest for this study. Tributary C basin is approximately 5.0 by 5.0 km and has a catchment of 24.2 km^2.

There was no reach along Tributary C suitable for the installation of a hydrometric station so the station was installed on Tributary A. The discharge history for Tributary C must be deduced from concurrent discharge data obtained from measured Tributary A and Tributary C discharges. The method of deriving the discharges for Tributary C is presented in section 2.2.6 of this report.

The hydrometric station is located on Tributary A and is approximately 50 metres downstream of the confluence of Tributary C in a well-defined channel. Tributary A flows northwest to the Hess River, and eventually to the Stewart River in theYukon Territories.

Figure 2.0, Photo A shows the reach of Tributary A where the monitoring station is installed, as well as the confluence of Tributary C with Tributary A. Photo B shows the hydrometric station.

2.2.1 Stage Measurements

Between July 2006 and September 2006, creek stage data were recorded every 15 minutes by the hydrological station instrumentation. The time history of stage measurements recorded is presented in Figure 2.1. During this period, whenever site visits occurred, staff gauge readings were manually recorded and used as a check on the stage monitoring instrumentation accuracy.

2.2.2 Discharge Measurements

During the period from July 10, 2006 to September 20, 2006 a total of 15 discrete discharge measurements were collected for Tributary A and a further five discharge measurements collected on Tributary C. These data have been summarized in Table 2.0.

The data collected on Tributary A were used to develop a stage-discharge relationship for this site, which enables the determination of time history of creek discharge, using the creek stage data recorded by the logger.

2.2.3 Stage-Discharge Relationship

Figure 2.2 shows the stage-discharge relationship for the hydrometric station on Tributary A. This consists of the measured discharges plotted against the data logger recorded creek stages. The data were fitted using an exponential function to best fit the data set. The regression coefficient (R^2) was 0.9604.

To calculate the discharge at any point in time from the stage records, the following function was used:

$y = 0.6642e^{6.4244x}$ Where y = creek discharge (m^3/s)
x = recorded water depth over transducer (m)
e = Naperian log (2.71828)

2.2.4 Time History of Discharge

The time history of discharges for Tributary A at the hydrometric station is shown in Figure 2.3 as a solid blue line. The black circles are the discharges that were determined in the field by measuring creek velocities and calculating discharge from representative flow areas. The red line is water temperature.

Based on the time history of discharges for Tributary A for the summer of 2006, the following observations were made:

1) Creek discharges were greater than 5.5 m^3/s prior July 9, 2006, the installation date of the hydrometric station.
2) From mid July to early September the base creek flow remained relatively constant at 3.0 m^3/s.
3) During this same period, storms could increase creek flows by more than 1 m^3/s. This is evidenced by the numerous peaks in the discharge history.
4) From early September to the end of the record (September 20, 2006) flows decreased from the summer base flow of 3.0 m^3/s to 2.0 m^3/s. It is assumed that creek flows will continue to decrease until the creek freezes up.

2.2.5 Time History of Tributary A Water Temperatures

During the period of flow measurement on Tributary A, creek water temperatures were recorded using the temperature instrumentation contained within the pressure transducer. The creek temperature data are presented as a red line in Figure 2.3.

These data indicate a diurnal temperature cycle with peak water temperatures occurring from 5:00 PM to 6:00 PM and minimum temperatures occurring from 7:30 AM to 9:00 AM. The typical daily maximum to minimum temperature variation is approximately 1.5°C. The warmest water temperature recorded was 10.6°C, which occurred on July 30 and the coolest, 1.0°C, occurred on September 14, 2006.

2.2.6 Tributary C Discharges

There was no suitable site for the installation of a hydrometric station on Tributary C, therefore it is necessary to estimate creek flows for this basin, based on the Tributary C discharges, collected just downstream of the confluence of Tributary C with Tributary A.

Over the survey period, discrete measurements of discharge were made on both tributaries at similar times. This provided flow split data between the two creeks. The ratio of the discharge data collected on Tributary A, to similar data, collected on Tributary C was used to generate a time history of discharge for Tributary C. Figure 2.4 is a graph comparing the measured discharges for both tributaries and a best fit line equation through the data. The equation allows the determination of the Tributary C flows based on the determined Tributary A discharges. Using this technique, Figure 2.5 was produced and gives an estimate of the time history of discharge, for Tributary C, for the same period of record as Tributary A. The black circles on the graph represent actual discharge measurements collected on Tributary C and demonstrate the accuracy of this method for estimating discharges.

2.3 Dale Creek (Site 2)

Dale Creek basin is about 7.0 km by 6.4 km with an area of 33.9 km^2. The estimated elevation of the Dale Creek hydrometric station is 1355 m (asl) and the highest elevation within the basin is 2300 m (asl). Inflows to Dale Creek consist of the runoff from two western tributaries originating at the territorial border. The most northerly tributary originates from Cirque Lake.

The hydrometric station at Dale Creek was established on July 10, 2006. The location is shown in Figure 1.1. Discharge from Dale Creek basin flows eastward to the Tsichu River, and eventually to the Keele River in the Northwest Territories.

Figure 2.6 (Photo A) shows an aerial view of the reach of Dale Creek, in which the hydrometric station is installed. Figure 2.6 (Photo B) shows the hydrometric station from ground level looking downstream.

2.3.1 Stage Measurements

From July 10, 2006 to September 20, 2006, creek stage data were recorded every 15 minutes by the hydrological station instrumentation. The time history of stage measurements recorded is presented in Figure 2.7. Whenever site visits occurred during this period, creek stages indicated by the staff gauge were manually recorded.

2.3.2 Point Discharge Measurements

Over the duration of the field survey for 2006 a total of 17 discharge measurements were recorded. The time, date, stage and discharge for each measurement are summarized in Table 2.1. The data collected on Dale Creek were used to develop a stage-discharge relationship for this site, which enables the determination of a time history of discharge for the creek.

2.3.3 Stage-discharge Relationship

The stage-discharge relationship for Dale Creek is shown in Figure 2.8. This figure shows the measured creek discharges plotted against the data logger recorded creek stages. The data was fitted using a power function to best fit the data set. The regression coefficient (R^2) was 0.9779

To calculate the discharge at any point in time from the stage records, the following equation was used:

$y = 29.792x^{3.7524}$ Where y = creek discharge (m^3/s)
x = recorded water depth over transducer (m)

2.3.4 Time History of Discharge

The time history of discharge for Dale Creek is shown in Figure 2.9. This figure shows the discharge history as a solid blue line. The black circles are the discharges that were determined in the field during site visits by measuring creek velocities and calculating discharge from representative flow areas. The red line indicates creek water temperatures.

Based on the history of Dale Creek discharges for the summer of 2006, the following observations were made:

1) The peak measured Dale Creek flow of 3.0 m^3/s occurred on July 14, 2006. This high flow was a likely a result of a storm event.
2) From mid July to early September the base creek flow is estimated at 1.0 m^3/s.
3) During this same period, storms increased creek flow by up to 1.5 m^3/s. This is evidenced by the numerous peaks in the discharge history. From mid September to the end of the record (September 20, 2006), flows were reducing from the summer base flow of 1.0 m^3/s to 0.7 m^3/s.

2.3.5 Time History of Creek Water Temperatures

During the period of stage measurement on Dale Creek, creek water temperatures were recorded using the temperature instrumentation contained within the pressure transducer. The creek temperature data are presented as a red line in Figure 2.9.

These data indicate a diurnal temperature cycle with maximum daily water temperatures occurring from 5:00 PM to 6:00 PM and minimum temperatures occurring from 7:30 AM to 9:00 AM. The typical daily maximum to minimum daily temperature variation is approximately 1.5^{o}C. The warmest water temperatures, 12.0^{o}C, occurred on the evening of July 30, 2006, and the coolest, 1.0^{o}C, occurred on the morning of September 14, 2006.

3 METEOROLOGY

Two meteorological stations are located in the vicinity of the MacTung Project Site. A Meteorological Services of Canada station is located about 7 km southwest of the project site at elevation 1379 m. As this station is relatively far from the site and at a much lower elevation the parameters measured may not represent the meteorological conditions at the project site.

Therefore on July 14, 2005 a meteorological station was installed at the MacTung project site near the camp. The NAD 27 GPS coordinates for these two stations are provided in Table 1.0

Specifications of the instruments installed on these weather stations, examples of the data storage arrays and photographs of each station are contained in the site descriptions included in Appendix A

Only the data collected at the MacTung project site have been presented in this report. The MacTung station measures a variety of meteorological parameters and the data are saved to a logger at 15-minute intervals throughout the day. At midnight the logger produces a 24-hour daily summary. The data are retrieved by downloading, at convenient times, using a laptop computer or by exchanging the memory storage module at site and then downloading the data in the office.

Within the data record there are two periods of missing data. The first period from September 6, 2005 was due to the data logger memory filling up before a site visit could be made to download the station. The problem was corrected by the installation of a memory module which greatly increased the storage capacity of the station. The second gap, which occurred from February 20, 2006 to March 21, 2006, was due to technical difficulties which were corrected during the next site visit.

3.1 MacTung Meteorological Station Instrumentation

The MacTung weather station consists of a standard 3-m meteorological tower, with instrumentation to measure wind speed and direction, air temperature, relative humidity and incident solar radiation. The meteorological station is powered by a 12-V DC battery and 20-watt solar panel. Data are recorded to a Campbell Scientific CR10X data logger.

Brief descriptions of these instruments, based on material provided by the manufacturers, are provided below.

3.1.1 Wind Speed and Direction Monitor

Model 05103-10 Wind Speed and Direction Monitor is manufactured by R.M. Young. It is composed of a four-blade propeller mounted on a torpedo-shaped wind vane. Rotation of the propeller produces an alternating current with a frequency that is directly proportional to the wind speed. Wind direction is sensed by a potentiometer that is excited by an applied voltage. The potentiometer outputs a voltage that is directly proportional to the azimuth angle. Wind data are collected every five seconds and the mean wind vector magnitude and direction are calculated and stored at 15 minute intervals. The standard deviation of wind direction is also computed and indicates the variability of wind direction over the archiving period.

3.1.2 Soil Temperature Probe

The Model 107B Soil/water temperature probe, manufactured by Campbell Scientific, uses a thermistor to measure temperatures to an accuracy of 0.5^{o}C.

3.1.3 Temperature and Relative Humidity Probe

The CS500-U relative humidity and air temperature probe measures relative humidity (RH) using a laser-trimmed INTERCAP capacitive chip. Temperature is measured with a 1000 ohm platinum resistance thermometer (PRT). Both sensors are enclosed in a 6-plate gill radiation shield designed to shield the sensors from precipitation and solar radiation.

3.1.4 Pyranometer

A pyranometer is a device used to measure incident solar radiation. The LI-COR LI-200S pyranometer consists of a high stability silicon photovoltaic detector (blue enhanced), which converts the incident solar radiation to an electrical signal proportional to the received solar radiation. The photodiode is housed in a

weatherproof anodized aluminum case with an acrylic diffuser. It has a spectral sensitivity between 400 and 1100 nm.

3.1.5 Data Storage

Data are recorded to a Campbell Scientific CR10X data logger. The archiving interval for all parameters is 15 minutes. At a 15-minute sample frequency, the station will log more than a year of data before filling the memory module. Meteorological data on all instruments are collected at 5-second intervals, then averaged over the archiving period and saved to the logger memory every 15 minutes.

At the conclusion of each 24-hour period a daily summary is saved to the logger memory. Variables that are indicative of the status of the meteorological station, such as battery power and internal logger temperatures, are saved in this 24-hour data array. Refer to the site description document in Appendix A for further information on the daily summary.

3.1.6 Station Power

The meteorological station is powered by a 12-V DC battery, a 20-watt solar panel and a charge regulator, all of which are attached to the 3 m tripod. With this power configuration the station can operate unattended for more than a year.

3.2 Winds

Wind data for the Mactung project site have been collected since the installation of the meteorological station on July 14, 2005. The data have been summarized and presented in three different forms, as described below.

3.2.1 Maximum Wind Speed

The maximum gust wind speed for the day is recorded by the meteorological station at midnight in the 24 hour data array. These data, collected over the period between July 14, 2005 and August 6, 2006, are displayed in Figure 3.0.

The maximum wind gust of 22.9 m/s was recorded on November 23, 2005. The average maximum gust on a daily basis is approximately 7.0 m/s. On a calm day maximum wind gusts are in the order of 4.0 m/s, whereas on a windy day maximum gusts are estimated to be in the order of 14.0 m/s.

3.2.2 Wind Speed and Direction Stick Plots

Figure 3.1 is a sample of the wind direction figures presented in Appendix B. Each figure in Appendix B represents a month of wind data over the survey period from July 2005 to July 2006. Each figure consists of three panels.

The upper panel is a stick plot that displays the hourly wind vector; direction is indicated by the angle of each hourly stick and true north is towards the top of the page. With this convention, a wind vector pointing due north indicates a wind blowing to the north, which is considered a south wind, as winds are referenced to the direction from which they blow. The wind speed is indicated by the length of the stick and is determined using the scale in m/s given at the left and right of the plot. For example, in Figure 3.1 on April 12, 2006, winds were blowing from the south at a speed of about 4.0 m/s. The next day at 3 AM the wind changed to a 2.0 m/s wind from north of northeast.

The central panel indicates the hourly wind speed in m/s. This panel is useful as an indicator of windstorms or periods of calm.

The lower panel in Figure 3.1 shows the bearing from which the wind was blowing on an hourly basis.

3.2.3 Wind Roses

A wind rose is a useful tool that can display an entire period of recorded wind data on a single graph. The total duration of wind occurring within a specified speed range and compass direction is determined as a percentage of the total period of record. Figure 3.2 is an example of a wind rose calculated using the entire period of record from July 2005 to July 2006. Wind speeds are grouped into ranges from 0 to 1 m/s (calm), 1 to 3 m/s, 3 to 6 m/s etc., in 3 m/s ranges, to 18+ m/s. The wind direction is also grouped into 16 compass direction ranges of 22.5 degrees starting at north. These data are summarized in the wind speed and direction frequency distribution table, which is located in the lower right of Figure 3.2. The wind rose displays graphically the data contained within the table.

The line types used to display winds in each compass direction are indicative of the wind speed. For example, in Figure 3.2, viewing the data in the west compass direction, three line types are displayed. The single thin line closest to the centre of the rose indicates that 3.58% of the time the winds are blowing from the west at between 1 and 3 m/s. The next line type, a double line, indicates that 6.53% of the time winds are blowing from the west between 3 and 6 m/s. The thick blue line at the end indicates wind speeds between 6 and 9 m/s, blowing from the west for 1.42% of the period of record used for the generation of the wind rose.

It is also possible to determine percentage of time the wind blows at specific speeds by viewing the “total (%)” row at the bottom of the frequency distribution table. For the MacTung meteorological station

location, over the period between July 2005 to July 2006, the wind was considered calm (wind speeds less than 1 m/s) 13.69% of the time, wind speeds were between 1 and 3 m/s 38.18% of the time; between 3 and 6 m/s for 38.39% of the time; and between 6 and 9 m/s for 7.77% of the time. 1.97 % of the time the wind speed was greater than 9.0 m/s.

Appendix C contains 13 wind rose / frequency distribution figures, one for each month for the period of record. These wind roses indicate that there is a seasonal variability in the wind direction. During the summer months of July, August and September 2005 the prevailing winds were from the northeast. Over the months of October to December, 2005 the prevailing winds change from northeast winds to west winds. Throughout the winter from January 2006 to March, 2006 the prevailing winds continued blowing from the west.

The two prevailing wind directions are clearly shown in the wind rose of Figure 3.2. The winds are generally from the west about 30% of the year, typically during the winter months. Approximately 24% of the time the winds are blowing from the general direction of the northeast. This wind direction is typical for the summer period.

3.3 Other Meteorological Parameters

Figure 3.3 is a sample of the 13 recorded weather parameter figures contained in Appendix D. These figures show, on a monthly basis, the remaining meteorological parameters of air temperature, soil temperature, relative humidity and solar radiation measured by the meteorological station from July 2005 to July 2006.

These plots present all the recorded meteorological data for a single month. By reviewing these figures, it is possible to determine the weather conditions for any period of time contained within the entire data record. For example, in Figure 3.3 on April 7, 2006 it was the brightest day of the month, with incident solar radiation at 800 W/m^2 (bottom panel); air temperature for that day was usually -5.0^oC but air temperatures approached 0.0^oC at noon (top panel); relative humidity was typically 80.0% for the day, (third panel from the top).

3.3.1 Air Temperature

Air temperatures are discussed in terms of daily extreme temperatures and means as well as the hourly data.

3.3.1.1 Daily Extremes for Air Temperature

The maximum, minimum and mean air temperatures for the day are recorded by the meteorological station at midnight. The data summarized in Figure 3.4 were collected between July 14, 2005 and August

7, 2006, and show the mean air temperatures for the day as a thick orange line bounded by the maximum and minimum temperatures indicated by thin red lines. Generally the daily variance in air temperature is ±5°C from the mean daily air temperature.

As would be expected at this latitude, a pattern to air temperature is evident in the year-long data record. The warmest period (summer) is from June to the end of August with a mean daily temperature of 7.0°C. During this period recorded temperatures were as high as 20°C and as low as 0°C. From September to the end of October the temperatures dropped to the winter normals.

The coldest period (winter) for the site occurs between November 2005 and the end of April 2006. During this period the mean daily temperature is -15°C, however, temperatures can be expected to be as low as –30°C or as high as 1.0°C. In April, air temperatures began to warm to the summer temperature normals.

Hourly Air Temperatures

3.3.1.2 Hourly Air Temperatures

Figure 3.3 is an example of the 13 monthly weather parameter figures contained in Appendix D. The upper panel in Figure 3.3 and the figures in Appendix D show the air temperatures measured by the station for each month of recorded data for each hour of the day. These figures are useful for viewing temperature trends for a particular day or for a short period of time such as during a storm.

3.3.2 Soil Temperatures

A soil temperature probe was installed as part of the meteorological station. The probe was placed on top of the bedrock under the moss and surface vegetation. The data are indicative of temperatures under the vegetation and give some indication of the insulation due to the vegetation and snow cover. Soil temperatures are shown in the second panel from the top on Figure 3.3, which is a sample of the 13 weather parameter figures contained in Appendix D.

Soil temperatures in July 2005 were just above 5.0°C with a ±1.0°C diurnal fluctuation. The soil temperature and diurnal variation reduced slowly through August until the end of September, when there was no diurnal variation and temperatures were just above freezing. This is indicative of snow on the ground, which acts a temperature insulator between the air and soil. By the end of January 2006, the soil temperature had reached its minimum value of -5.0°C. As a comparison, air temperatures at this time were of the order of -15°C. Near the end of March 2006 soil temperatures began to slowly rise.

The soil temperature instrument failed on June 14, 2006 and there are no plans to replace it.

3.3.3 Relative Humidity

Relative humidity is discussed in terms of daily extremes and means as well as data recorded hourly by the meteorological station.

3.3.3.1 Daily Extremes for Relative Humidity

At the conclusion of each day the station records the maximum, mean and minimum relative humidity for the day. Figure 3.5 shows the relative humidity data plotted from July 14, 2005 to August 7, 2006. The thick green line in the figure represents the mean relative humidity for the day. The maximum and minimum relative humidity results are indicated by black lines.

The variance of relative humidity is indicated by the envelope of maximum and minimum relative humidity. Over the period of record the relative humidity varied from short duration lows of 18% to a high of 98%, which could occur at any time of the year. The only evidence of any seasonal variation to relative humidity is that during the summer months there a larger daily variation to %RH. During the warmer summer months, the daily range of relative humidity is typically from 40% to 98% or ± 30% from the daily mean. Whereas, during the winter, the daily range of relative humidity is typically from 80% to 98% or ± 10% from the daily mean, with only a few days when the relative humidity would vary more than ± 10% during the day.

3.3.3.2 Hourly Relative Humidity

Figure 3.3 is used as an example of the 13 monthly weather parameter figures contained in Appendix D. The third panel from the top shows the relative humidity measured by the station for each hour in the particular month.

3.3.4 Solar Incident Radiation

Solar incident radiation is discussed in terms of daily extremes as well as hourly data.

3.3.4.1 Daily Extremes for Incident Solar Radiation

At the conclusion of each day, the station records the maximum incident solar radiation in W/m^2 for the day. The minimum daily incident solar radiation will be zero, as at this latitude, it gets dark for at least a short time each night during the summer. Figure 3.6 shows the daily maximum recorded incident solar radiation plotted from November 28, 2005 to August 7, 2006. The data gap that exists with the pyranometer is due to a wiring connection in the data logger that became loose shortly after the installation.

There is a strong yearly pattern to the data set. Over the winter period from November to January the sun is lowest in the sky, hence the solar radiation is at a minimum, typically in the order of less than 100 W/m^2. During this winter period daily variations to the maximum incident solar radiation are typically less than 30 W/m^2.

During the summer period from April to July, the solar radiation is at it highest, with typical maximum radiation for the day of about 850 W/m^2. The highest recorded incident solar radiation of 1164 W/m^3 occurred on May 6, 2006. During the summer months, there are large changes to the daily maximums due to heavy cloud cover. This cloud cover can reduce the measured maximum daily incident solar radiation from an average of 850 W/m^2 to under 400 W/m^2 for the day.

3.3.4.2 Hourly Incident Solar Radiation

Figure 3.3 is used as an example of the 13 monthly weather parameter figures contained in Appendix D. The bottom panel from shows the solar incident radiation, measured by the station, for each hour during the month.

The peaks typically occur at midday, when the sun is at its highest. The radiation drops to zero over the night.

The data can be used to determine the number of daylight hours at site for any day of the year, or to determine the incident solar radiation at any point in time.

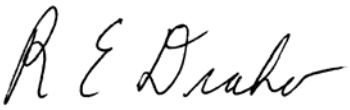
4 RECOMMENDATIONS

It is recommended that the hydrometric stations be re-installed in the spring of 2007. This will enable a better determination of the year to year variability of discharge and water temperature. A second season of discharge data is essential to improving the confidence level for the determination of return periods and other hydrological parameters.

The meteorological station should remain in operation through 2007 at the MacTung Camp for similar reasons as the hydrological stations but with respect to weather parameters.

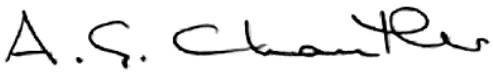
Prepared by,

HAY & COMPANY CONSULTANTS



R.E. Draho, B.Sc.
Senior Project Scientist

Reviewed by:



Dr. A.G. Chantler, P.Eng.
Principal

PROJECT REPORT – GENERAL CONDITIONS

This Report incorporates and is subject to these "General Conditions".

1.0 PURPOSE

These General Conditions apply to this Report, which Hay & Company Consultants, a Division of EBA Engineering Consultants Ltd. (Hayco) has prepared in fulfillment of certain project specific requirements that have been previously agreed to by Hayco and its Client. The Report may include plans, drawings, profiles and other support documents that collectively constitute the Report.

2.0 USE OF REPORT

This Report pertains to a specific site, a specific development, and a specific scope of work. The Report and all supporting documents are intended for the sole use of Hayco's client. Hayco does not accept any responsibility for the accuracy of any of the data, analyses or other contents of the Report when it is used or relied upon by any party other than Hayco's Client, unless authorized in writing by Hayco. Any unauthorized use of the Report is at the sole risk of the user.

3.0 CALCULATIONS AND DESIGNS

Hayco has undertaken design calculations and has prepared project specific recommendations or designs in accordance with terms of reference that were previously set out in consultation with, and agreement of, Hayco's client. These recommendations or designs have been prepared to a standard that is consistent with industry practice. Notwithstanding, if any error or omission is detected by Hayco's client or any party that is authorized to use the Report, the error or omission should be immediately drawn to the attention of Hayco.

4.0 ENVIRONMENTAL & REGULATORY ISSUES

Unless so stipulated in the Report, Hayco was not retained to investigate, address or consider, and has not investigated, addressed or considered any environmental or regulatory issues associated with the project specific design.

5.0 STANDARD OF CARE

Services that Hayco provided to complete this Report have been undertaken in a manner that is consistent with the approach ordinarily exercised by members of the profession currently practising under similar conditions in the jurisdiction in which the services were provided. Engineering judgement has been applied in developing design elements that are integral to this Report. No other warranty or guarantee, expressed or implied, is made concerning the content of this Report.

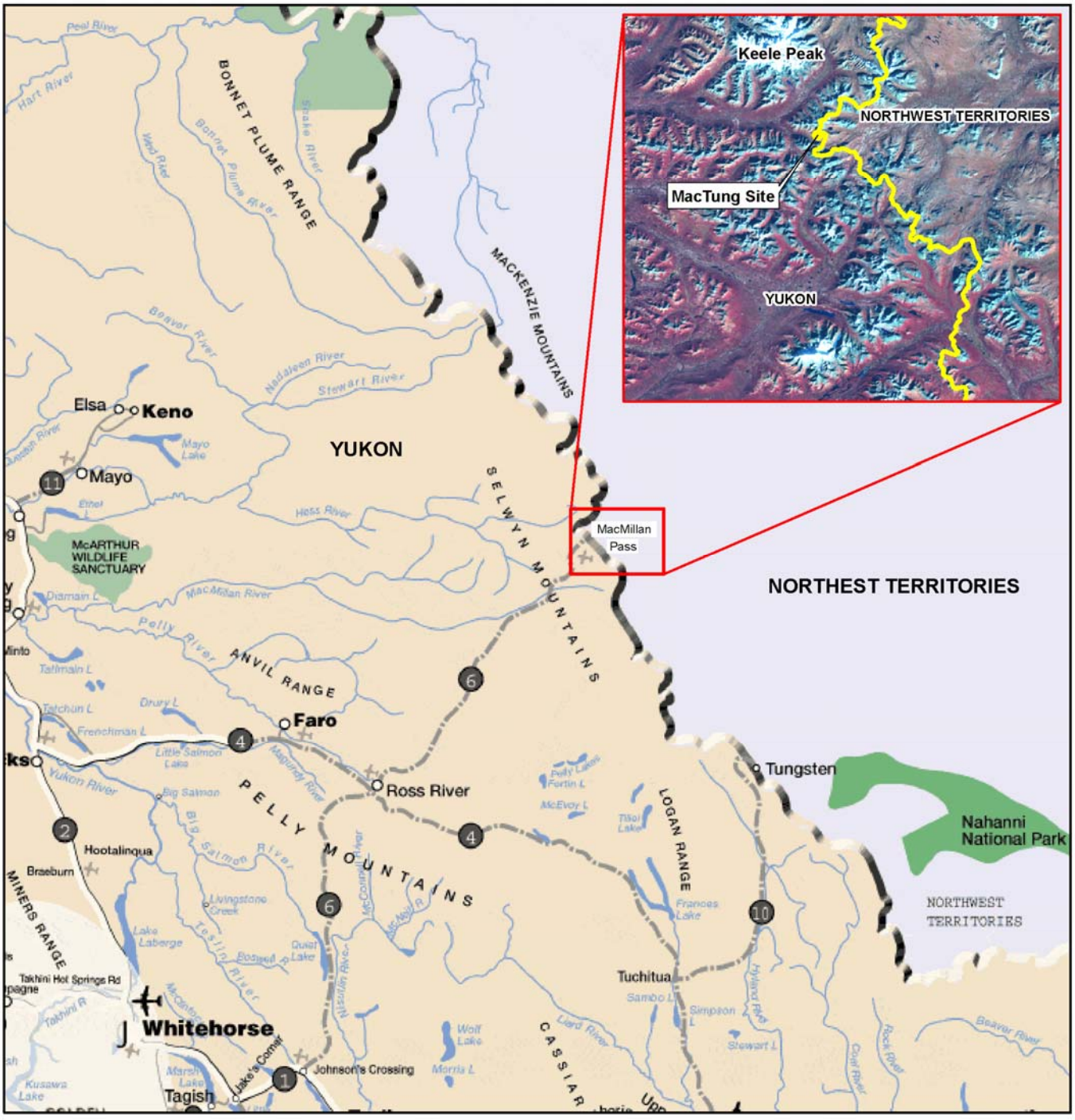
6.0 ALTERNATE REPORT FORMAT

Where Hayco submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed Hayco's instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by Hayco shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancies, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by Hayco shall be deemed to be the overall original for the Project.

The Client agrees that both electronic file and hard copy versions of Hayco's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except Hayco. The Client warrants that Hayco's instruments of professional service will be used only and exactly as submitted by Hayco.

The Client recognizes and agrees that electronic files submitted by Hayco have been prepared and submitted using specific software and hardware systems. Hayco makes no representation about the compatibility of these files with the Client's current or future software and hardware systems.

FIGURES



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2006 HYDROMETEOROLOGICAL SURVEY MACTUNG PROJECT

PROJECT LOCATION MAP

FIG. 1.0

Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\maps\FIG1.0.ppt

LEGEND

TRIB A	- Tributary A Hydrometric Station
DALE C	- Dale Creek Hydrometric Station
MET	- MacTung Camp Meteorological Station
MACPAS	- MSC Macmillan Pass Meteorological Station
	- Access Road

Note: Map taken from 1: 250,000
ETopo 105O Map
Edition 2, UTM Zone 9, NAD27
Transverse Mercator Projection

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2006 HYDROMETEOROLOGICAL SURVEY MACTUNG PROJECT

HYDROMETEOROLOGICAL SITE LOCATION MAP

FIG. 1.1

Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\maps\FIG1.1.ppt

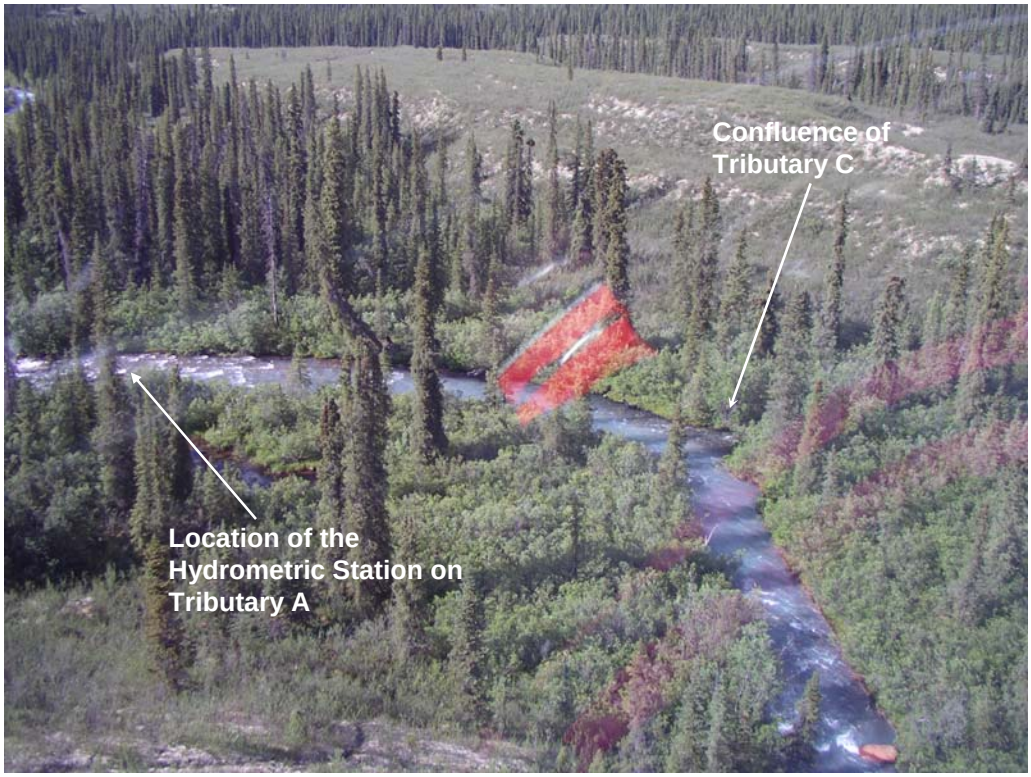

Photo A – Aerial View of Tributary A at the Hydrometric Station

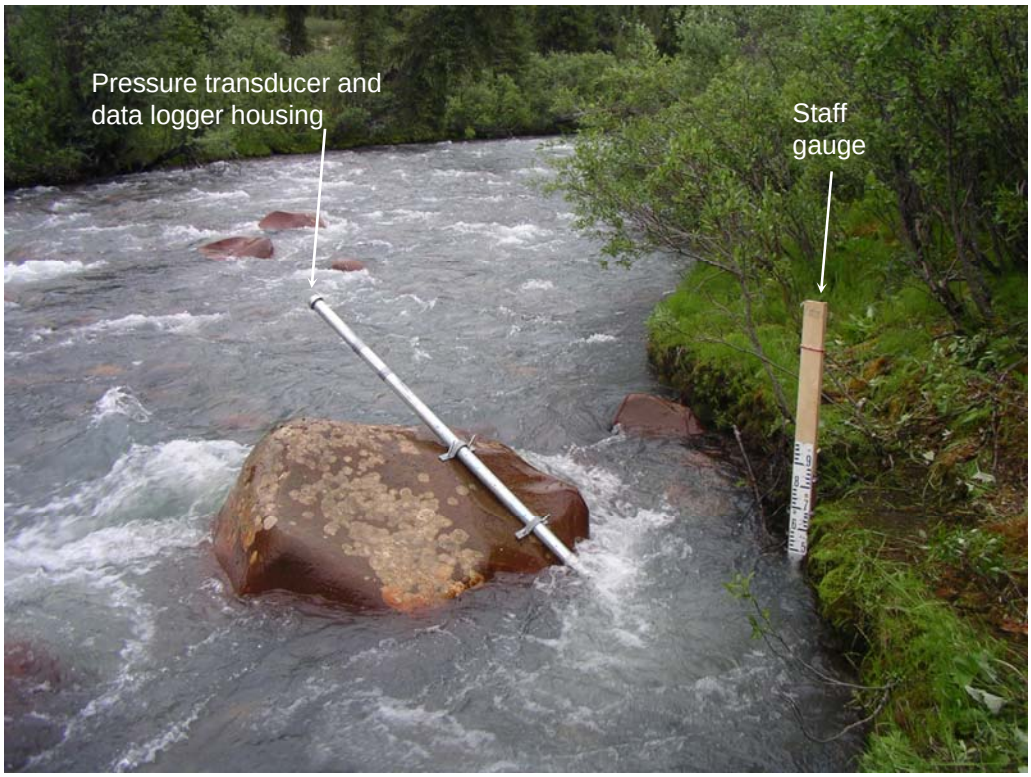

Photo B – Tributary A Hydrometric Station

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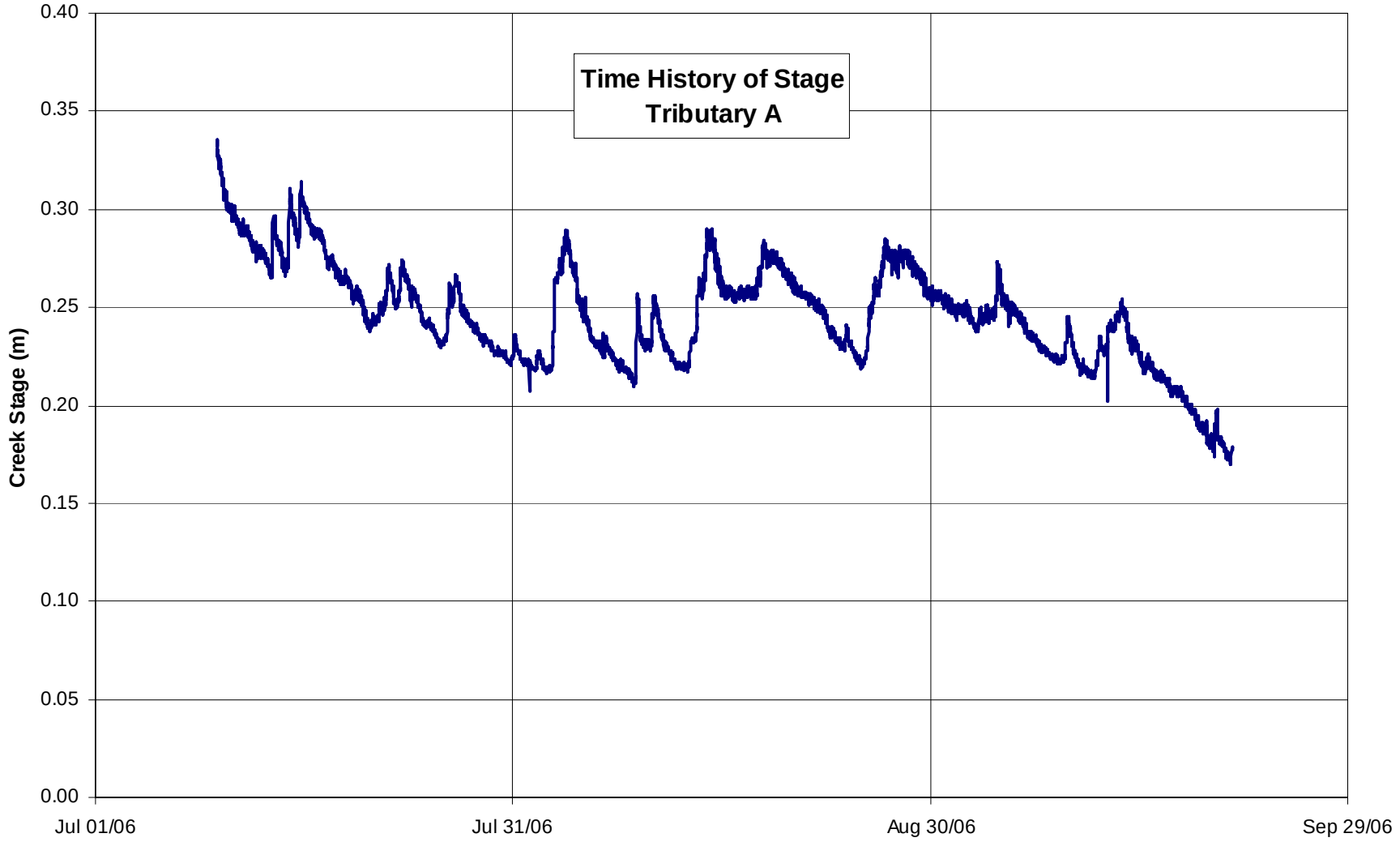
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

SITE 1 – TRIBUTARY A
HYDROMETRIC STATION

FIG.
2.0

FILE: Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Hydrology\Yukon_Creek-Site1\FIG2.0.ppt



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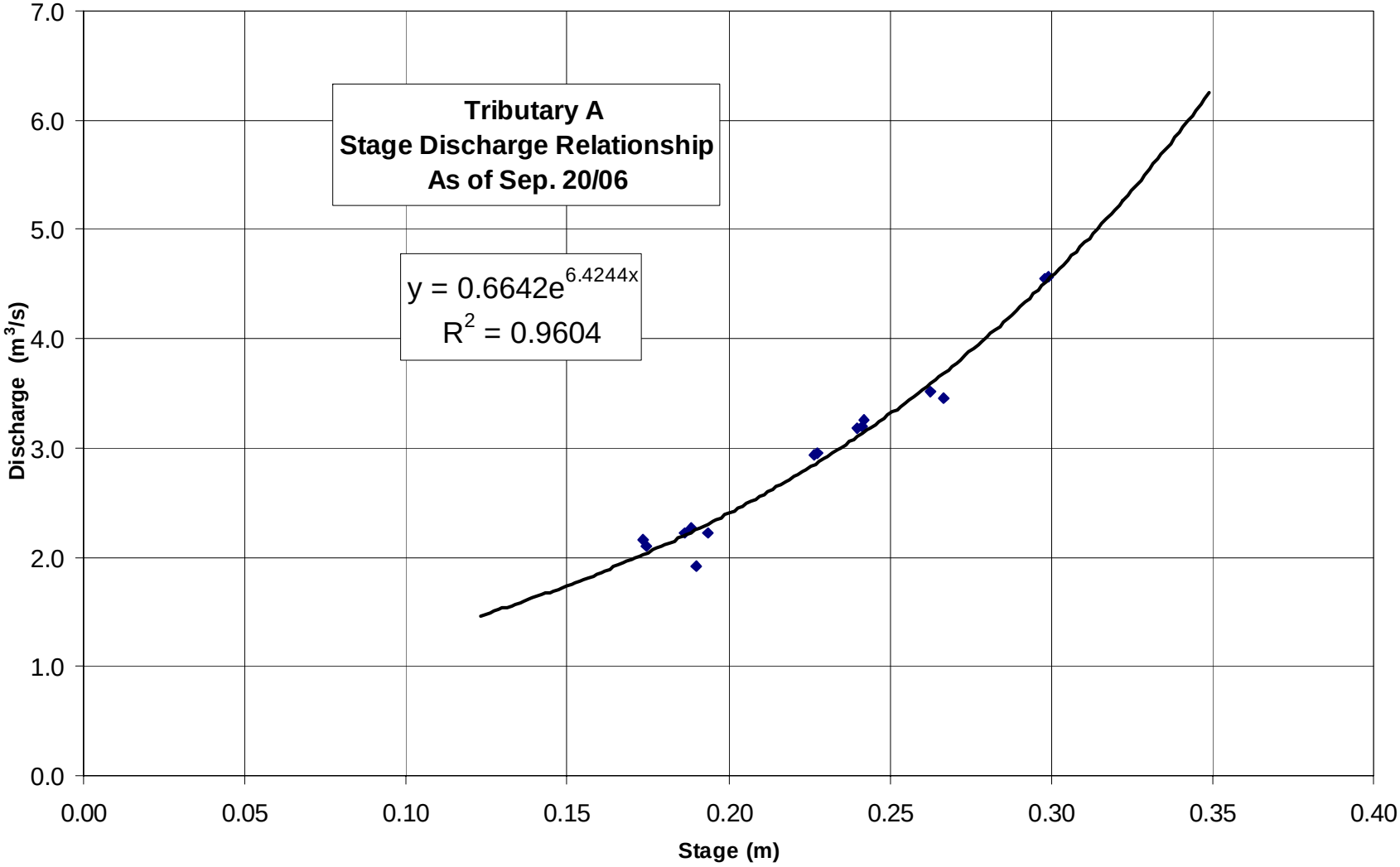
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

2006 TIME HISTORY OF STAGE
SITE 1 - TRIBUTARY A

FIG. 2.1

EXCEL FILE: Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Hydrology\Trib_A-Site1\Trib_A_flows.xls



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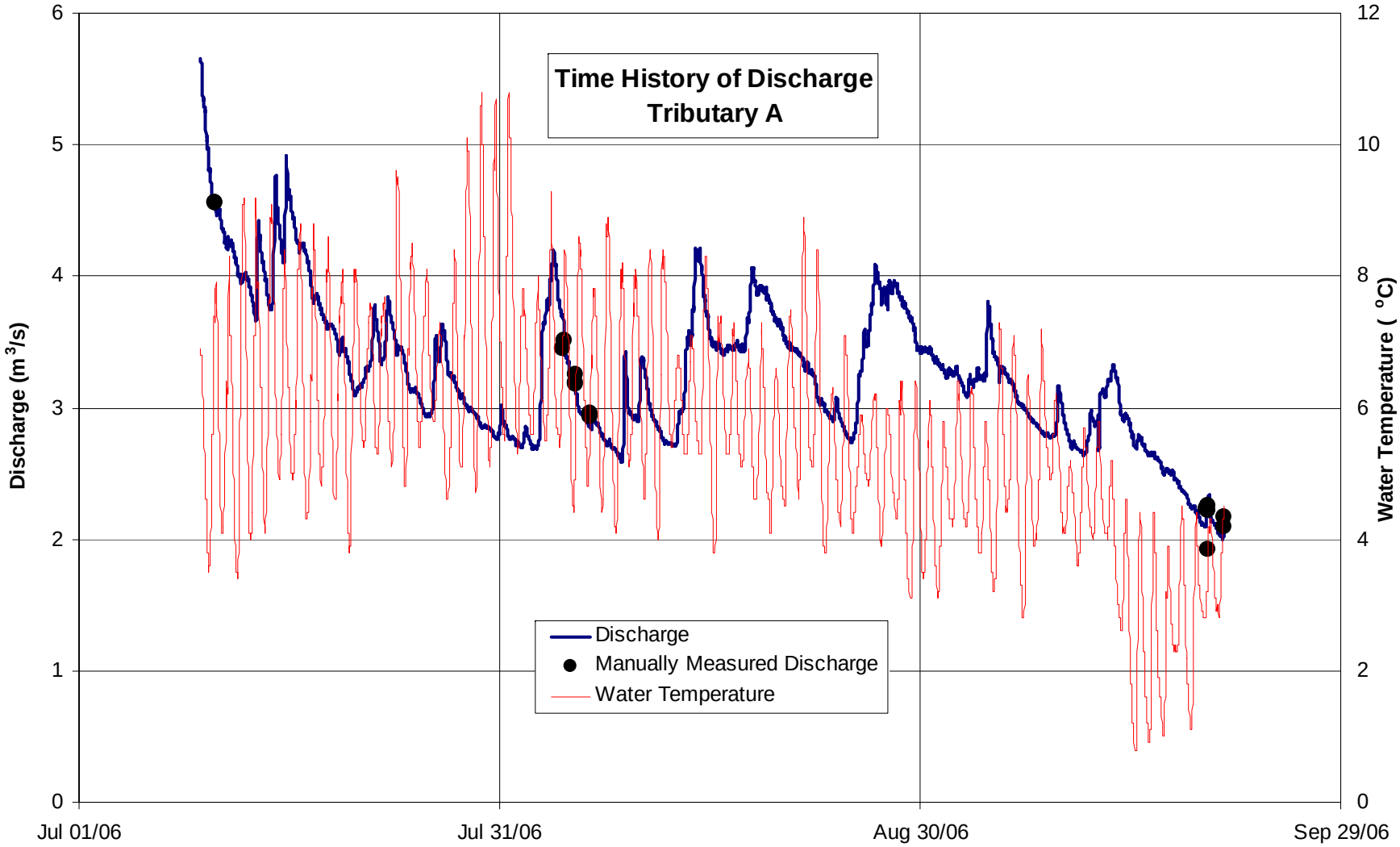
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

STAGE-DISCHARGE RELATIONSHIP
SITE 1 - TRIBUTARY A

FIG. 2.2

EXCEL FILE: Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Hydrology\Trib_A-Site1\Trib_A-Flowcalc.xls



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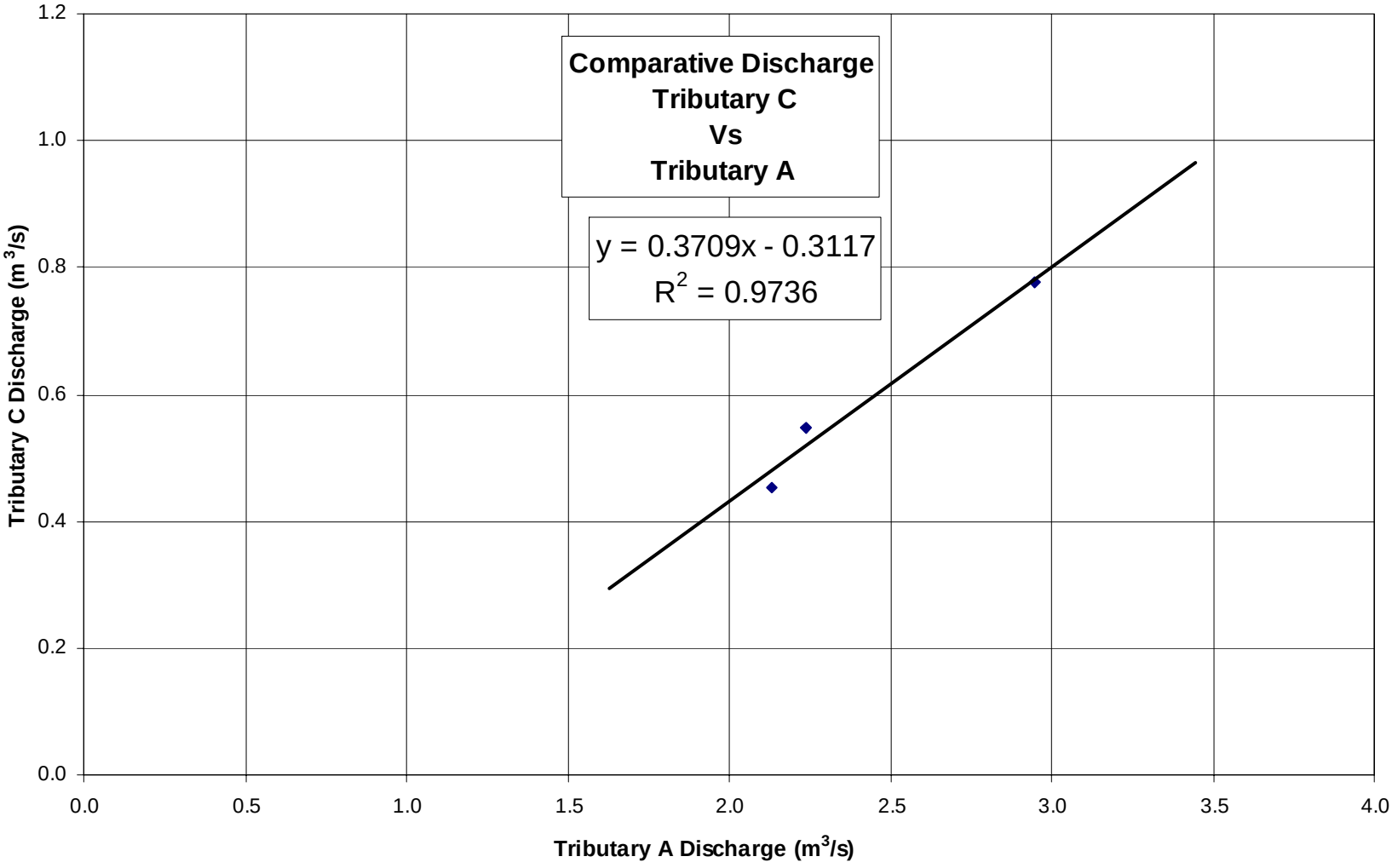
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

2006 TIME HISTORY OF DISCHARGE
SITE 1 - TRIBUTARY A

FIG. 2.3

EXCEL FILE: Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Hydrology\Trib_A-Site1\Trib_A_flows.xls



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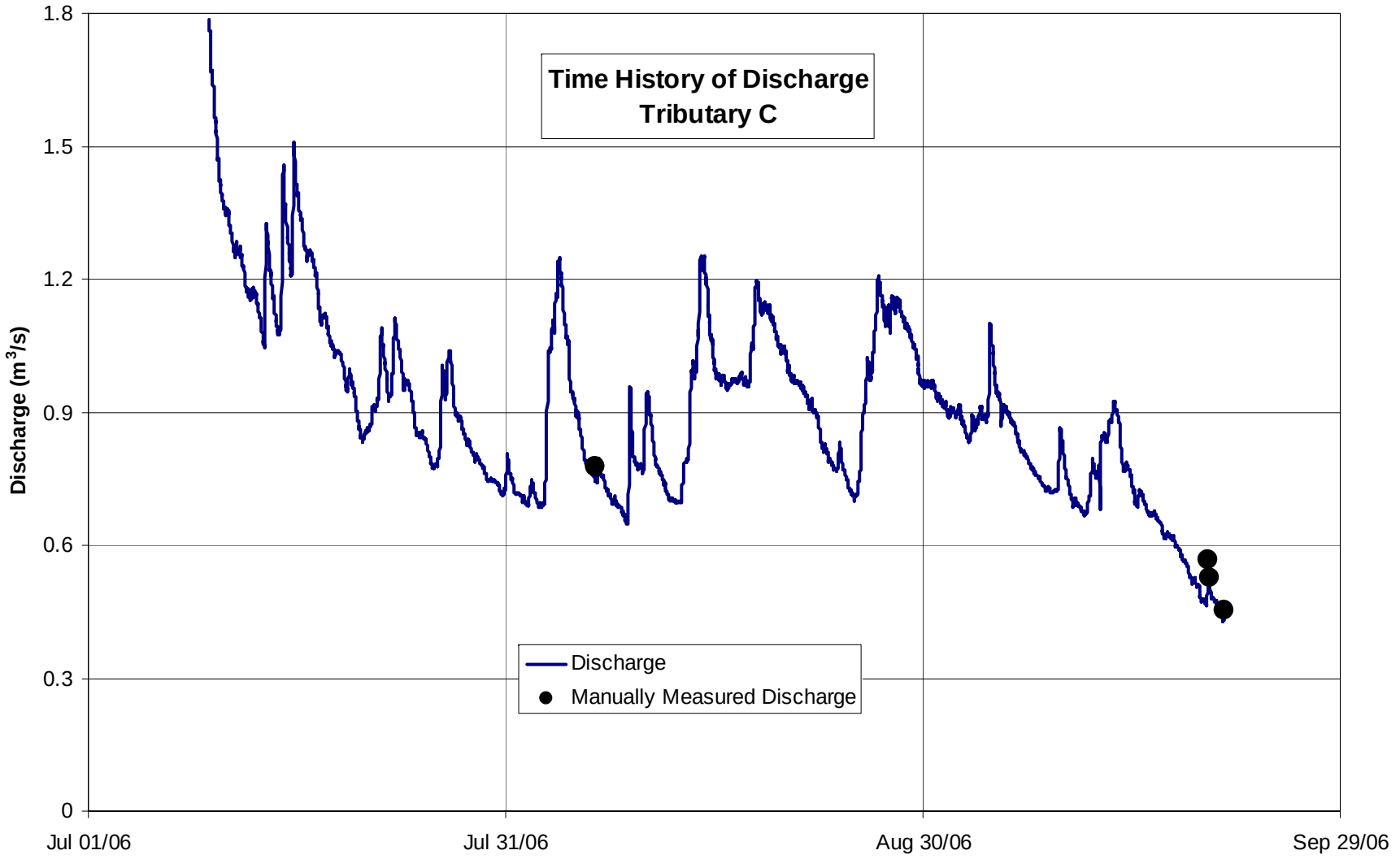
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

COMPARATIVE DISCHARGES
TRIBUTARY C VS TRIBUTARY A

FIG. 2.4

EXCEL FILE: Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Hydrology\Trib_C\Trib_C-Flowcalc.xls



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2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

2006 TIME HISTORY OF DISCHARGE
TRIBUTARY C

FIG. 2.5

EXCEL FILE: Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Hydrology\Trib_C\Trib_C-Flowcalc.xls

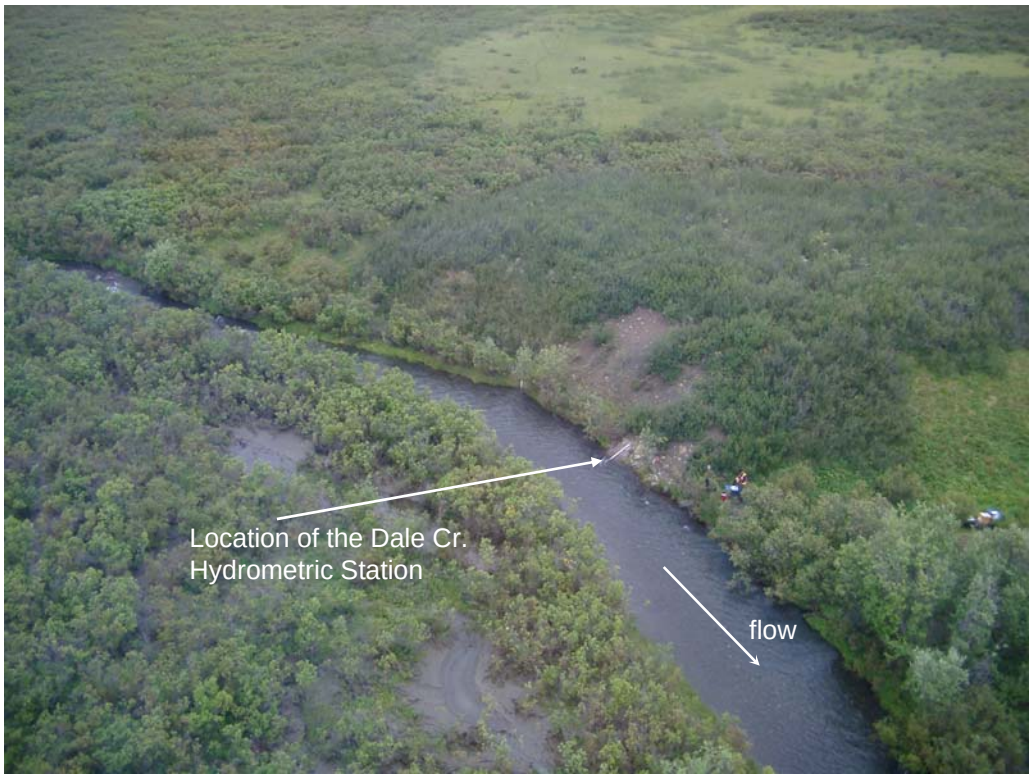

Photo A – Aerial View of Dale Creek at the Hydrometric Station

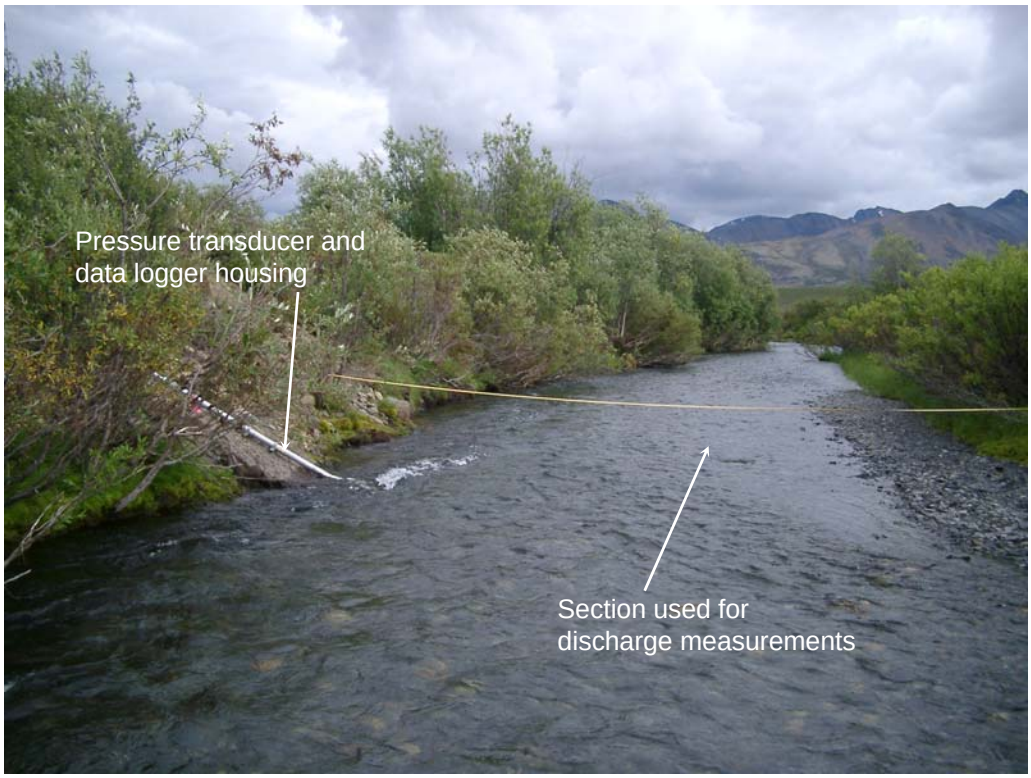

Photo B – Dale Creek Hydrometric Station

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2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

SITE 2 - DALE CREEK
HYDROMETRIC STATION

FIG. 2.6

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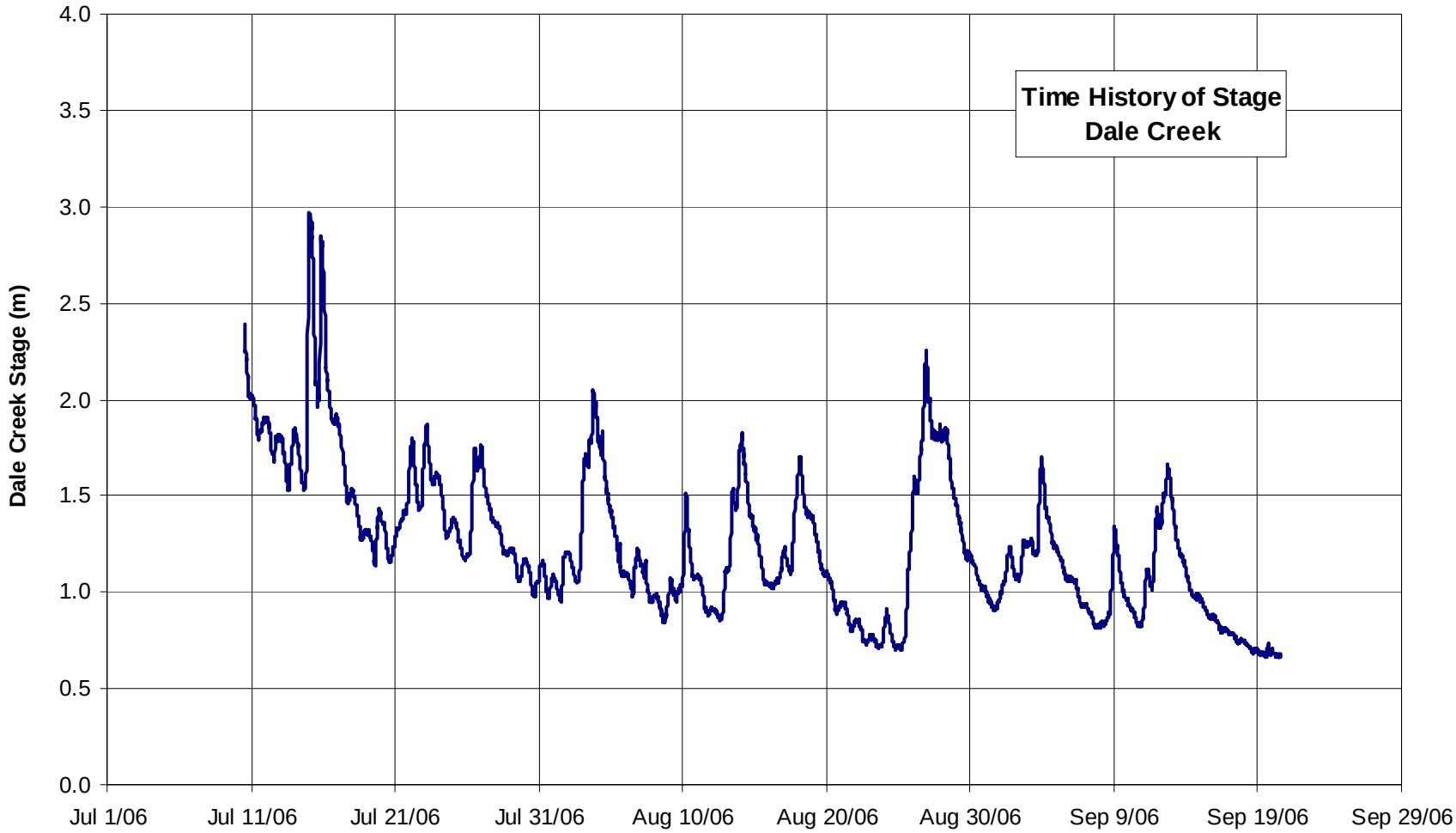

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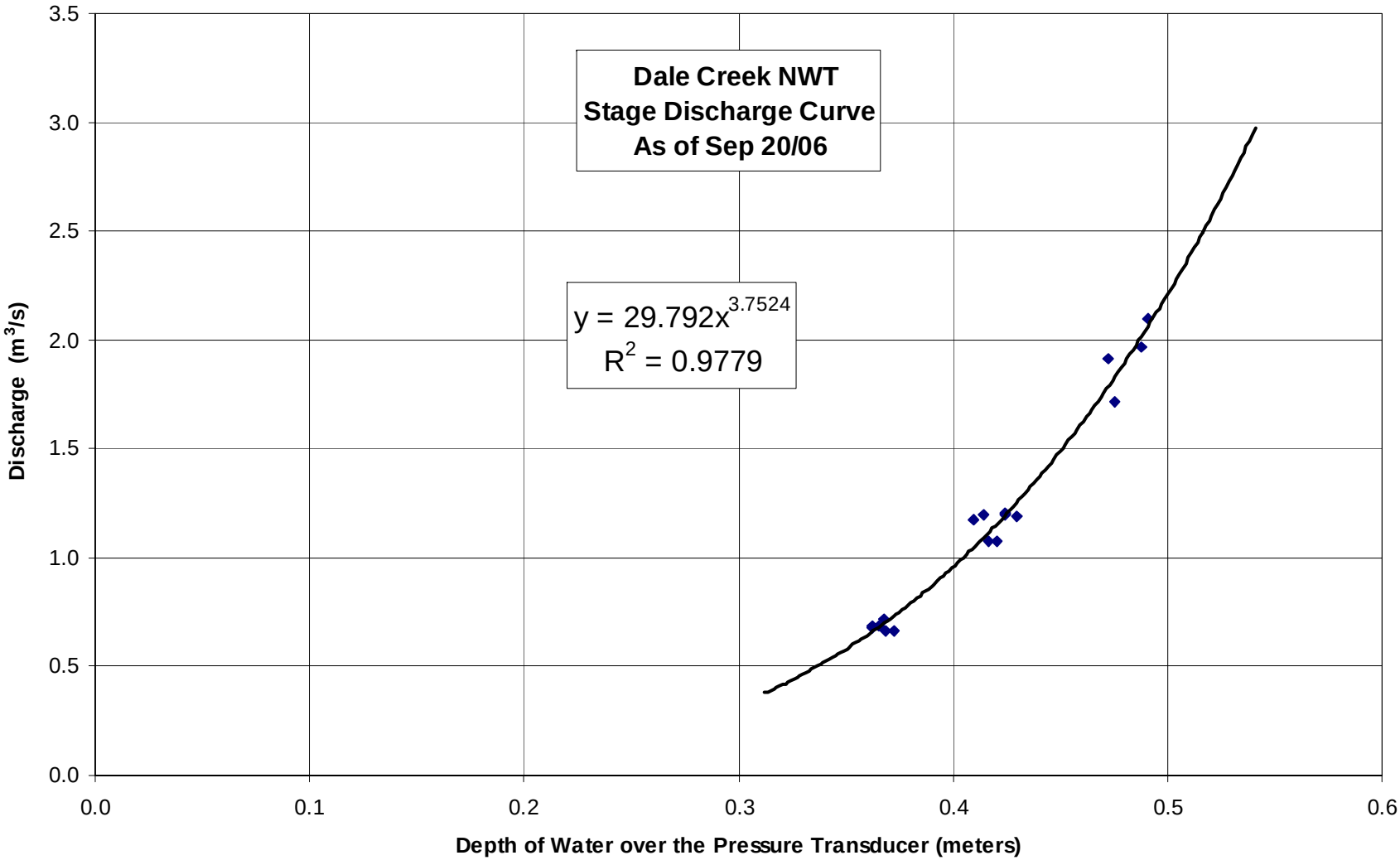
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

2006 TIME HISTORY OF STAGE
SITE 2 - DALE CREEK

FIG. 2.7

EXCEL FILE: Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Hydrology\Dale-Creek-Site2\DaleCr_Flows.xls



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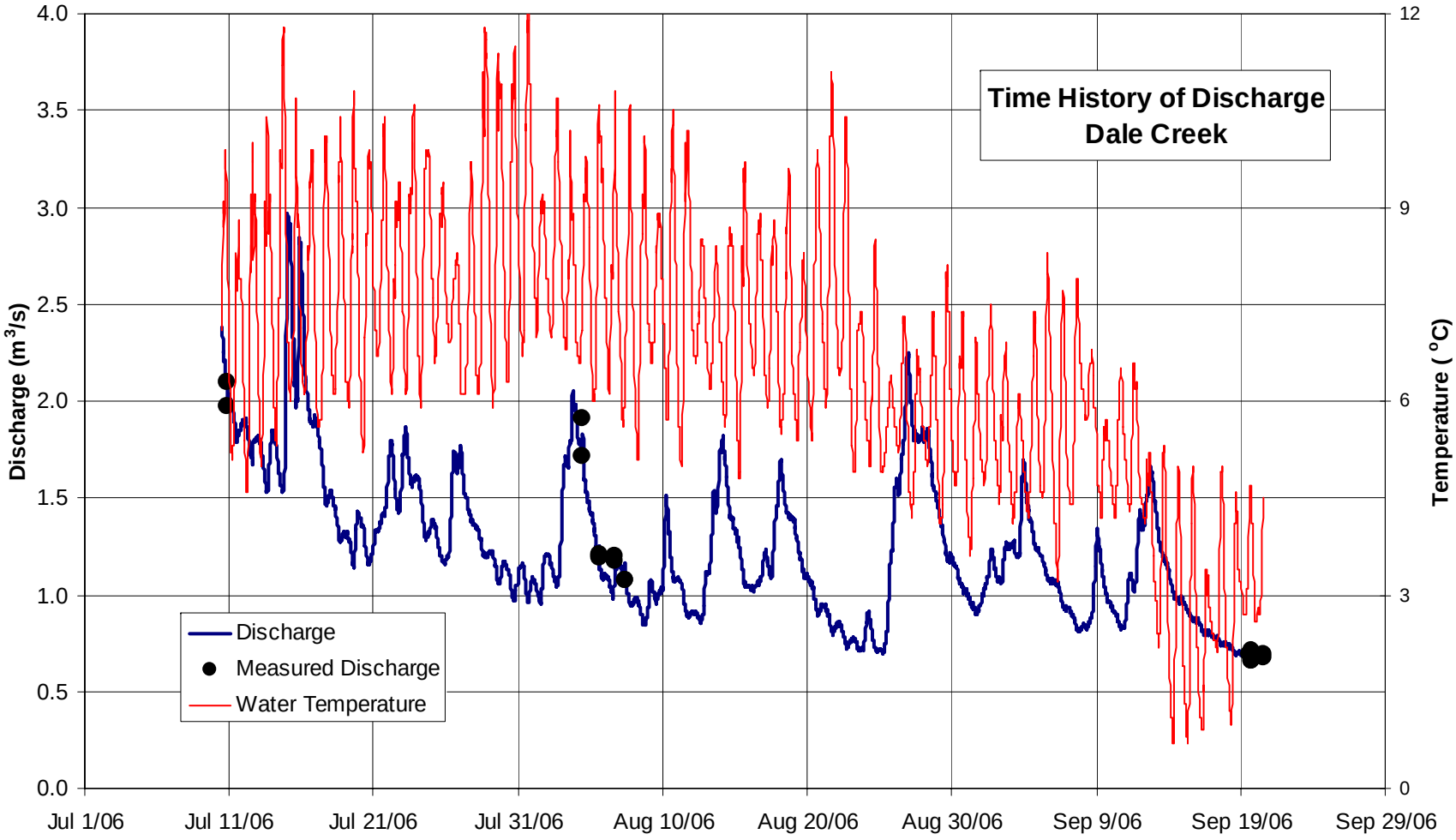
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

STAGE-DISCHARGE RELATIONSHIP
SITE 2 - DALE CREEK

FIG. 2.8

EXCEL FILE: Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Hydrology\Dale-Creek-Site2\DaleCr-Flowcalc.xls



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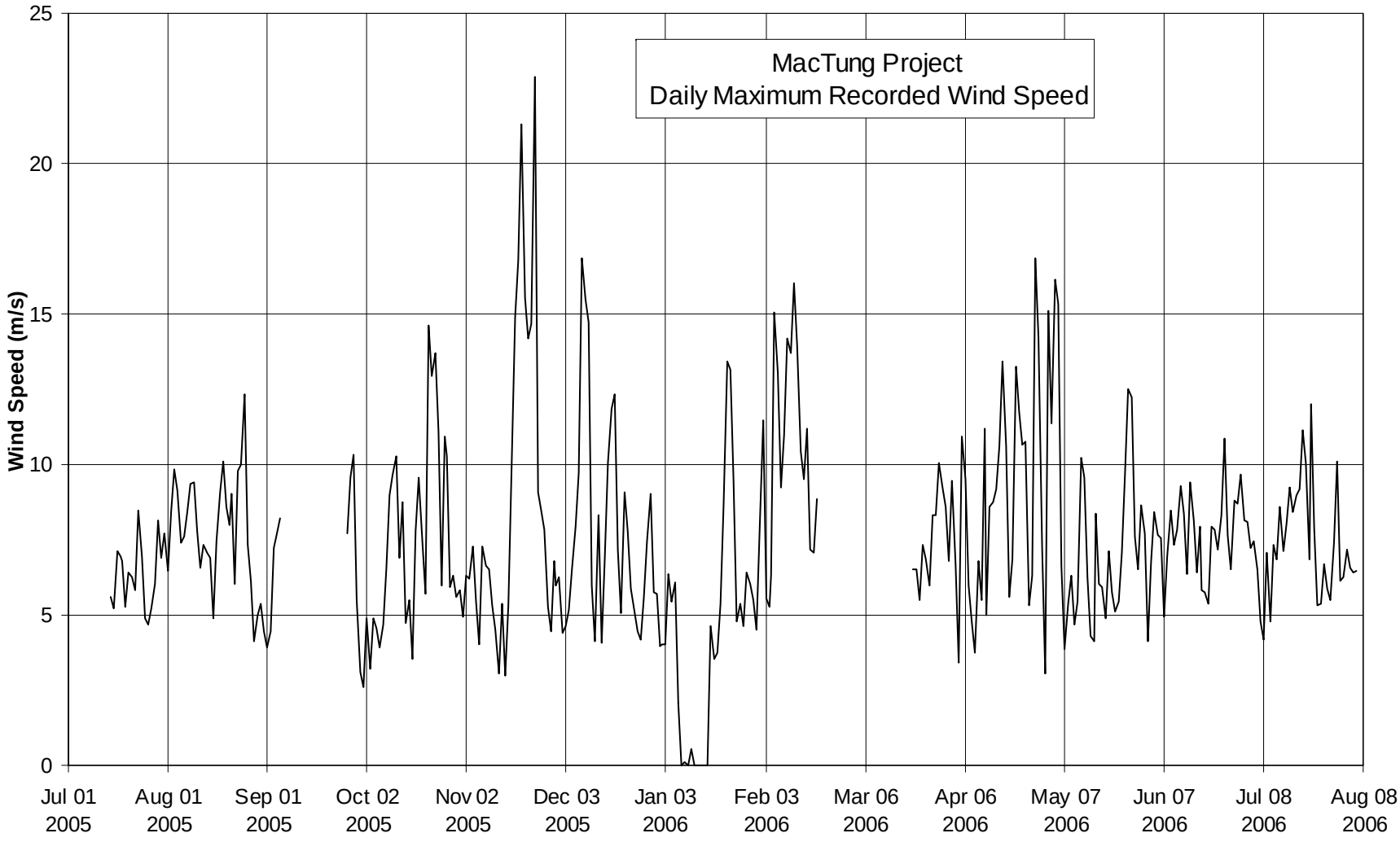
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

2006 TIME HISTORY OF DISCHARGE
SITE 2 - DALE CREEK

FIG. 2.9

EXCEL FILE: Q:\Vancouver\Data\0201-WH\PROJECTS\1200163 - Mactung\Mactung\RED\Hydrology\Dale-Creek-Site2\DaleCr_Flows.xls



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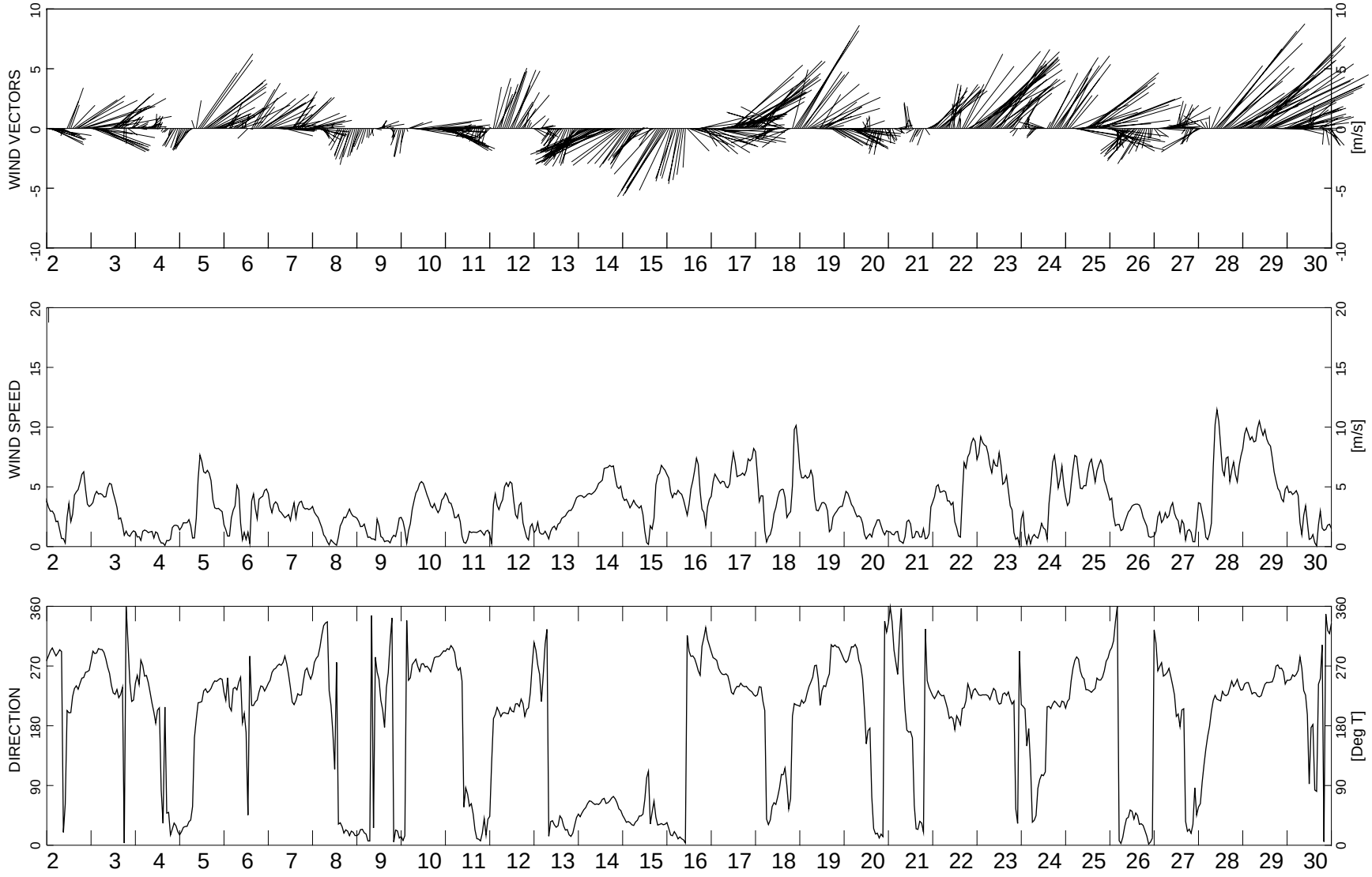
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

DAILY MAXIMUM RECORDED
WIND SPEED - MACTUNG CAMP

FIG. 3.0

EXCEL FILE: Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\MacTung_Daily_Met_Summary.xls



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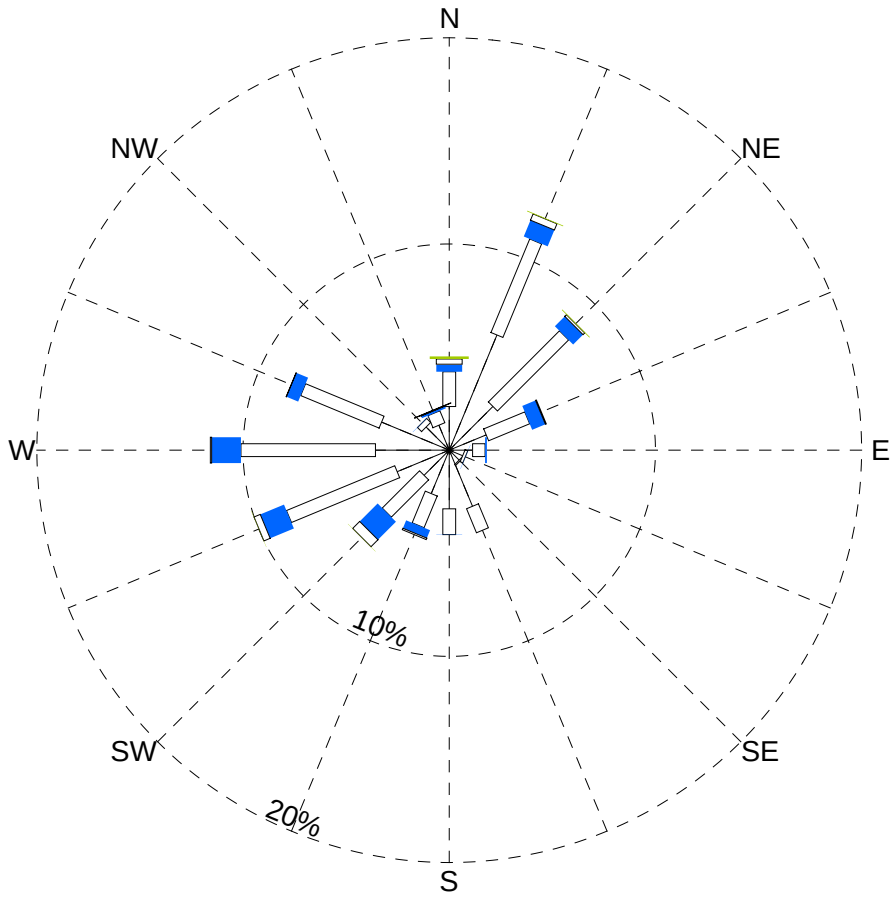
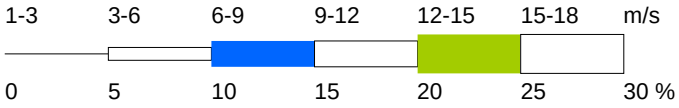
2006 HYDROMETEOROLOGICAL SURVEY MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION APRIL 2006

FIG. 3.1

Wed Oct 25 12:58:59 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 381 days
Start Date: Jul. 14, 2005
End Date: Jul. 31, 2006
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	1.94	2.15	0.69	0.05	-	-	-	4.84
NE	-	3.00	4.88	0.68	0.11	0.04	-	-	8.70
NNE	-	6.05	4.91	0.86	0.33	0.04	-	-	12.18
N	-	2.12	1.69	0.37	0.25	0.13	-	-	4.55
NNW	-	1.31	0.63	0.11	0.01	0.01	0.01	-	2.09
NW	-	1.59	0.28	0.01	-	-	-	-	1.88
WNW	-	3.55	4.12	0.62	0.01	-	-	-	8.30
W	-	3.58	6.53	1.42	0.06	-	-	-	11.59
WSW	-	2.73	5.68	1.25	0.33	0.01	-	-	10.00
SW	-	1.73	2.56	1.23	0.48	0.01	-	-	6.01
SSW	-	2.28	1.66	0.42	0.08	-	-	-	4.43
S	-	2.85	1.25	0.01	-	-	-	-	4.11
SSE	-	2.95	1.26	-	-	-	-	-	4.21
SE	-	0.68	0.06	-	-	-	-	-	0.74
ESE	-	0.70	0.14	0.01	-	-	-	-	0.86
E	-	1.13	0.61	0.09	-	-	-	-	1.83
Calm	13.69	-	-	-	-	-	-	-	13.69
Total (%)	13.69	38.18	38.39	7.77	1.71	0.24	0.01	-	100.00

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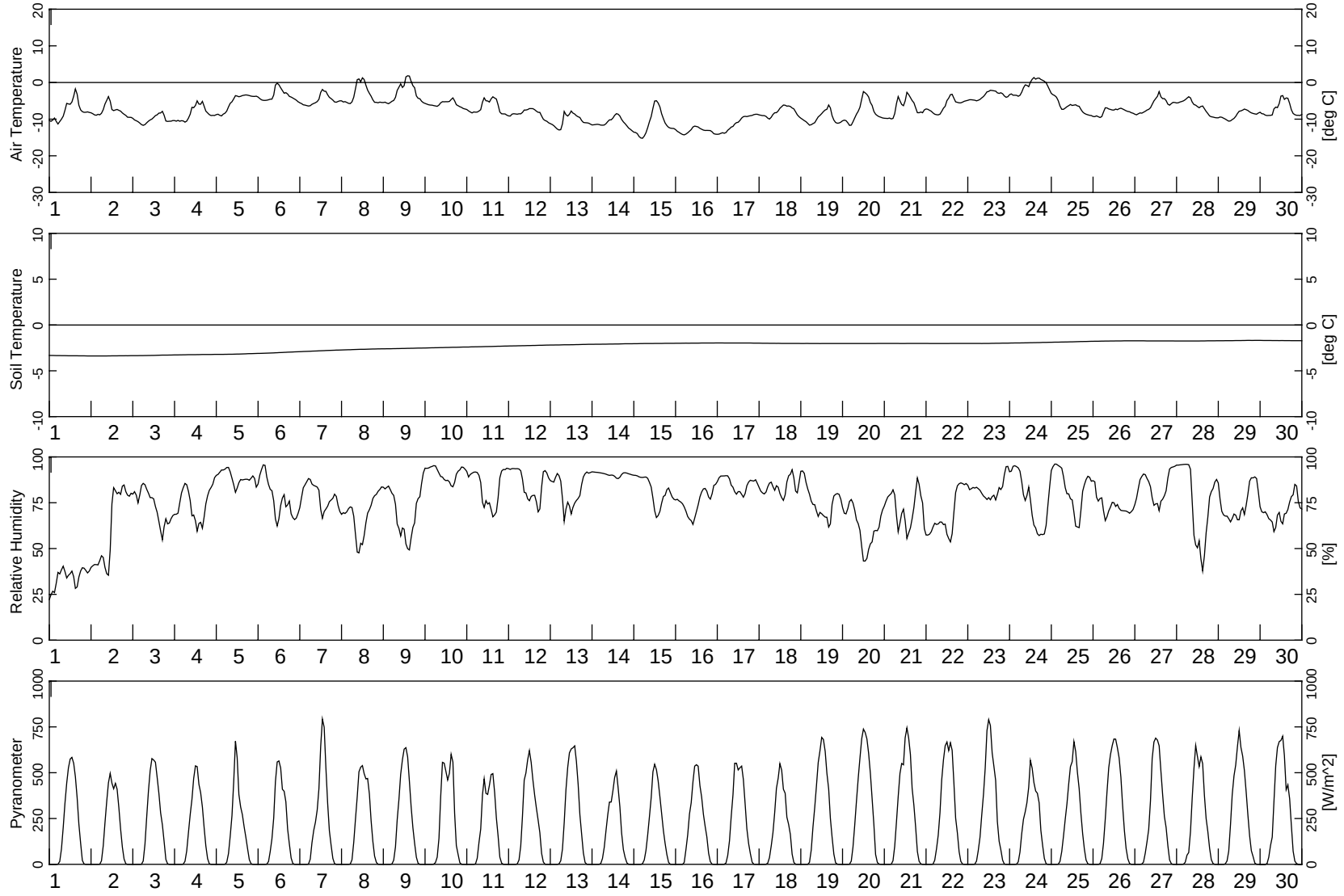
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
JULY 2005 TO JULY 2006

FIG. 3.2



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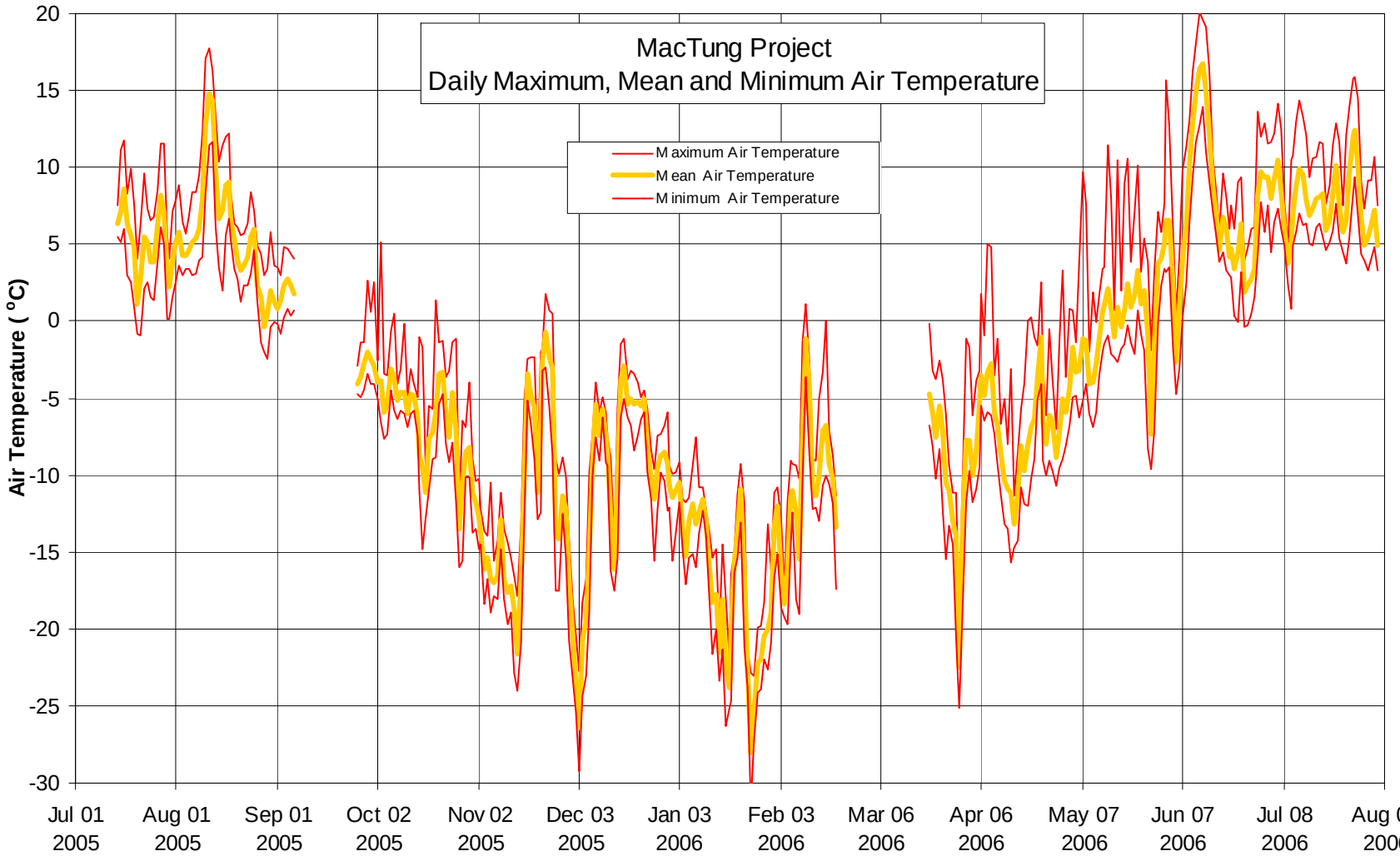
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
APRIL 2006

FIG. 3.3

Wed Oct 25 12:59:00 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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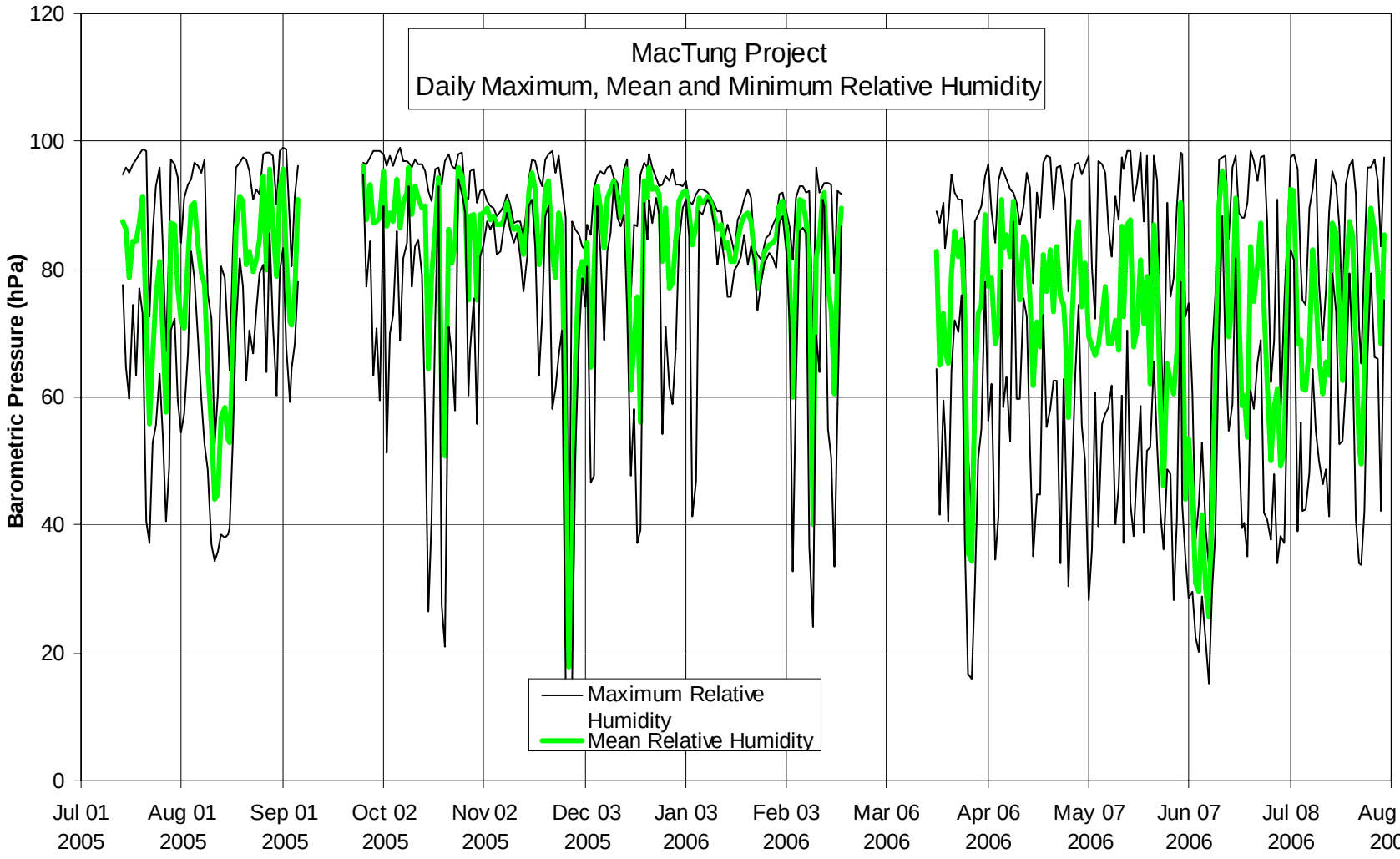
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

DAILY MAXIMUM, MEAN AND MINIMUM AIR TEMPERATURE - MACTUNG CAMP

FIG. 3.4

EXCEL FILE: Q:\Vancouver\Data\0201-WH\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\MacTung_Daily_Met_Summary.xls



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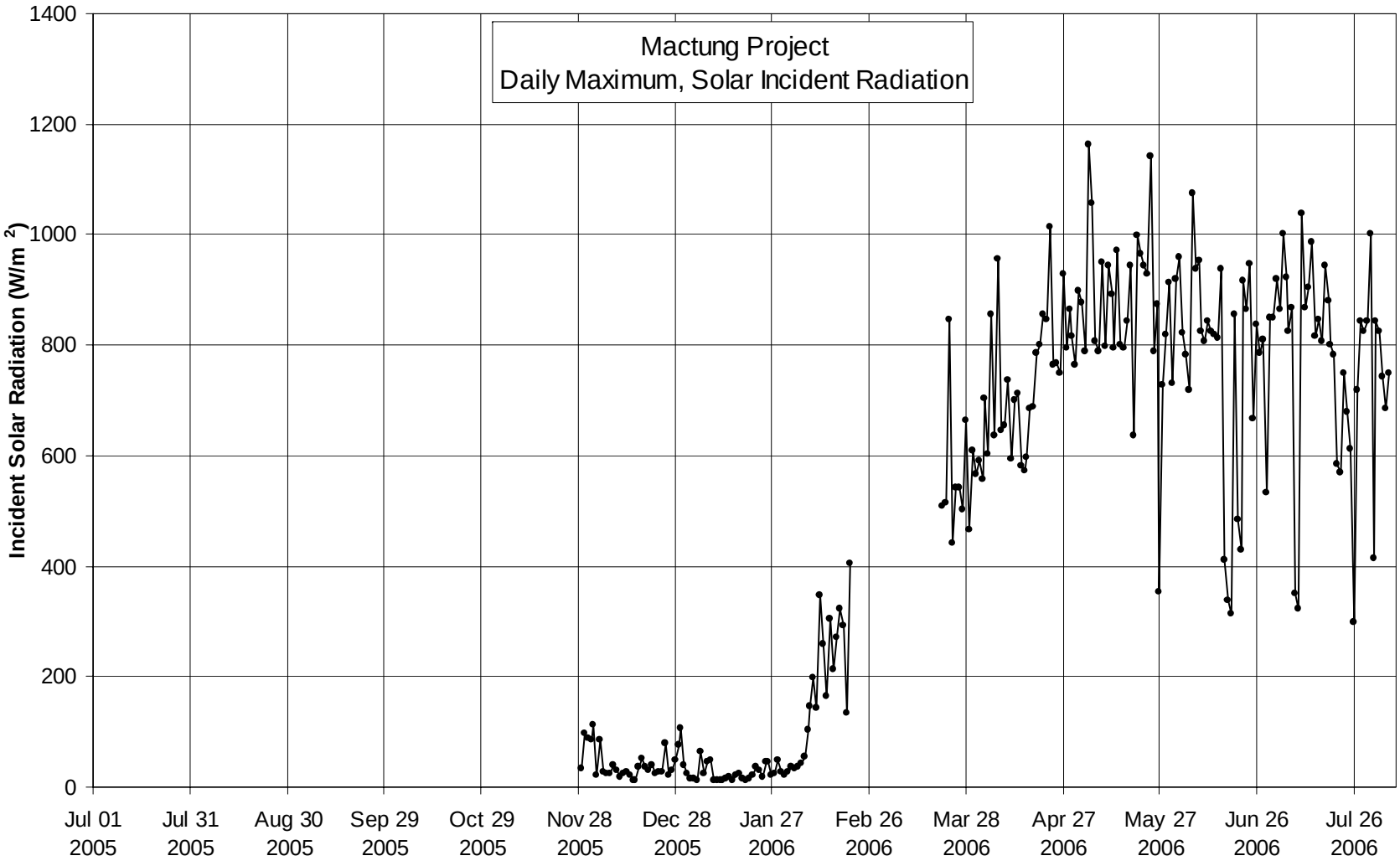
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

DAILY MAXIMUM, MEAN AND MINIMUM RELATIVE HUMIDITY - MACTUNG CAMP

FIG. 3.5

EXCEL FILE: Q:\Vancouver\Data\0201-WH\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\MacTung_Daily_Met_Summary.xls



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2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

MAXIMUM DAILY INCIDENT SOLAR RADIATION
RADIATION - MACTUNG CAMP

FIG. 3.6

EXCEL FILE: Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\MacTung_Daily_Met_Summary.xls

TABLES

TABLE 1.0
2006 HYDROMETEOROLOGICAL SURVEY

Hydrometeorological Station Geographic Coordinates

Station	Longitude			Latitude			Elevation
	º	'	"	º	'	"	m (asl)
Site 1 - Tributary A Hydrometric Station	130	17	19.0	63	17	22.6	1133
Site 2 - Dale Creek Hydrometric Station	130	1	36.8	63	16	44.7	1355
MET - MacTung Camp Meteorological Station	130	8	50.3	63	16	50.2	1860
MACPAS - MSC MacMillan Pass Meteorological Station	130	2	7.1	63	14	36.9	1379

Note: GPS coordinates datum is NAD27

TABLE 2.0
2006 HYDROMETEOROLOGICAL SURVEY

Summary of Collected Discharge Measurements
Site 1 - Tributary A

Date/time MDST	Staff Gauge Reading m	Logger stage m	Discharge m^3/s
Jul 10/06 16:41	0.450	0.299	4.56
Jul 10/06 17:25	0.450	0.298	4.55
Aug 04/06 13:12	0.398	0.266	3.45
Aug 04/06 13:46	0.398	0.263	3.51
Aug 05/06 09:39	0.385	0.242	3.26
Aug 05/06 10:18	0.385	0.241	3.20
Aug 05/06 11:30	0.385	0.240	3.18
Aug 06/06 09:47	0.373	0.227	2.96
Aug 06/06 10:24	0.370	0.227	2.93
Sep 19/06 11:27	0.334	0.186	2.23
Sep 19/06 12:23	0.335	0.189	2.26
Sep 19/06 13:10	0.334	0.190	1.92
Sep 19/06 13:46	0.334	0.194	2.22
Sep 20/06 15:19	0.329	0.173	2.17
Sep 20/06 15:49	0.329	0.175	2.10

Site 1 - Tributary C

Date/time MDST	Staff Gauge Reading m	Logger stage m	Discharge m^3/s
Aug 06/06 11:22	n/a	n/a	0.78
Aug 06/06 11:43	n/a	n/a	0.78
Sep 19/06 14:30	n/a	n/a	0.57
Sep 19/06 14:51	n/a	n/a	0.53
Sep 20/06 16:24	n/a	n/a	0.45

TABLE 2.1
2006 HYDROMETEOROLOGICAL SURVEY

Summary of Collected Discharge Measurements
Site 2 - Dale Creek

Date/time MDST	Staff Gauge Reading m	Logger stage m	Discharge m^3/s
Jul 10/06 20:07	0.345	0.491	2.10
Jul 10/06 21:02	0.345	0.488	1.97
Aug 04/06 10:52	0.304	0.472	1.91
Aug 04/06 11:24	0.302	0.476	1.72
Aug 05/06 14:04	0.268	0.424	1.21
Aug 05/06 14:32	0.267	0.430	1.19
Aug 05/06 15:25	0.265	0.424	1.20
Aug 06/06 15:11	0.259	0.410	1.17
Aug 06/06 15:53	0.259	0.414	1.20
Aug 07/06 09:16	0.255	0.417	1.08
Aug 07/06 09:48	0.254	0.421	1.07
Sep 19/06 16:12	0.213	0.363	0.69
Sep 19/06 16:50	0.213	0.369	0.66
Sep 19/06 17:25	0.213	0.368	0.71
Sep 19/06 18:00	0.212	0.372	0.66
Sep 20/06 13:12	0.212	0.362	0.67
Sep 20/06 13:37	0.212	0.365	0.69

APPENDIX A
HYDROMETEOROLOGICAL
SITE DESCRIPTIONS

Station Name: **MacMillan Pass**
Station Coordinates (NAD27): North 63° 14' 36.9"
West 130° 2' 7.1"
Date of Installation: Feb 1, 1998
Tower Height: 10 m
Site el. above sea level: 1379 m
MSC Climate ID No.: 2100693

Station Description:

This weather station is operated by the Meteorological Services of Canada (MSC). It consists of a 10-m meteorological tower with instrumentation to measure hourly values for wind speed and direction, air temperature, relative humidity, barometric pressure and dew point temperature. Other instrumentation mounted at ground level record daily totals for rainfall, snowfall, total precipitation and snow depth. The station is powered by 12 Vdc batteries and uses a solar panel for charging augmented by a 12 Vdc wind powered generator.

Station Location:

The station is located in MacMillan pass about 7 km southwest from the MacTung camp site. It is in the Northwest Territories near the boarder between the Yukon and Northwest Territories. The station is approximately 25 m north of the access road that connected the MacTung Camp to the MacMillan Airstrip.

Installation Notes:

The station is located in a clear area with no nearby trees. The ground cover consists of squat bushes and lichens. The base of the tower is mounted to a concrete base and the top of the tower is further secured using guy wires. The remaining meteorological instruments, not mounted on the tower, are located within a 15 m radius of the tower.

Recorded Data:

The two tables below show examples of the data collected hourly and the 24 hour summary.

15 Minute Record

Date	Time	Air Temperature	Dew Point Temperature	Relative Humidity	Wind Direction	Wind Speed	Barometric Stn Pressure
	(hhmm)	(°C)	(degrees)	(%)	(degrees)	(km/h)	(kPa)
2007/01/28	00:00	-12.4	-13.6	91	21	7	86.44
2007/01/28	01:00	-17.1	-18.9	87	8	7	86.51
2007/01/28	02:00	-14.1	-15.4	90	5	4	86.57

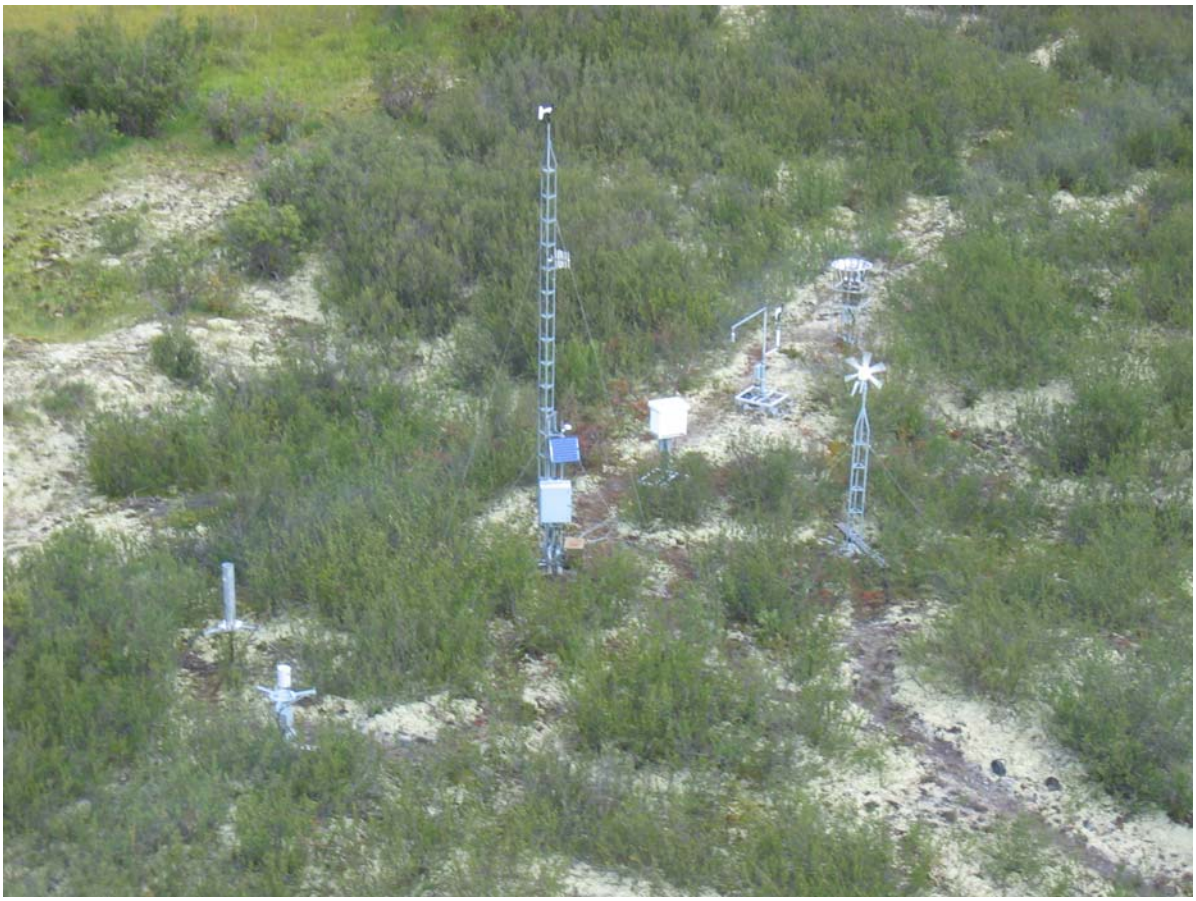
Daily Summary

Date	Maximum Air Temperature (^{o}C)	Minimum Air Temperature (^{o}C)	Mean Air Temperature (^{o}C)	Heat Deg Days (C)	Cool Deg Days (C)	Total Rain (mm)	Total Snow (cm)	Total Precip-itation (mm)	Snow on Ground (cm)	Direction of Maximum Wind Gust (10's Deg)	Speed of Maximum Wind Gust (km/h)
Jan 4/07	-6.8	-14.3	-10.6	28.6	0.0	M	M	1.2	74	23	63
Jan 5/07	-14.1	-23.4	-18.8	36.8	0.0	M	M	1.7	58	25	32
Jan 6/07	-16.9	-23.6	-20.3	38.3	0.0	M	M	0.3	58		<31

Meteorological Station Instrumentation Parameters

Instrument	Model	Measuring Range	Sensitivity/Accuracy
Wind monitor (Two units installed for the station)	05103-10 R.M. Young	0 to 60 m/s 0 to 100 m/s gusts	±0.3 m/s accuracy 1.0 m/s threshold wind
		0 to 355 degrees	±1.4°
Relative humidity / air temperature probe	HMP45C Vaisala	Relative humidity 0.0 to 100	Accuracy at 20 ^{o}C ±2% RH (10-90% RH) ±3% RH (90-100% RH)
		Air temperature -40° to +60°C	± 0.4 ^{o}C Accuracy at 20 ^{o}C
Barometric pressure	SBP270 Setra	800 – 1100 mbar	± 0.2 mbar accuracy ±0.1% long term stability
Tipping bucket rain gauge	TB3 Hydrological Services Pty.	0 to 700 mm/hr	± 3% accuracy (25-500 mm/hr) 0.25 mm resolution
All weather precipitation gauge	Pluvio Ott Hydrometrie	0 to 250 mm then needs to be drained	0.25 mm resolution 0.04 mm accuracy
Snow depth sensor	SR50-45 Sonic Ranger 50KHz	0.5 to 10 metres	±1.0 cm accuracy or ± 0.4% of distance to target (whichever is greater)
Soil temperature	107B	-35° to +50°C	Less than ±0.4 ^{o}C

Photograph of the MSC MacMillan Pass Meteorological Station:



Station Name: **Met - MacTung Station**
Station Coordinates (NAD27): North 63° 16' 50.2"
West 130° 8' 50.3"
Magnetic deviation: 26.47° or TN=333.53° mag.
Date of Installation: Jul. 15/05
Tower Height: 3 m
Site elevation above sea level: 1860 m
North alignment pole set 333.53° mag.

Station Description:

This weather station consists of a standard 3-m meteorological tower with instrumentation to measure wind speed and direction, air temperature, relative humidity, soil temperature and a pyranometer for incident solar radiation. The station is powered by a 12 Vdc 8.5 Ahr battery with a 20-watt solar panel for charging. Data is recorded to a Campbell Scientific CR10X data logger. The data collection cycle is 5 seconds and the data is averaged over the 15 minute archiving period and saved to the logger memory. Station memory capacity exceeds one year of data at the current sampling rate.

Station Location:

The station is located on the MacTung property in a clearing overlooking MacMillan Pass. It is approximately 50 metres south of the MacTung camp site.

Installation Notes:

The tripod tower was fixed to the ground by stakes and then large boulders were placed on each of the tripod legs to further secure the tower. There are no wind obstructions within 50 metres of the station.

Recorded Data:

The two tables below show examples of the data array collected every 15 minutes as well as a 24 hour summary of the day's maximums and minimums.

15 Minute Record

Date	Time	Wind Speed	Wind Direction	SD Wind Direction	Air Temp	Relative Humidity	Pyrano-meter	Soil Temp
	(hhmm)	(m/s)	(degrees)	(degrees)	(°C)	(%)	W/m^2	(°C)
2005/07/14	1645	1.390	213.5	22.35	7.29	91.1	197.44	6.705
2005/07/14	1700	1.231	181.9	39.65	7.55	88.0	208.40	6.742
2005/07/14	1715	1.399	203.1	28.11	7.56	90.5	307.21	6.787

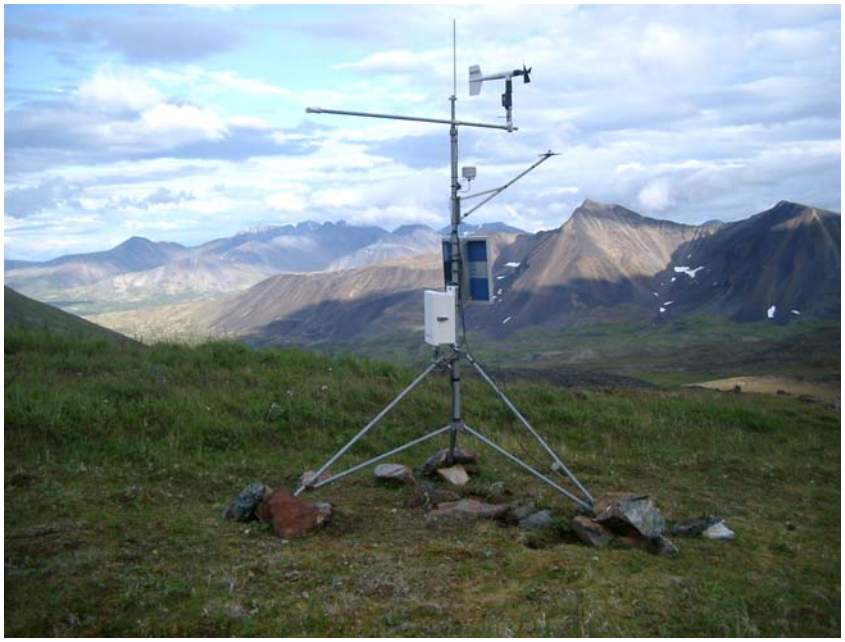
Daily Summary

Date / Time	Hour	Wind Speed	Maximum Logger Box Temperature	Minimum Logger Box Temperature	Minimum Battery Voltage	Station ID
	(hhmm)	(m/s)	(°C)	(°C)	(Vdc)	
14-Jul-05	2400	5.604	11.14	4.844	12.72	3
15-Jul-05	2400	5.243	13.23	4.741	12.66	3
16-Jul-05	2400	7.12	13.98	5.965	12.69	3

Meteorological Station Instrumentation Parameters

Instrument	Model	Measuring Range	Sensitivity/Accuracy
Wind Monitor	05103-10 R.M. Young	0 to 60 m/s 0 to 100 m/s gusts	Accuracy ±0.3 m/s Threshold wind = 1.0 m/s
		0 to 355 degrees	±1.4°
Relative Humidity / Air Temperature Probe	CS500-U Vaisala	Relative Humidity 0.0 to 100	Accuracy at 20 °C ±3% RH (10-90% RH) ±6% RH (90-100% RH)
		Air Temperature -40° to +60°C	Accuracy at 20 °C ± 0.4 °C
Pyranometer	LI200S LI-COR	Spectral Waveband. 400-1100 nm	1.0% Linearity (at 3000 W/m^2) 2.0% Non stability (% change/year)
Soil Temperature	107B	-35° to +50°C	Less than ±0.5 °C

Photograph of the MacTung Meteorological Station:



Site Identification: Site: #1 GPS Waypoint: TRIB A Name: Tributary A

Site GPS Coordinates (NAD27): 130° 17' 19.0" Longitude 63° 17' 22.6" Latitude

Site Location:

Site 1, installed on July 8, 2006, is located on Tributary A approximately five km due west of the MacTung camp. The hydrometric station is located on the south-west side of the creek near the left bank approximately 50 m downstream of the junction of Tributary C with Tributary A. Tributary C drains the western portion of the MacTung property and is the discharge of interest for this project. The approximate site elevation is 1133 m above sea level.

Description:

Tributary A is a fast flowing creek with a moderate water surface slope. The reach selected for Site 1 flows to the northwest. The creek is wide (12 m) but shallow (0.4 m maximum depth) at the location of the hydrometric station. The creek bed consists of course gravel and rock with boulder up to 2 metres in diameter.

Instrumentation:

The hydrometric station consists of a PT2X stage recorded with a 5 PSI pressure transducer and a data logger which is housed in a .05 metre by 2.5 metres long galvanized steel pipe bolted to a large boulder. The data logger collects both depth of water over the pressure transducer and water temperature at 15-minute intervals. A Water Survey of Canada type staff gauge is mounted less than 1 metre away from the pressure transducer near the bank. The flow gauging station is located about 15 metres upstream from the hydrometric station in an area of the creek where there are no large boulders impeding the flow.

Specifics on Measurements:

1133.000 m Sea level, benchmark elevation at the site (approximate)
1132.148 m sea level, elevation of zero reading on staff gauge
1132.300 m sea level, elevation of zero reading on pressure transducer
0.852 m difference in elevation from staff gauge zero reading to BM
0.700 m difference in elevation from pressure transducer to BM
0.152 m difference from staff gauge zero to transducer elevation
2620031 Serial number of the pressure transducer / data logger

Photographs of the Yukon Creek Site:

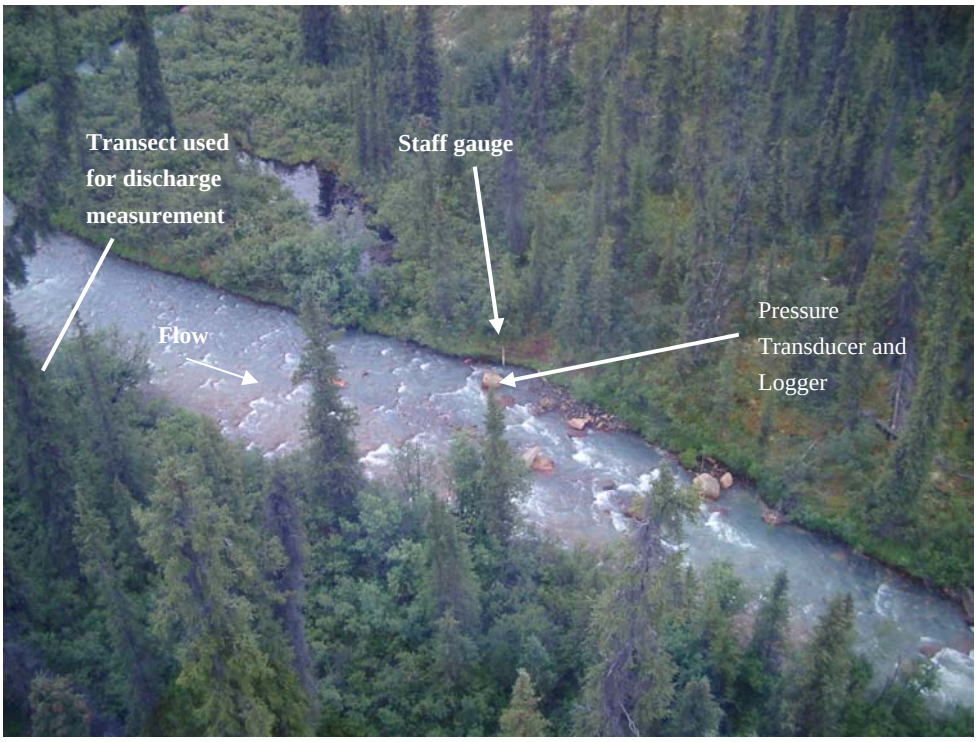


Photo A: Aerial view of the Tributary A hydrometric station

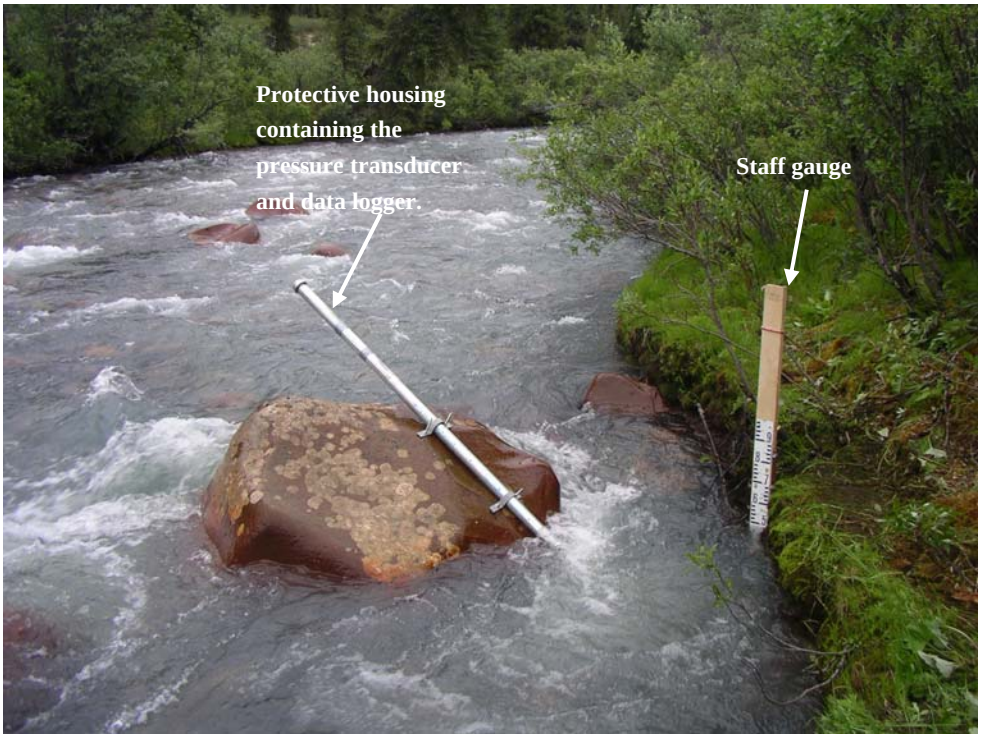


Photo B: View looking upstream at the Tributary A hydrometric station

Site Identification: Site: #2 GPS Waypoint: DALECR Name: Dale Creek

Site GPS Coordinates (NAD27): 130° 01' 36.8 " Longitude 63° 16' 44.7 " Latitude

Site Location:

Site 2, installed on July 10, 2006, is located on Dale Creek in the NWT. The hydrometric station is located 6 km east of the Mactung camp, downstream of the junction of the two branches of Dale Creek. Creek flow at this location is toward the east. The approximate site elevation is 1355 m above sea level.

Description:

The reach of Dale Creek where the station is installed has a gentle surface water slope. The creek is approximately 5 metres wide with a maximum depth of 0.5 m. The creek bed consists of gravel with small to medium size boulders up to 0.2 metre in diameter.

Instrumentation:

The hydrometric station includes a PT2X stage recorder consisting of a 5 PSI pressure transducer and a data logger which is housed in a .05 metre by 2.5 metres long galvanized steel pipe bolted to rock on the bank of the creek. The data logger collects both the depth of water over the pressure transducer as well as the water temperature at 15-minute intervals. A Water Survey of Canada type staff gauge is mounted approximately 12 m upstream of the pressure transducer. The flow gauging station is located approximately 2 metres downstream from the stage recording station in a portion of the river which is relatively level and has a bed consisting of gravel with no large boulders.

Specifics on Measurements:

1355.000 m sea level, benchmark elevation at the site (approximate)
1353.985 m sea level, elevation of zero reading on staff gauge
1353.500 m sea level, elevation of zero reading on pressure transducer
1.015 m difference in elevation from staff gauge zero reading to BM
1.500 m difference in elevation from pressure transducer to BM
-0.485 m difference from staff gauge zero to transducer elevation
2524014 Serial number of the pressure transducer / data logger

Photographs of the Dale Creek Site:

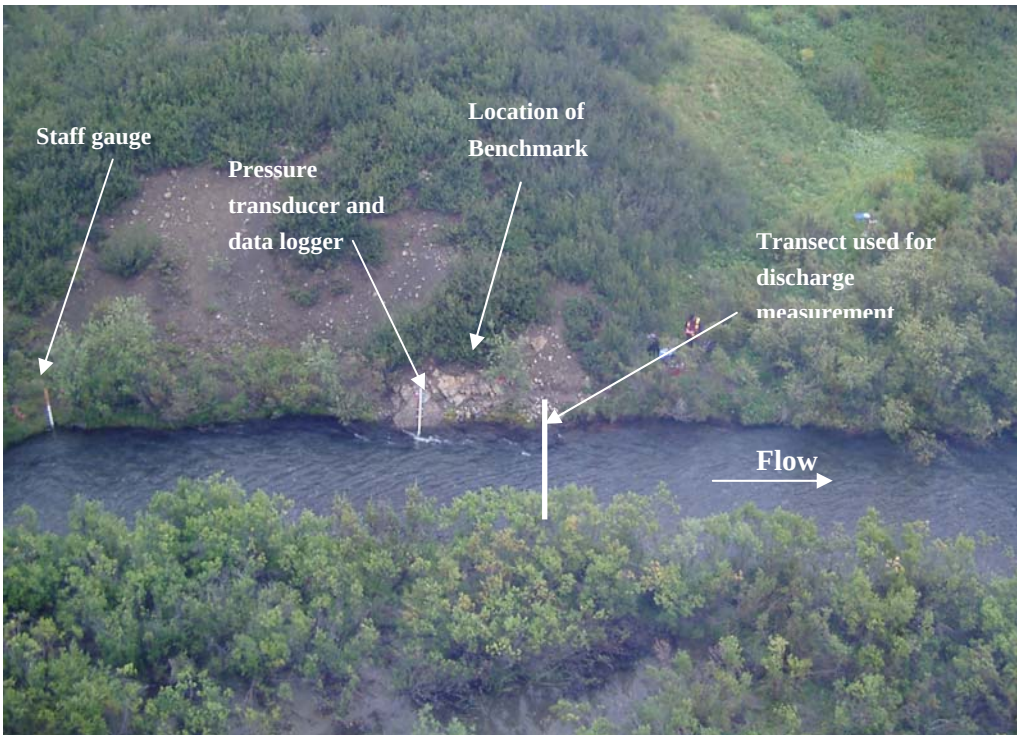


Photo A Aerial view of the Dale Creek hydrometric station.

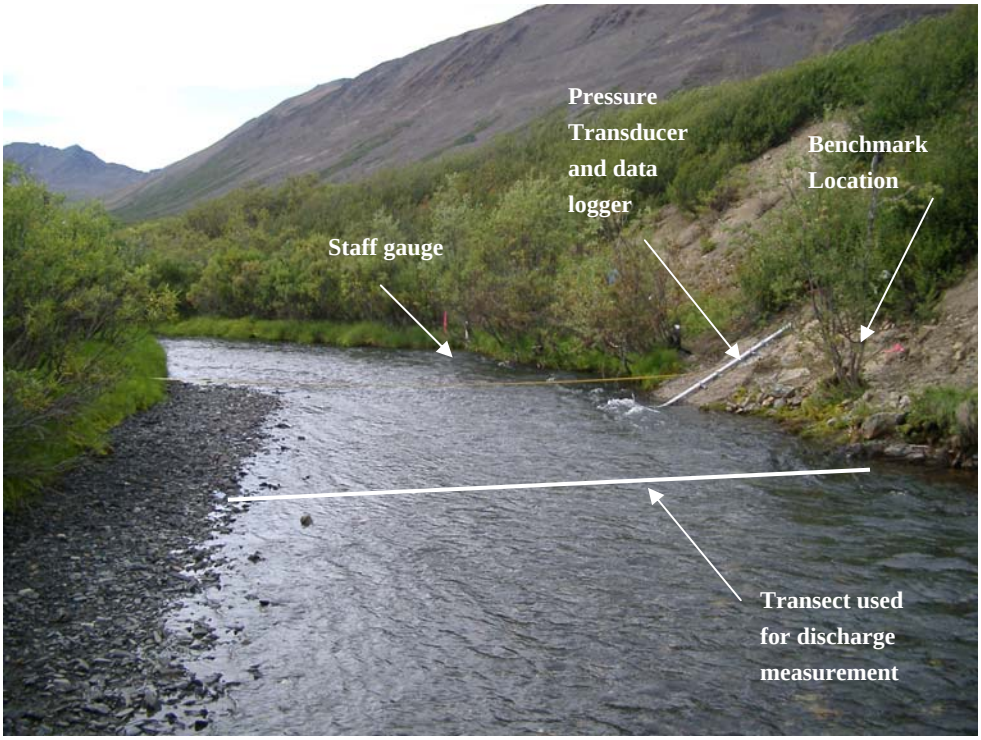
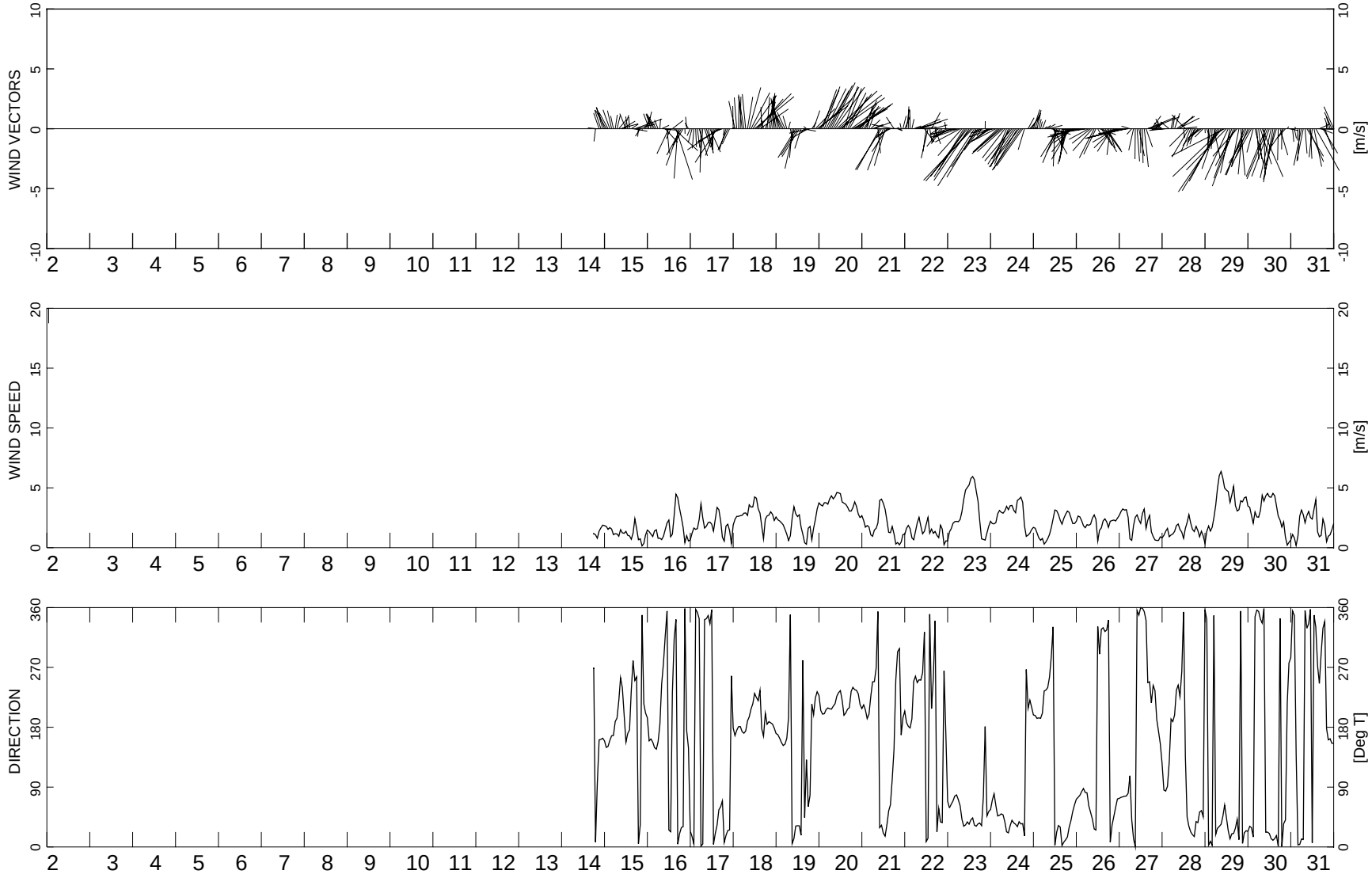


Photo B View looking upstream at the Dale Creek Hydrometric Station

APPENDIX B
MONTHLY WIND SUMMARIES
JULY 2005 TO JULY 2006



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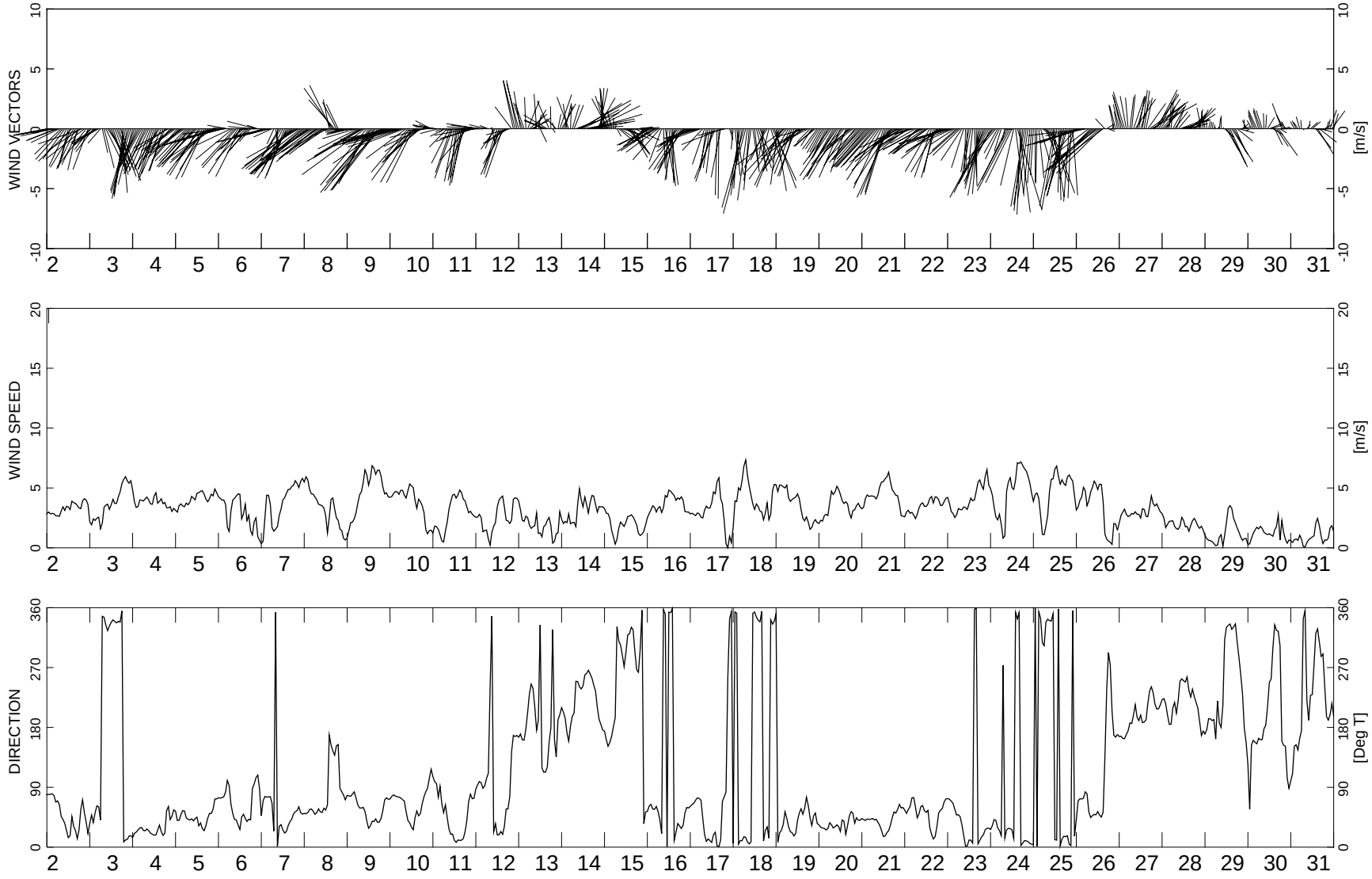
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION
JULY 2005

FIG. B1

Wed Oct 25 12:58:49 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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2006 HYDROMETEOROLOGICAL SURVEY MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION AUGUST 2005

FIG. B2

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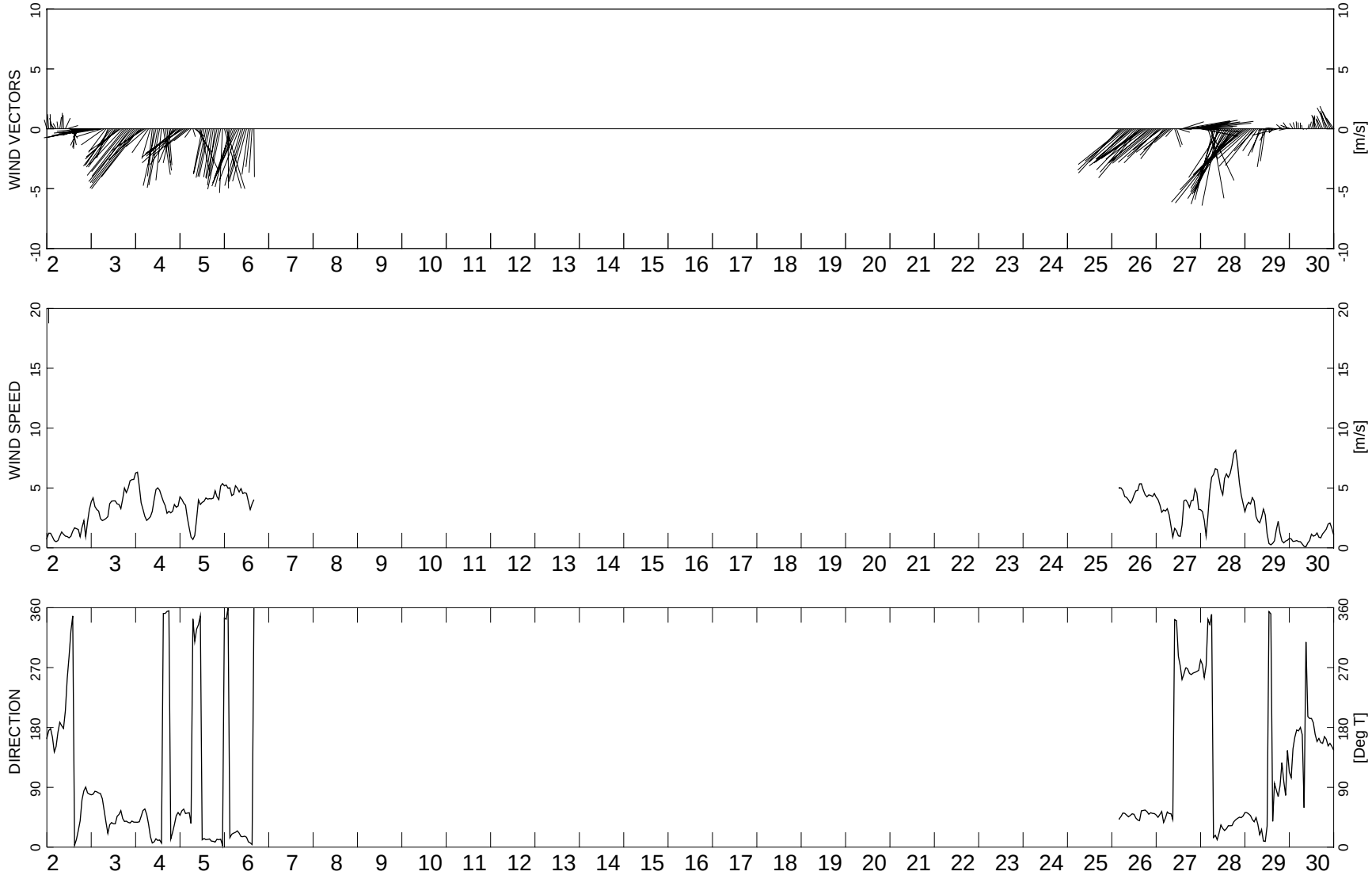

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2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION
SEPTEMBER 2005

FIG. B3

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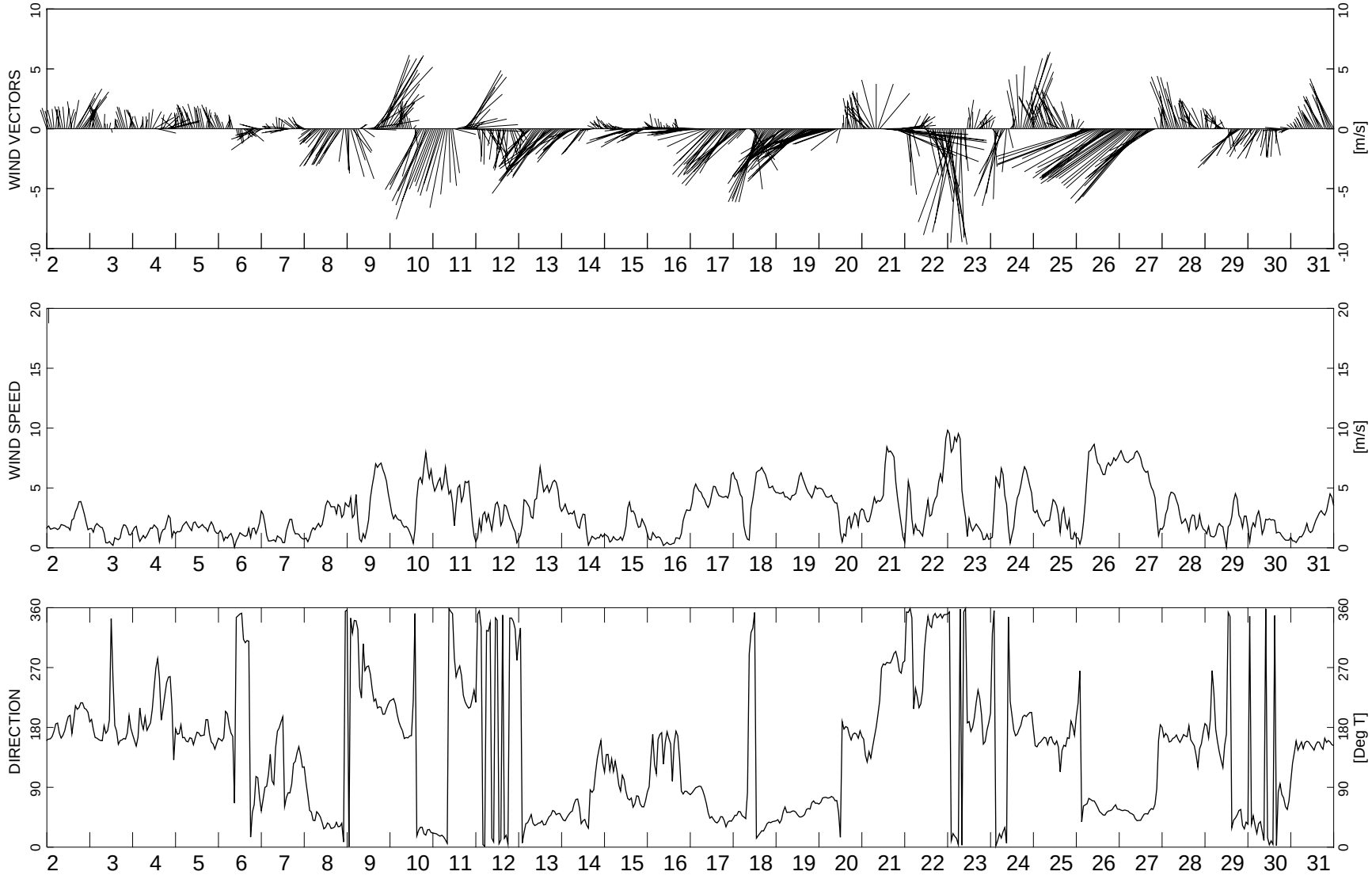

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2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION
OCTOBER 2005

FIG.
B4

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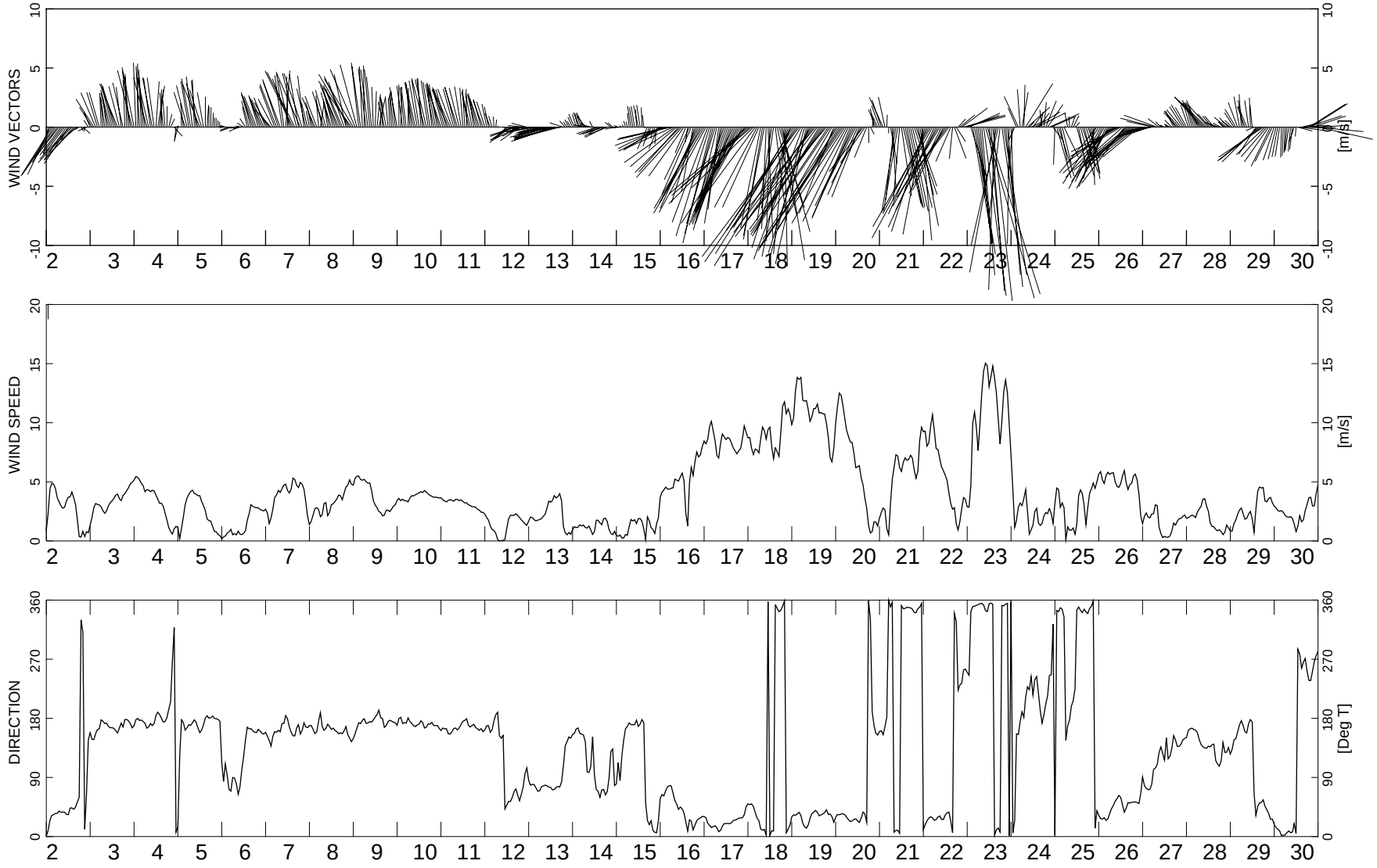

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2006 HYDROMETEOROLOGICAL SURVEY MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION NOVEMBER 2005

FIG. B5

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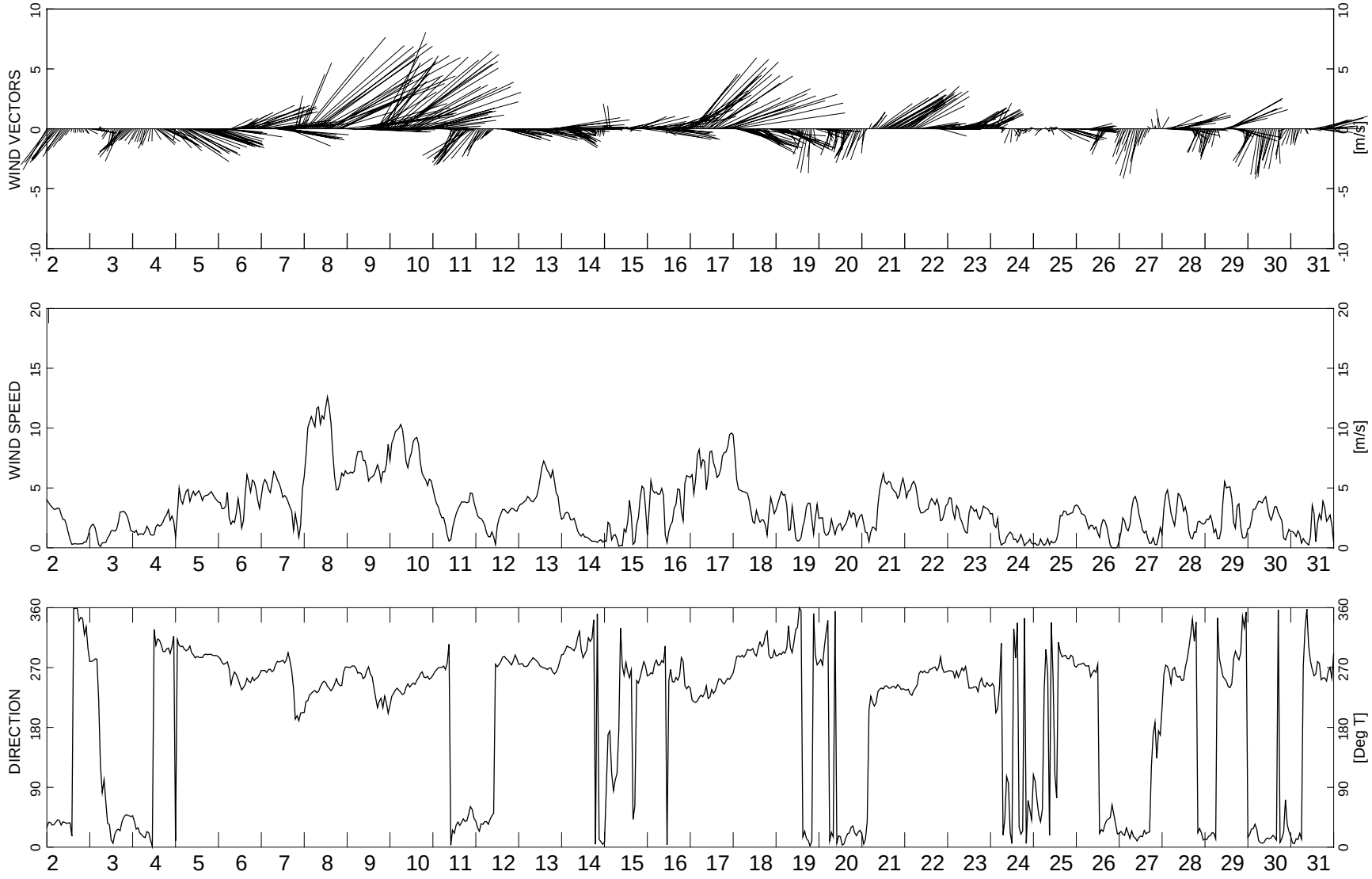

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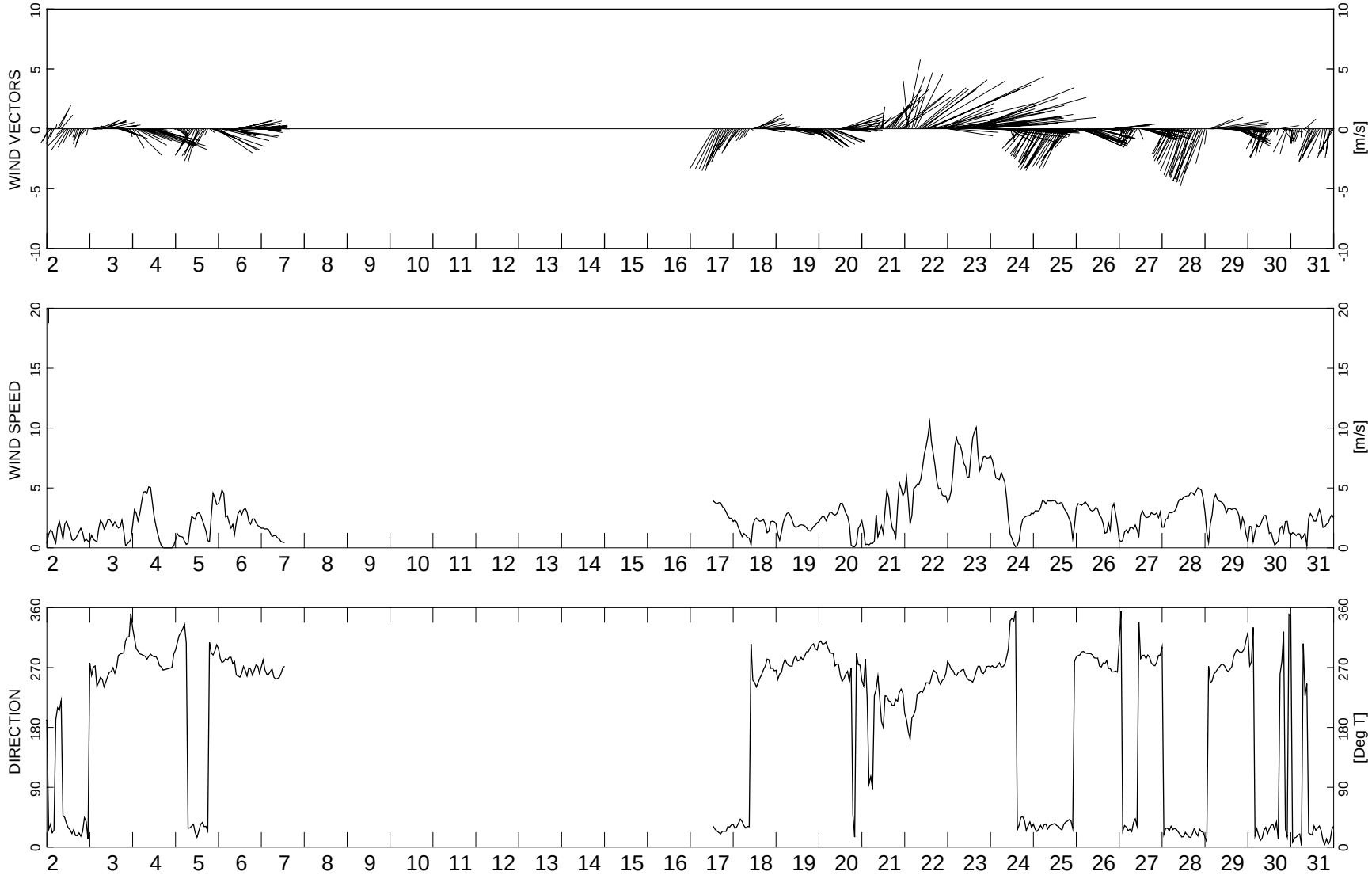
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION
DECEMBER 2005

FIG. B6

Wed Oct 25 12:58:55 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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2006 HYDROMETEOROLOGICAL SURVEY MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION JANUARY 2006

FIG. B7

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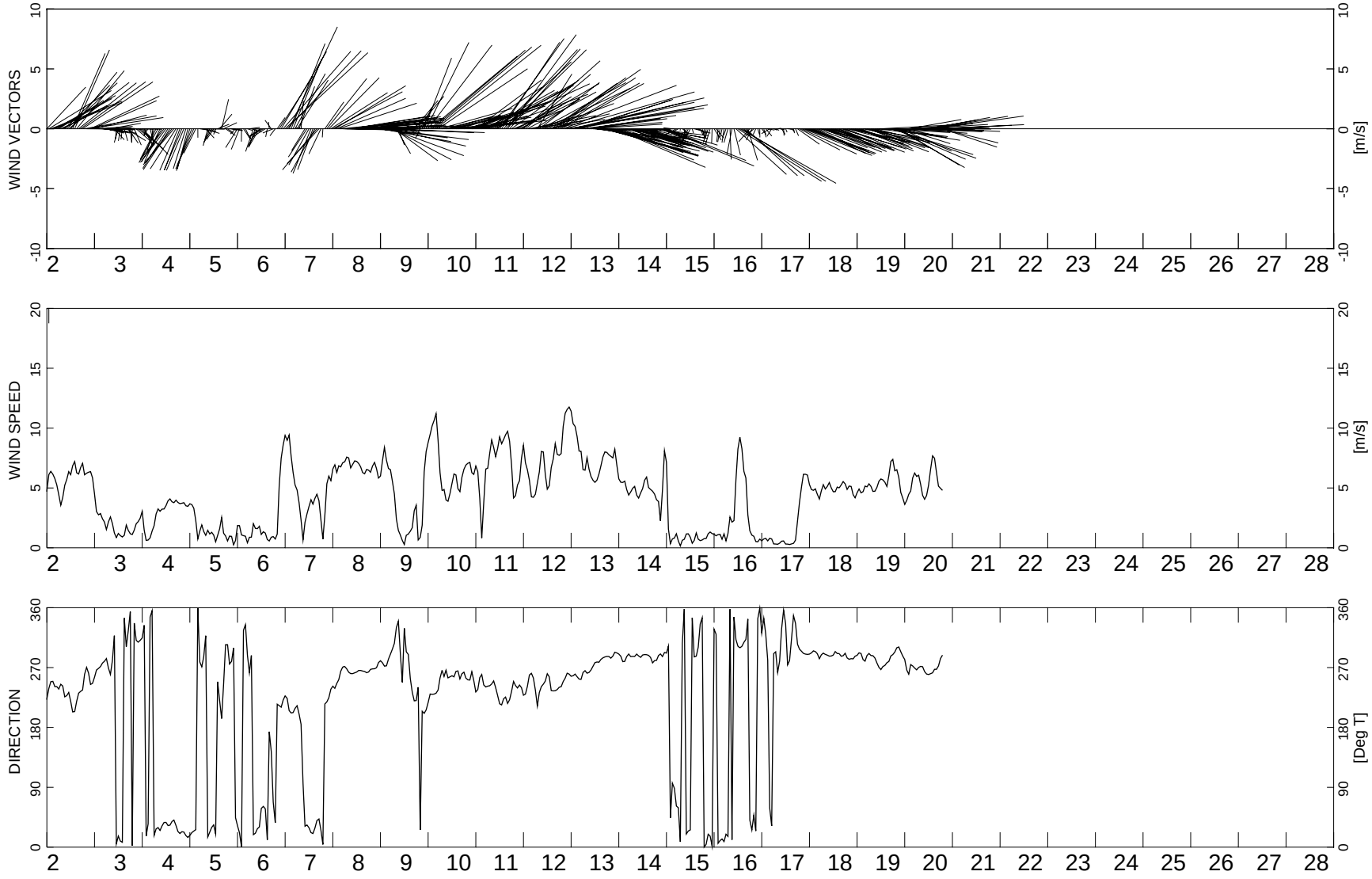

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2006 HYDROMETEOROLOGICAL SURVEY MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION FEBRUARY 2006

FIG. B8

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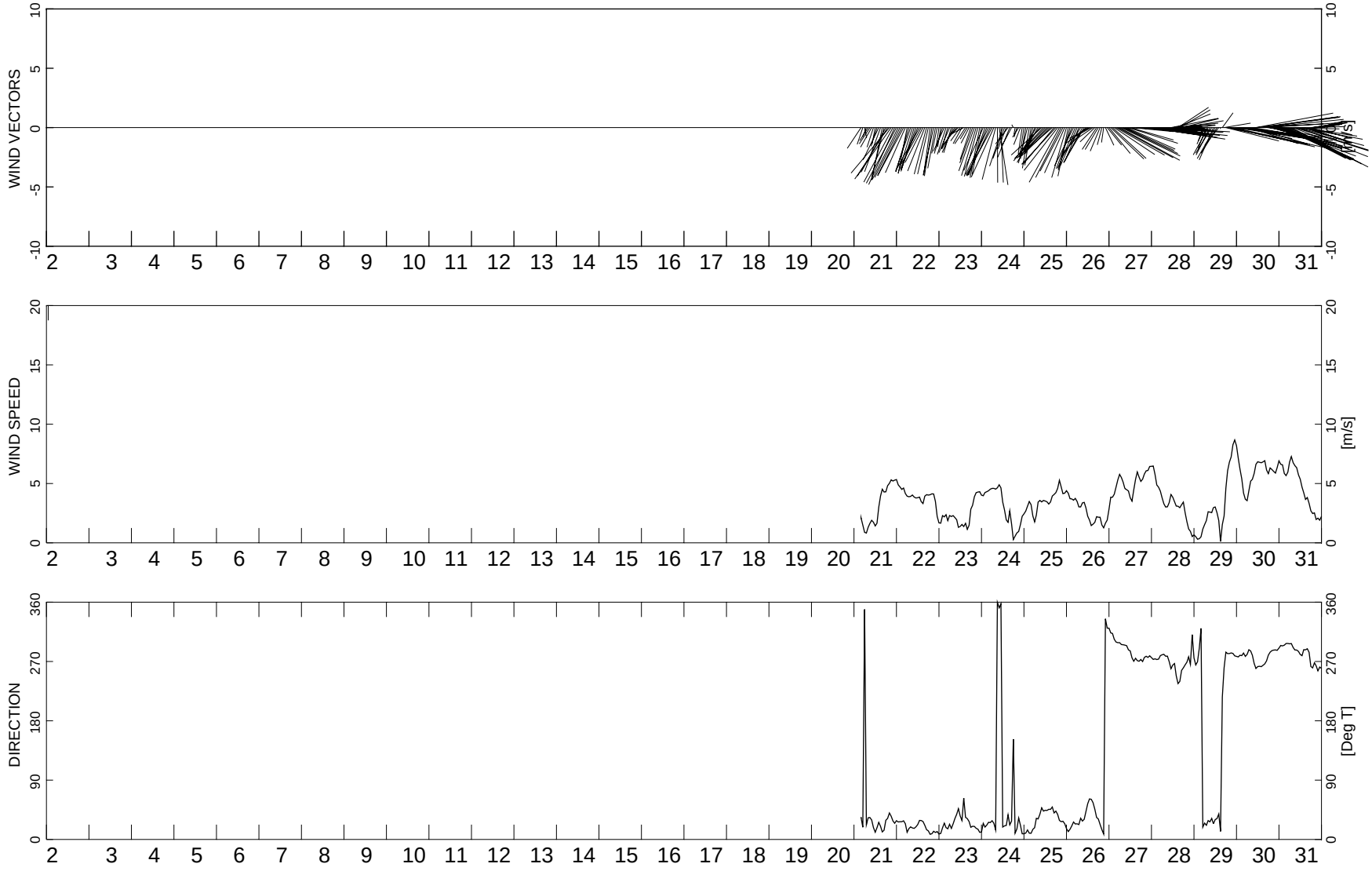

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2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION
MARCH 2006

FIG. B9

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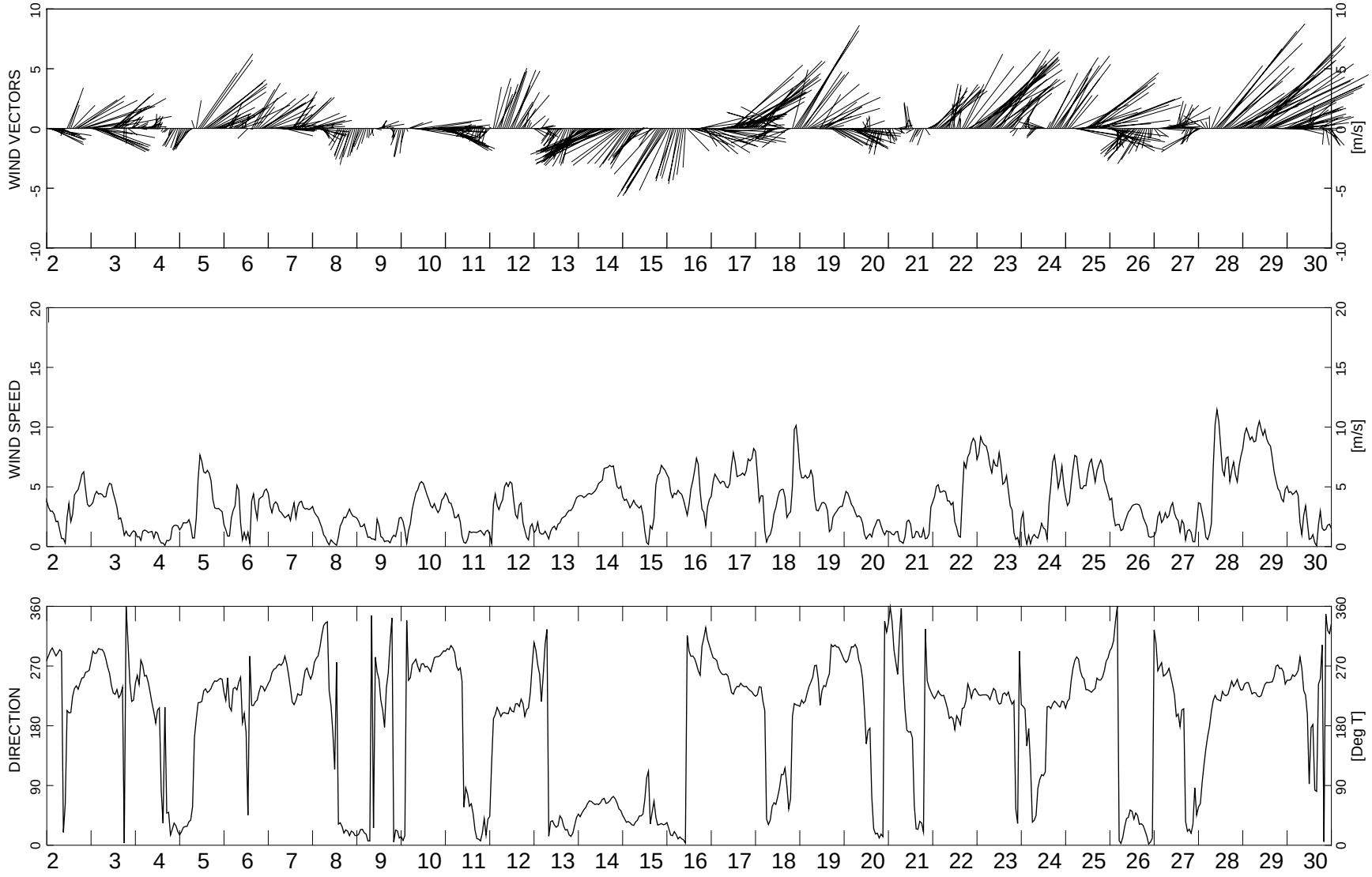

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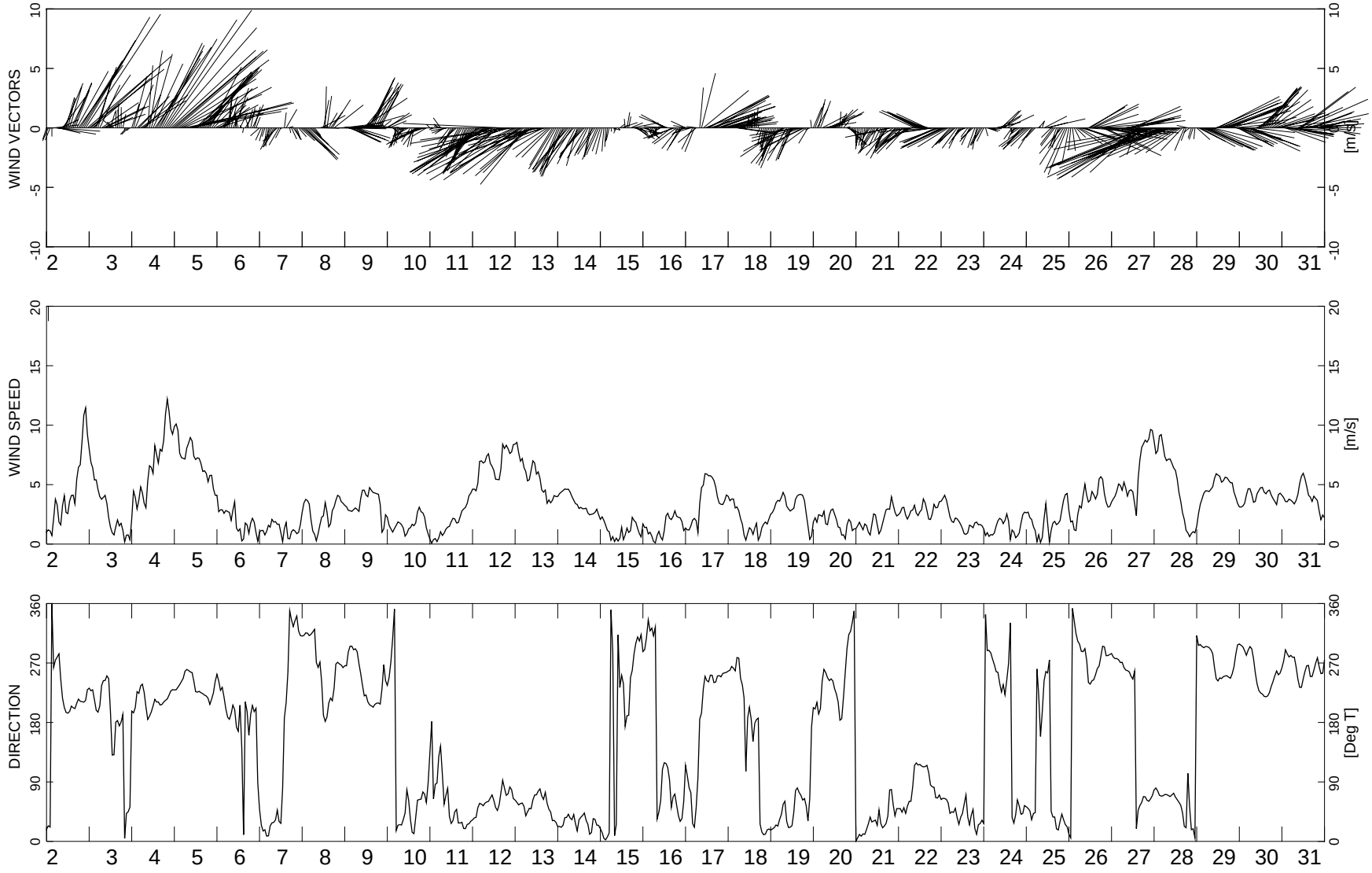
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION
APRIL 2006

FIG.
B10

Wed Oct 25 12:58:59 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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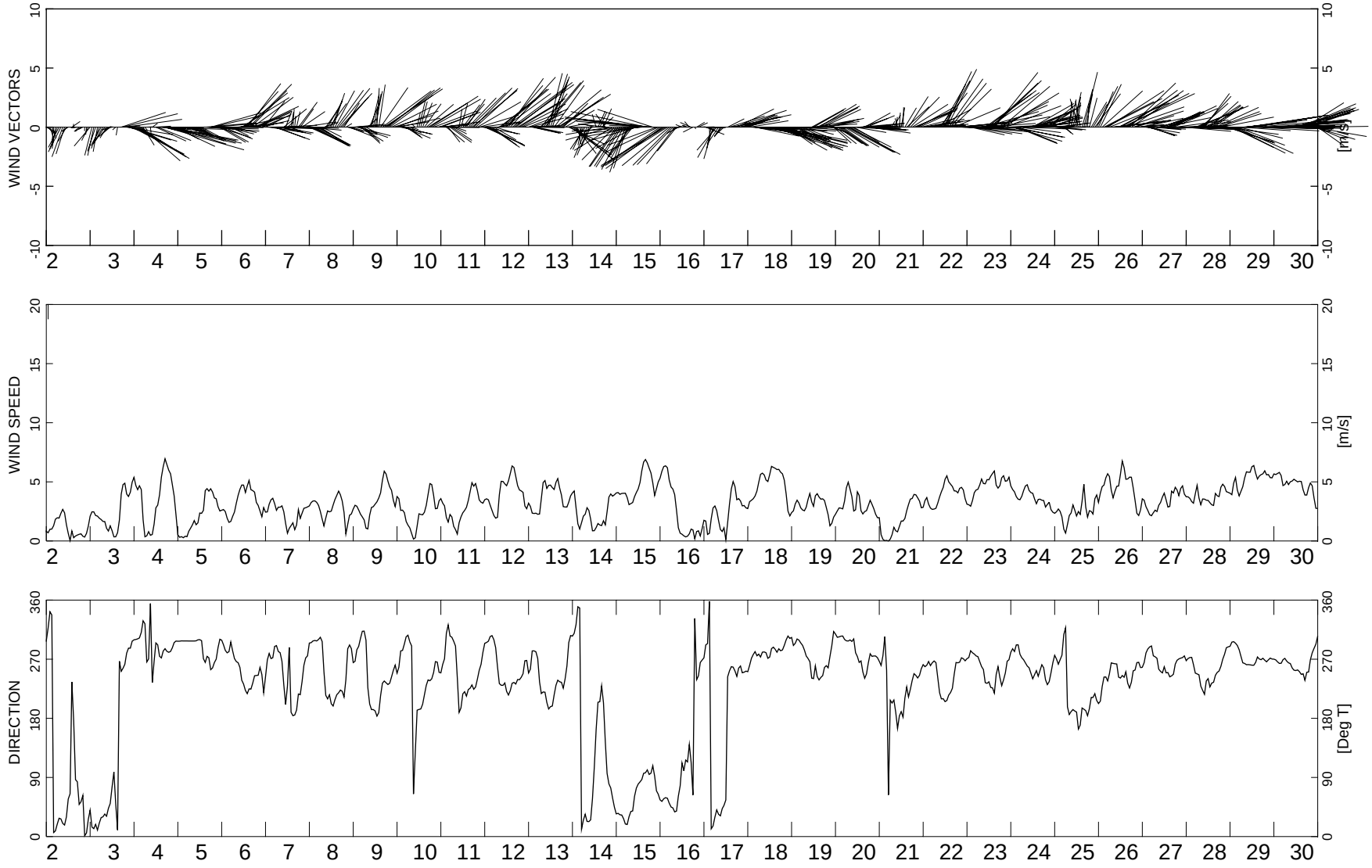
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION
MAY 2006

FIG. B11

Wed Oct 25 12:59:00 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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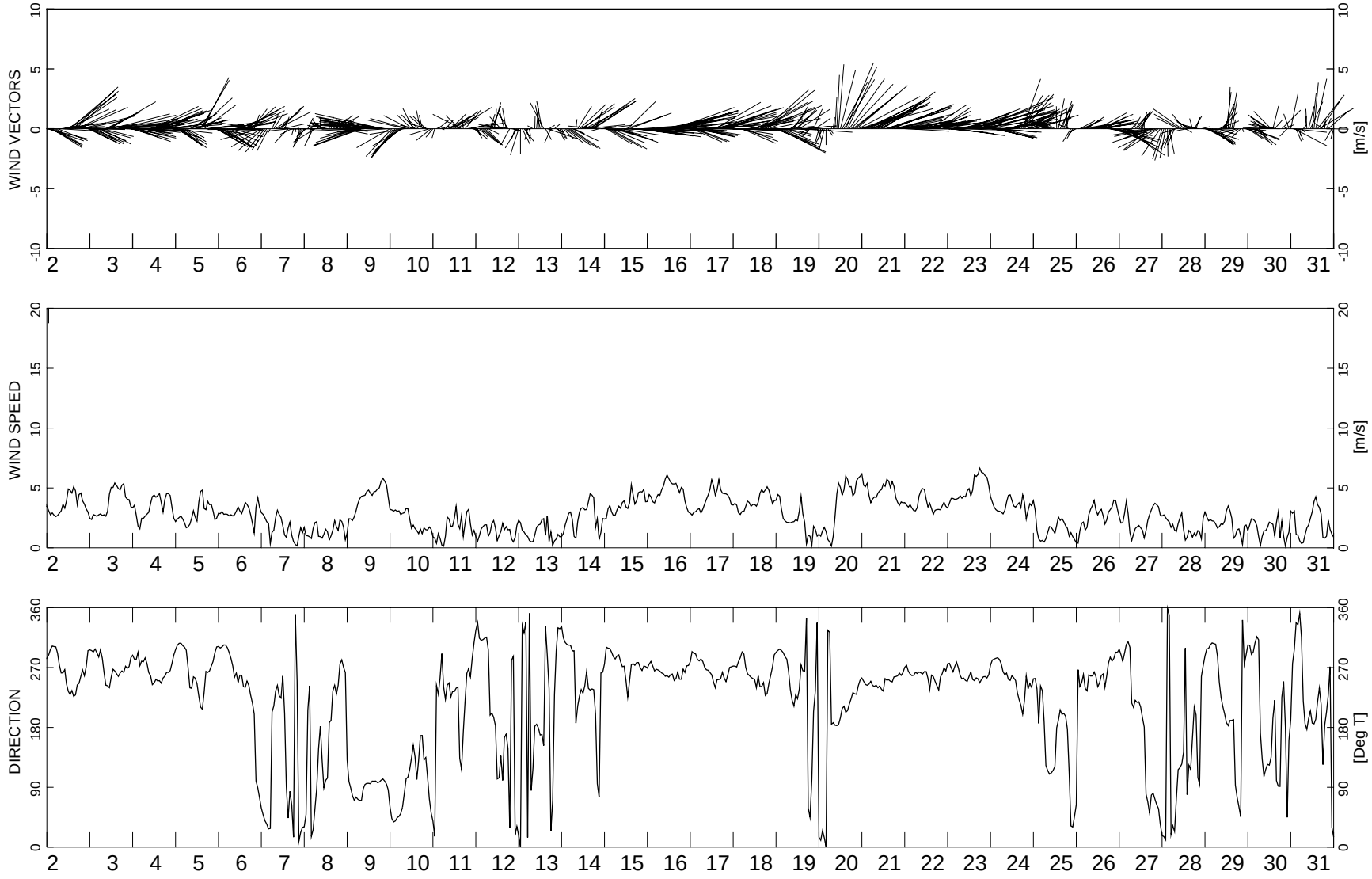
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WIND SPEED AND DIRECTION
JUNE 2006

FIG. B12

Wed Oct 25 12:59:02 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



HAY & COMPANY CONSULTANTS

NORTH AMERICAN TUNGSTON CORP. LTD.

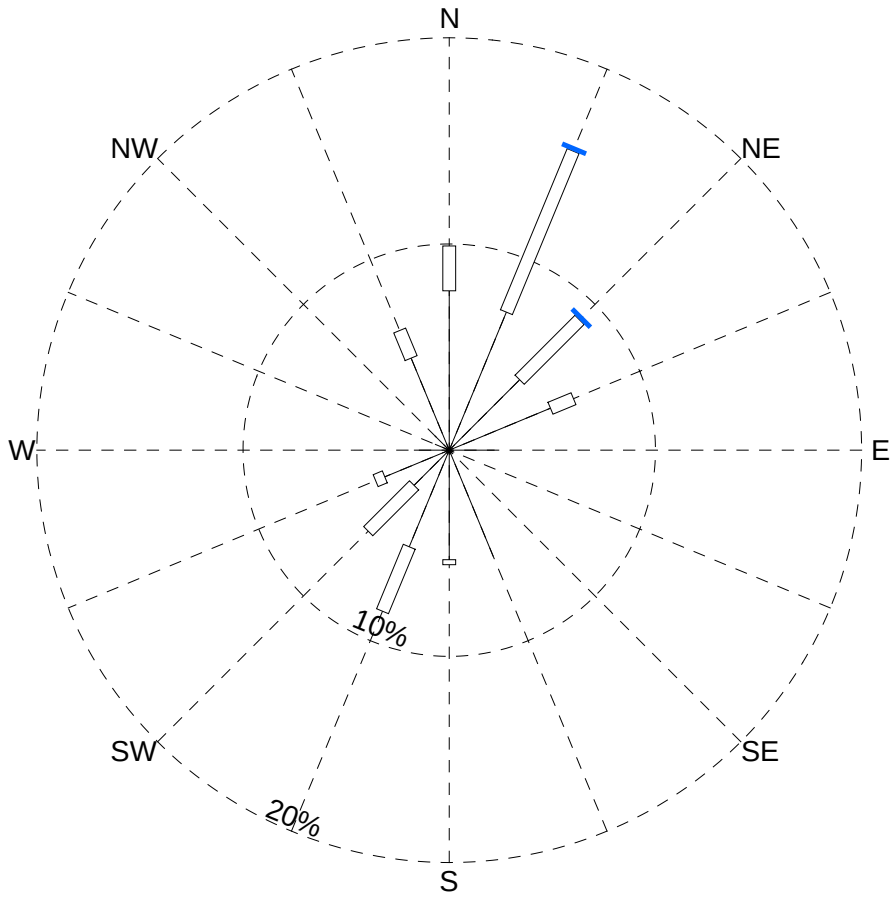
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

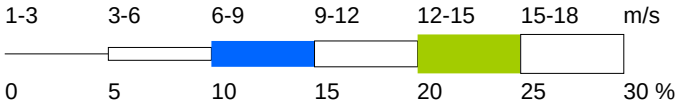
RECORDED WIND SPEED AND DIRECTION
JULY 2006

FIG.
B13

Wed Oct 25 12:59:03 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction

APPENDIX C
SUMMARY OF MONTHLY WIND ROSES
JULY 2005 TO JULY 2006





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 17 days
Start Date: Jul. 14, 2005
End Date: Jul. 31, 2005
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	5.31	1.21	-	-	-	-	-	6.52
NE	-	4.83	4.11	0.24	-	-	-	-	9.18
NNE	-	7.25	8.45	0.24	-	-	-	-	15.94
N	-	7.73	2.17	-	-	-	-	-	9.90
NNW	-	4.83	1.45	-	-	-	-	-	6.28
NW	-	0.97	-	-	-	-	-	-	0.97
WNW	-	0.73	-	-	-	-	-	-	0.73
W	-	1.69	-	-	-	-	-	-	1.69
WSW	-	3.38	0.48	-	-	-	-	-	3.87
SW	-	2.41	3.14	-	-	-	-	-	5.56
SSW	-	5.07	3.38	-	-	-	-	-	8.45
S	-	5.31	0.24	-	-	-	-	-	5.56
SSE	-	5.56	-	-	-	-	-	-	5.56
SE	-	0.24	-	-	-	-	-	-	0.24
ESE	-	0.24	-	-	-	-	-	-	0.24
E	-	2.17	-	-	-	-	-	-	2.17
Calm	17.15	-	-	-	-	-	-	-	17.15
Total (%)	17.15	57.73	24.64	0.48	-	-	-	-	100.00

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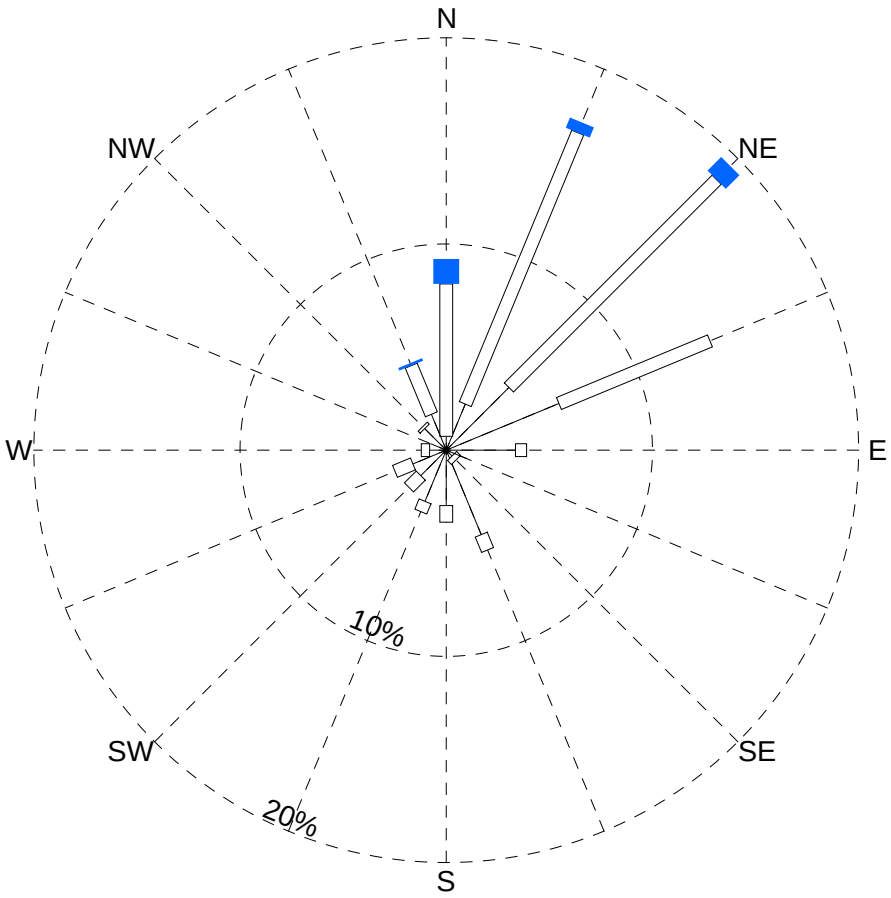
NORTH AMERICAN TUNGSTON CORP LTD

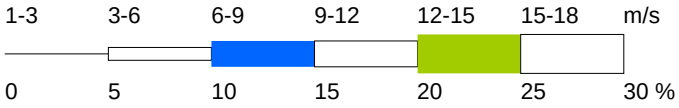
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
JULY 2005

FIG. C1

Fri Oct 13 13:22:27 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Wind_roses





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 31 days
Start Date: Aug. 01, 2005
End Date: Aug. 31, 2005
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	5.91	7.93	-	-	-	-	-	13.84
NE	-	4.30	14.25	0.94	-	-	-	-	19.49
NNE	-	2.42	14.25	0.54	-	-	-	-	17.20
N	-	0.67	7.39	1.21	-	-	-	-	9.27
NNW	-	1.88	2.55	0.13	-	-	-	-	4.57
NW	-	1.48	0.13	-	-	-	-	-	1.61
WNW	-	0.81	-	-	-	-	-	-	0.81
W	-	0.81	0.40	-	-	-	-	-	1.21
WSW	-	1.75	0.94	-	-	-	-	-	2.69
SW	-	1.75	0.81	-	-	-	-	-	2.55
SSW	-	2.69	0.54	-	-	-	-	-	3.23
S	-	2.69	0.81	-	-	-	-	-	3.49
SSE	-	4.43	0.81	-	-	-	-	-	5.24
SE	-	0.40	0.27	-	-	-	-	-	0.67
ESE	-	1.08	-	-	-	-	-	-	1.08
E	-	3.36	0.54	-	-	-	-	-	3.90
Calm	9.14	-	-	-	-	-	-	-	9.14
Total (%)	9.14	36.42	51.61	2.82	-	-	-	-	100.00

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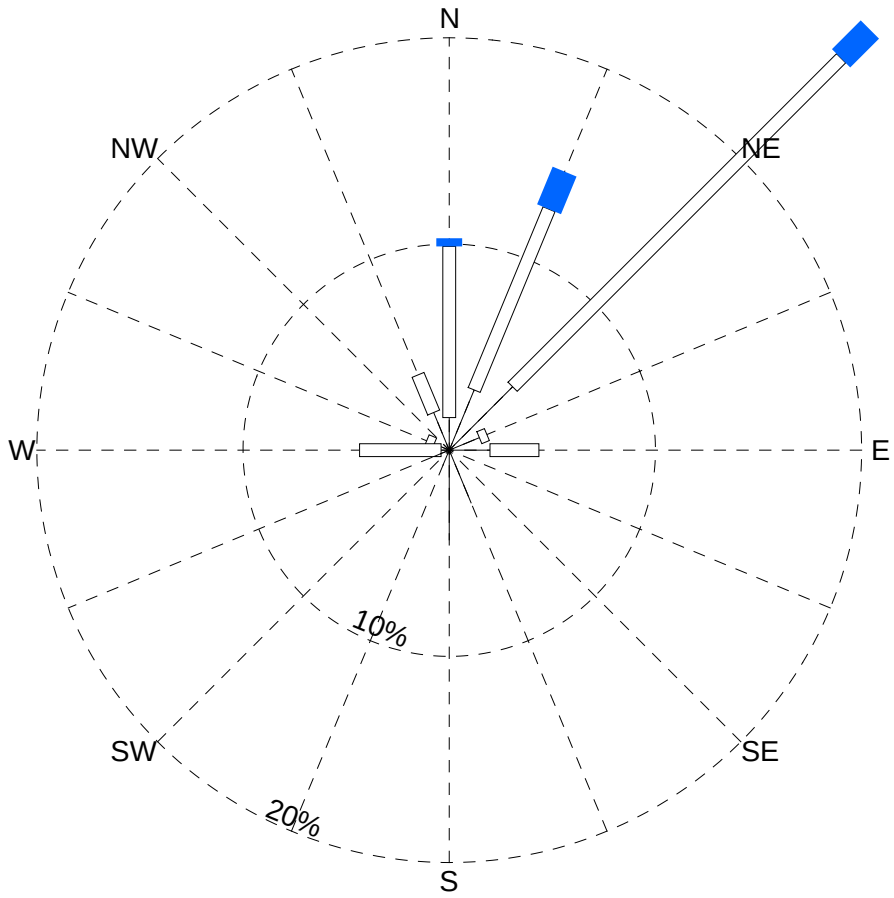
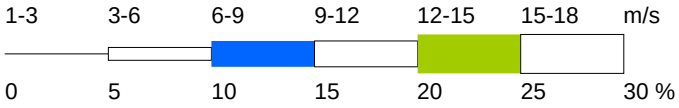
NORTH AMERICAN TUNGSTON CORP LTD

2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
AUGUST 2005

FIG. C2





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 30 days
Start Date: Sep. 01, 2005
End Date: Sep. 30, 2005
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	1.58	0.40	-	-	-	-	-	1.98
NE	-	4.35	22.53	1.98	-	-	-	-	28.85
NNE	-	3.16	9.49	1.98	-	-	-	-	14.62
N	-	1.58	8.30	0.40	-	-	-	-	10.28
NNW	-	1.98	1.98	-	-	-	-	-	3.95
NW	-	0.40	-	-	-	-	-	-	0.40
WNW	-	0.79	0.40	-	-	-	-	-	1.19
W	-	0.40	3.95	-	-	-	-	-	4.35
WSW	-	0.79	-	-	-	-	-	-	0.79
SW	-	-	-	-	-	-	-	-	-
SSW	-	0.79	-	-	-	-	-	-	0.79
S	-	4.35	-	-	-	-	-	-	4.35
SSE	-	2.77	-	-	-	-	-	-	2.77
SE	-	-	-	-	-	-	-	-	-
ESE	-	-	-	-	-	-	-	-	-
E	-	1.98	2.37	-	-	-	-	-	4.35
Calm	21.34	-	-	-	-	-	-	-	21.34
Total (%)	21.34	24.90	49.41	4.35	-	-	-	-	100.00

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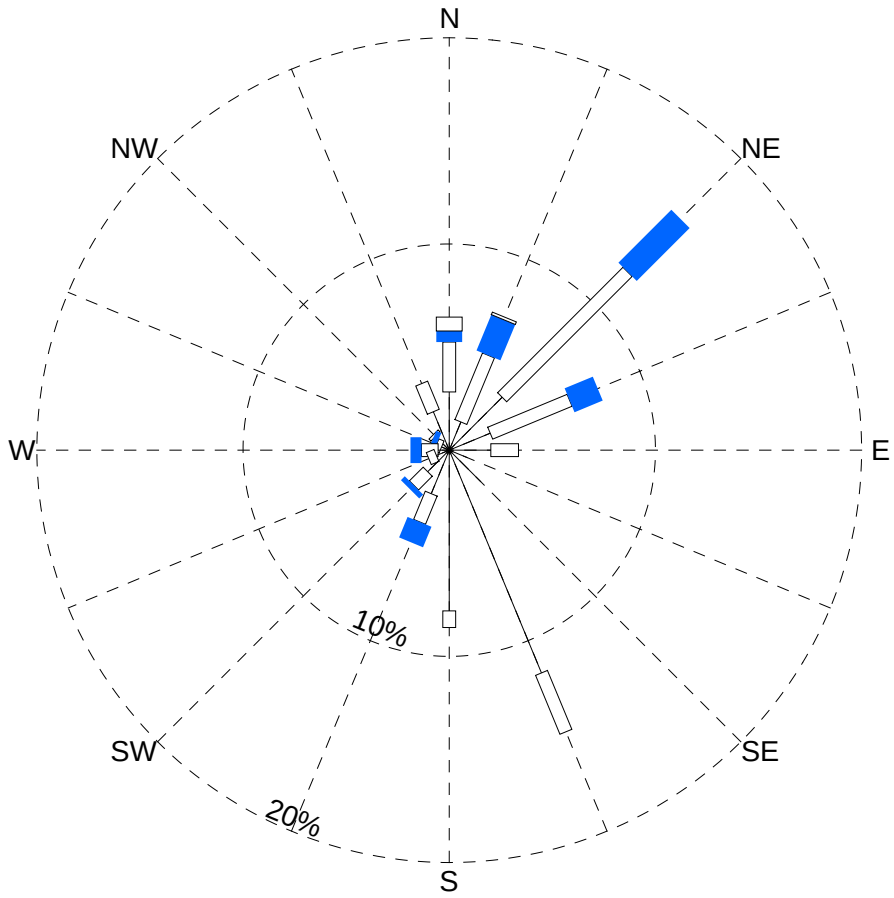
NORTH AMERICAN TUNGSTON CORP LTD

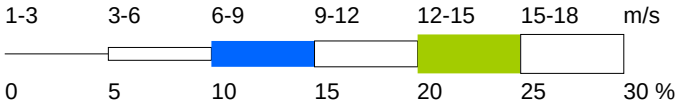
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
SEPTEMBER 2005

FIG. C3

Fri Oct 13 13:22:28 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Wind_roses





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 31 days
Start Date: Oct. 01, 2005
End Date: Oct. 31, 2005
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	2.15	4.17	1.48	-	-	-	-	7.80
NE	-	3.63	8.60	3.63	-	-	-	-	15.86
NNE	-	1.48	3.49	1.88	0.13	-	-	-	6.99
N	-	2.82	2.42	0.54	0.67	-	-	-	6.45
NNW	-	2.02	1.48	-	-	-	-	-	3.49
NW	-	0.94	0.13	-	-	-	-	-	1.08
WNW	-	0.40	0.27	0.27	-	-	-	-	0.94
W	-	0.54	0.81	0.54	-	-	-	-	1.88
WSW	-	0.67	0.40	-	-	-	-	-	1.08
SW	-	1.48	0.94	0.27	-	-	-	-	2.69
SSW	-	2.29	1.48	1.08	-	-	-	-	4.84
S	-	7.80	0.81	-	-	-	-	-	8.60
SSE	-	11.69	3.09	-	-	-	-	-	14.78
SE	-	2.15	-	-	-	-	-	-	2.15
ESE	-	0.94	-	-	-	-	-	-	0.94
E	-	2.02	1.34	-	-	-	-	-	3.36
Calm	17.07	-	-	-	-	-	-	-	17.07
Total (%)	17.07	43.01	29.43	9.68	0.81	-	-	-	100.00

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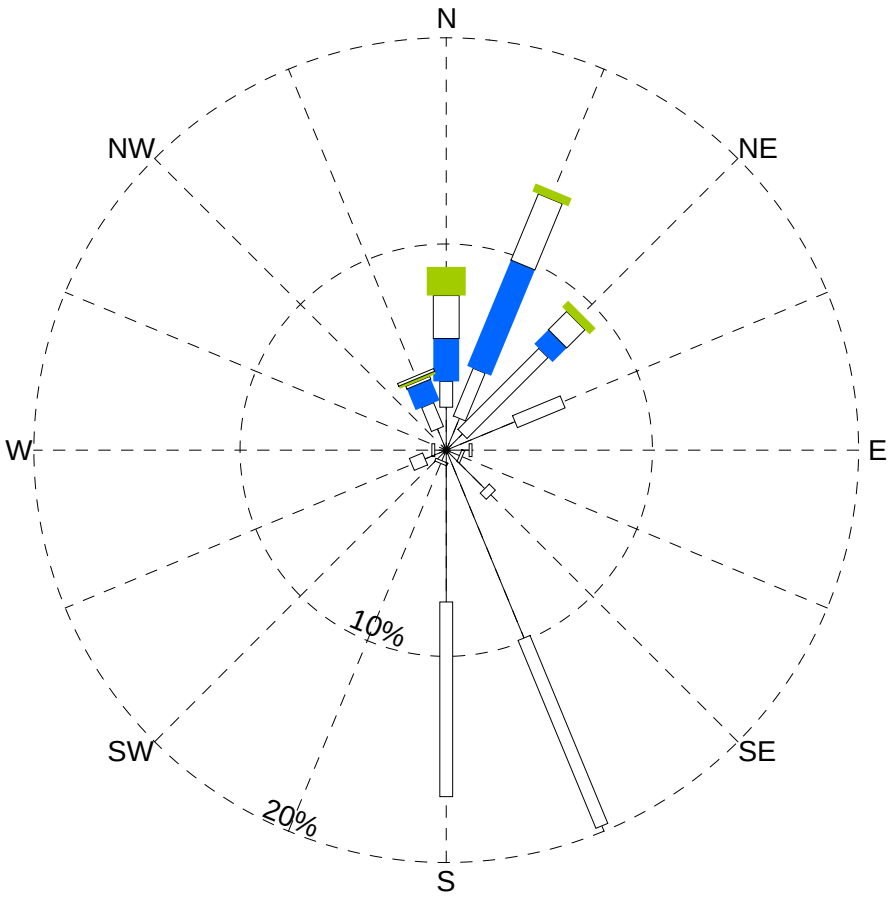
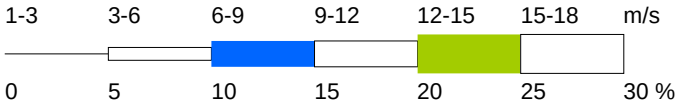
NORTH AMERICAN TUNGSTON CORP LTD

2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
OCTOBER 2005

FIG. C4





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 30 days
Start Date: Nov. 01, 2005
End Date: Nov. 30, 2005
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	3.61	2.50	-	-	-	-	-	6.11
NE	-	1.11	5.56	0.97	1.25	0.42	-	-	9.31
NNE	-	1.67	2.50	5.56	3.47	0.42	-	-	13.61
N	-	2.08	1.25	2.08	2.08	1.39	-	-	8.89
NNW	-	1.11	1.25	1.11	0.14	0.14	0.14	-	3.89
NW	-	0.28	-	-	-	-	-	-	0.28
WNW	-	0.14	-	-	-	-	-	-	0.14
W	-	0.56	0.14	-	-	-	-	-	0.69
WSW	-	1.11	0.69	-	-	-	-	-	1.81
SW	-	0.83	-	-	-	-	-	-	0.83
SSW	-	0.56	0.14	-	-	-	-	-	0.69
S	-	7.36	9.44	-	-	-	-	-	16.81
SSE	-	9.86	9.86	-	-	-	-	-	19.72
SE	-	2.64	0.42	-	-	-	-	-	3.06
ESE	-	0.69	0.14	-	-	-	-	-	0.83
E	-	1.11	0.14	-	-	-	-	-	1.25
Calm	12.08	-	-	-	-	-	-	-	12.08
Total (%)	12.08	34.72	34.03	9.72	6.94	2.36	0.14	-	100.00

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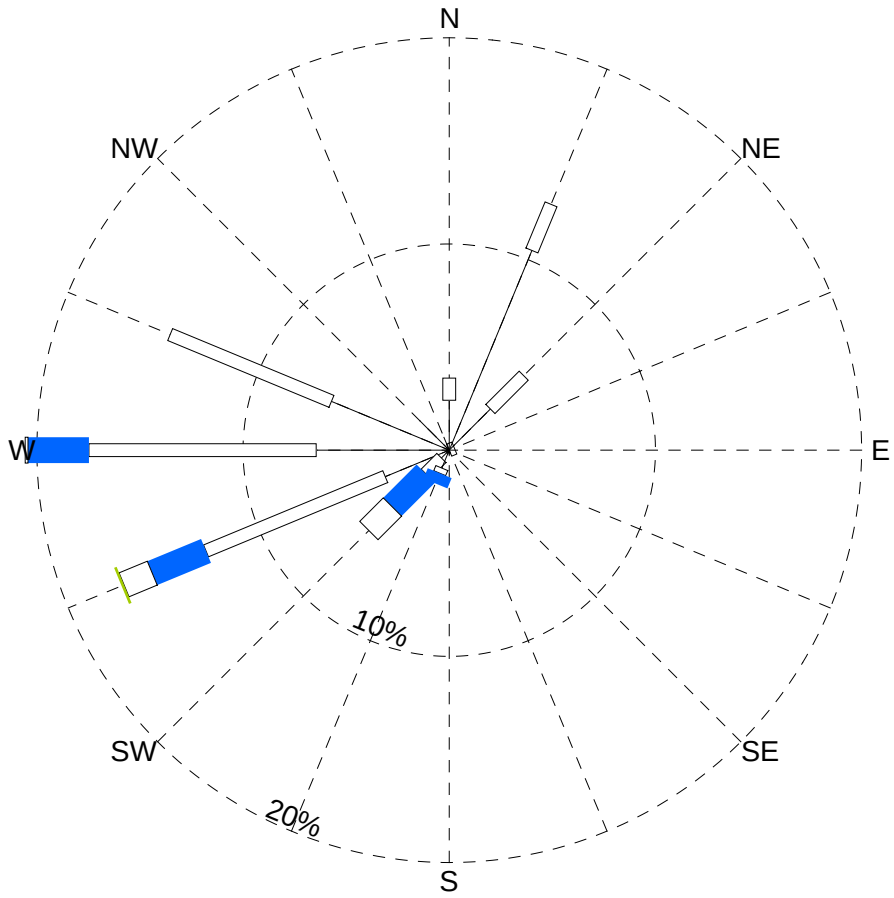
NORTH AMERICAN TUNGSTON CORP LTD

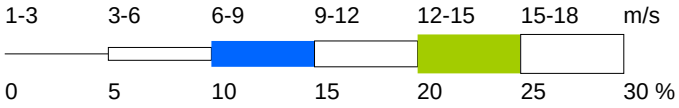
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
NOVEMBER 2005

FIG. C5

Fri Oct 13 13:22:28 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Wind_roses





Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	-	0.27	-	-	-	-	-	0.27
NE	-	2.82	2.29	-	-	-	-	-	5.11
NNE	-	10.48	2.42	-	-	-	-	-	12.90
N	-	2.42	1.08	-	-	-	-	-	3.49
NNW	-	0.67	-	-	-	-	-	-	0.67
NW	-	2.02	-	-	-	-	-	-	2.02
WNW	-	6.18	8.47	-	-	-	-	-	14.65
W	-	6.45	11.02	2.96	0.13	-	-	-	20.57
WSW	-	3.36	9.41	2.82	1.48	0.13	-	-	17.20
SW	-	0.54	1.08	2.29	1.61	-	-	-	5.51
SSW	-	0.94	0.27	0.54	-	-	-	-	1.75
S	-	0.27	-	-	-	-	-	-	0.27
SSE	-	0.13	-	-	-	-	-	-	0.13
SE	-	-	-	-	-	-	-	-	-
ESE	-	-	-	-	-	-	-	-	-
E	-	0.40	-	-	-	-	-	-	0.40
Calm	15.05	-	-	-	-	-	-	-	15.05
Total (%)	15.05	36.69	36.29	8.60	3.23	0.13	-	-	100.00

Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 31 days
Start Date: Dec. 01, 2005
End Date: Dec. 31, 2005
Comment:

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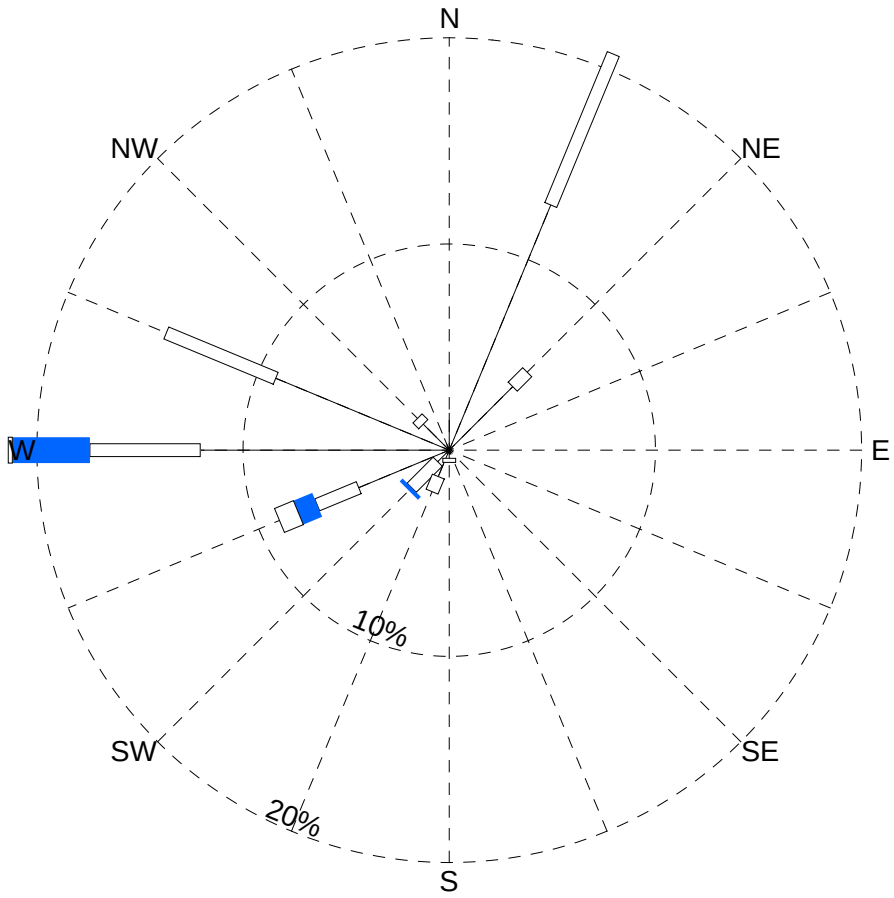
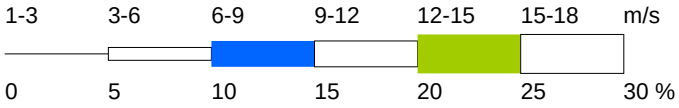
NORTH AMERICAN TUNGSTON CORP LTD

2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
DECEMBER 2005

FIG. C6





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 31 days
Start Date: Jan. 01, 2006
End Date: Jan. 31, 2006
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	-	-	-	-	-	-	-	-
NE	-	4.36	0.99	-	-	-	-	-	5.35
NNE	-	12.87	7.92	-	-	-	-	-	20.79
N	-	1.78	-	-	-	-	-	-	1.78
NNW	-	0.59	-	-	-	-	-	-	0.59
NW	-	1.78	0.40	-	-	-	-	-	2.18
WNW	-	9.11	5.74	-	-	-	-	-	14.85
W	-	12.08	5.35	3.76	0.20	-	-	-	21.39
WSW	-	4.75	2.18	0.99	0.99	-	-	-	8.91
SW	-	0.79	1.78	0.20	-	-	-	-	2.77
SSW	-	1.39	0.79	-	-	-	-	-	2.18
S	-	0.40	0.20	-	-	-	-	-	0.59
SSE	-	0.20	-	-	-	-	-	-	0.20
SE	-	-	-	-	-	-	-	-	-
ESE	-	-	-	-	-	-	-	-	-
E	-	-	-	-	-	-	-	-	-
Calm	18.42	-	-	-	-	-	-	-	18.42
Total (%)	18.42	50.10	25.35	4.95	1.19	-	-	-	100.00

HAY & COMPANY CONSULTANTS

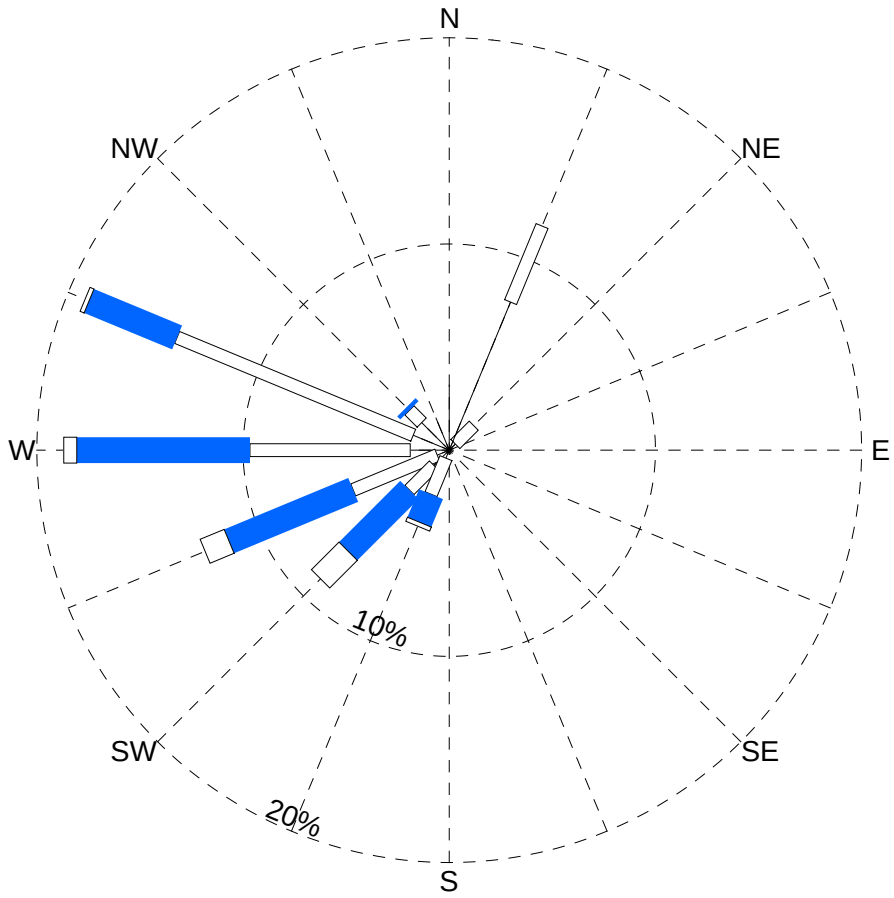
NORTH AMERICAN TUNGSTON CORP LTD

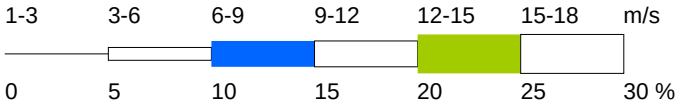
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
JANUARY 2006

FIG. C7

Fri Oct 13 13:22:29 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Wind_roses





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 28 days
Start Date: Feb. 01, 2006
End Date: Feb. 28, 2006
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	0.84	-	-	-	-	-	-	0.84
NE	-	0.42	1.26	-	-	-	-	-	1.68
NNE	-	7.77	3.99	-	-	-	-	-	11.77
N	-	3.15	-	-	-	-	-	-	3.15
NNW	-	1.68	-	-	-	-	-	-	1.68
NW	-	1.89	0.84	0.21	-	-	-	-	2.94
WNW	-	1.89	12.40	4.62	0.21	-	-	-	19.12
W	-	1.89	7.77	8.40	0.63	-	-	-	18.70
WSW	-	0.63	4.41	6.51	1.26	-	-	-	12.81
SW	-	1.05	1.68	4.20	1.89	-	-	-	8.82
SSW	-	0.42	1.89	1.47	0.21	-	-	-	3.99
S	-	0.21	-	-	-	-	-	-	0.21
SSE	-	-	-	-	-	-	-	-	-
SE	-	-	-	-	-	-	-	-	-
ESE	-	-	-	-	-	-	-	-	-
E	-	-	-	-	-	-	-	-	-
Calm	14.29	-	-	-	-	-	-	-	14.29
Total (%)	14.29	21.85	34.24	25.42	4.20	-	-	-	100.00

HAY & COMPANY CONSULTANTS

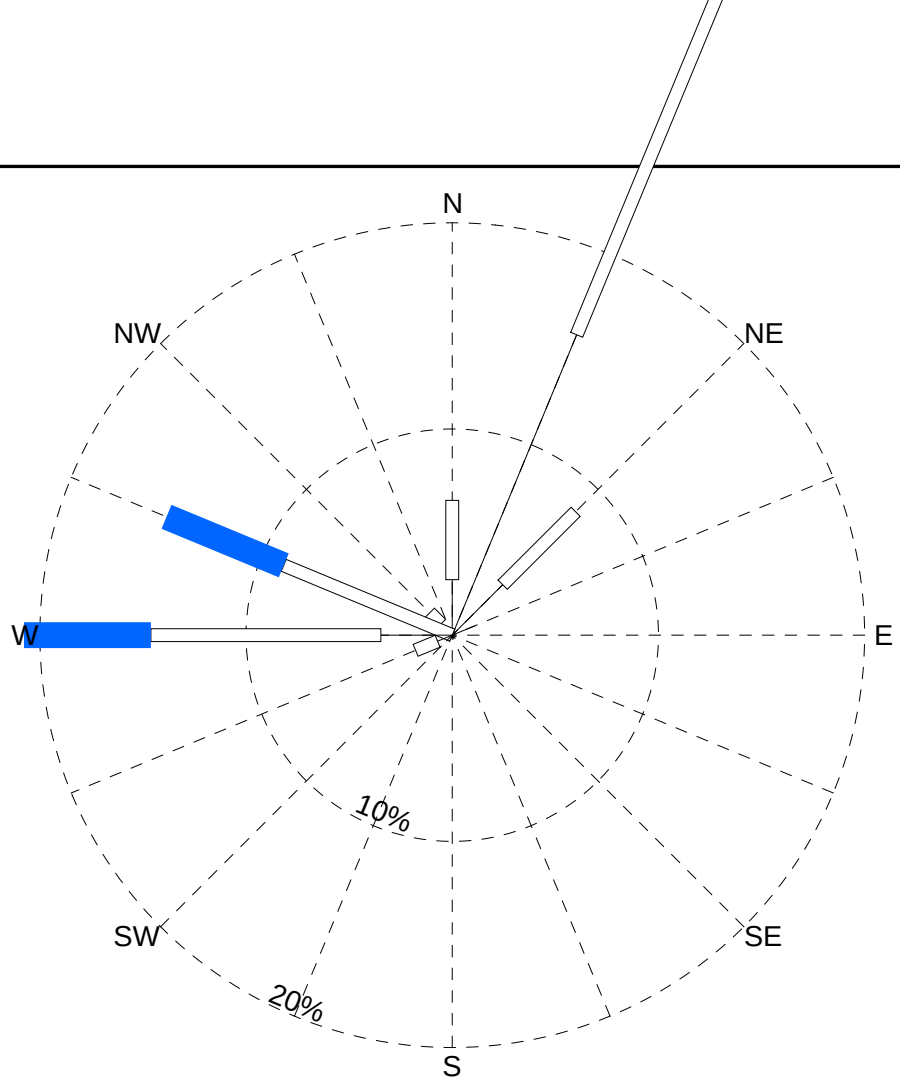
NORTH AMERICAN TUNGSTON CORP LTD

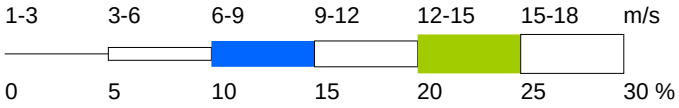
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
FEBRUARY 2006

FIG. C8

Fri Oct 13 13:22:29 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Wind_roses





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 31 days
Start Date: Mar. 01, 2006
End Date: Mar. 31, 2006
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	1.15	-	-	-	-	-	-	1.15
NE	-	3.46	5.00	-	-	-	-	-	8.46
NNE	-	15.77	22.69	-	-	-	-	-	38.46
N	-	2.69	3.85	-	-	-	-	-	6.54
NNW	-	0.38	-	-	-	-	-	-	0.38
NW	-	0.77	0.77	-	-	-	-	-	1.54
WNW	-	-	8.85	6.15	-	-	-	-	15.00
W	-	3.46	11.15	6.15	-	-	-	-	20.77
WSW	-	0.77	1.15	-	-	-	-	-	1.92
SW	-	0.38	-	-	-	-	-	-	0.38
SSW	-	-	-	-	-	-	-	-	-
S	-	-	-	-	-	-	-	-	-
SSE	-	-	-	-	-	-	-	-	-
SE	-	-	-	-	-	-	-	-	-
ESE	-	-	-	-	-	-	-	-	-
E	-	-	-	-	-	-	-	-	-
Calm	5.39	-	-	-	-	-	-	-	5.39
Total (%)	5.39	28.85	53.46	12.31	-	-	-	-	100.00

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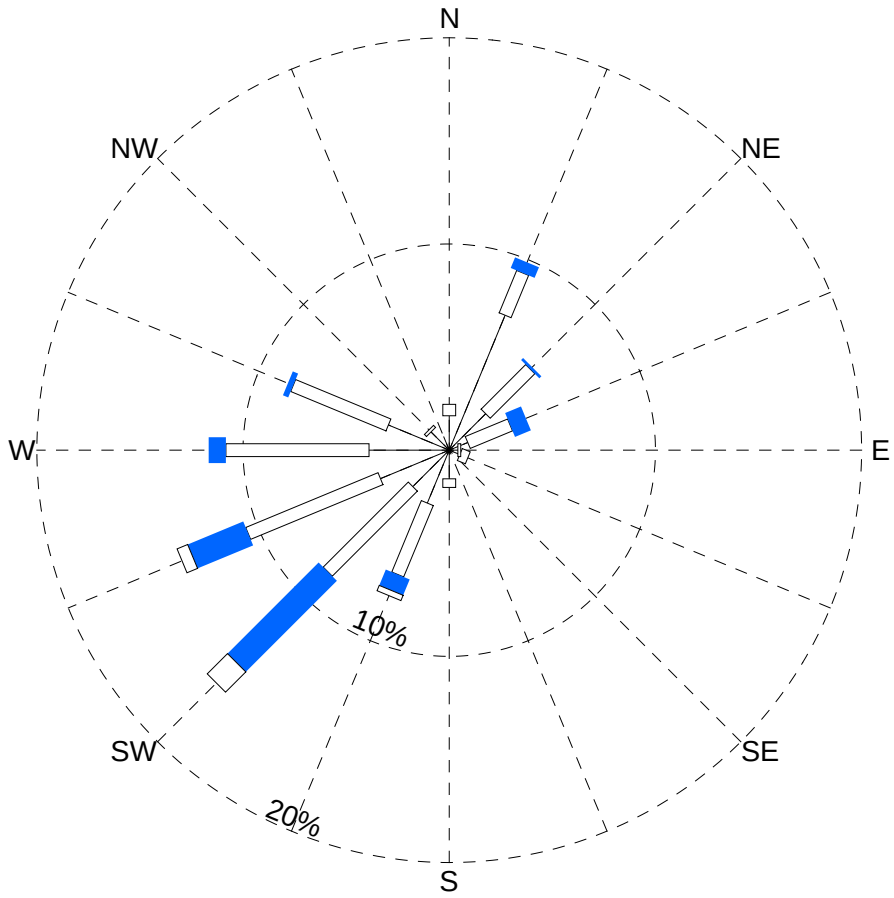
NORTH AMERICAN TUNGSTON CORP LTD

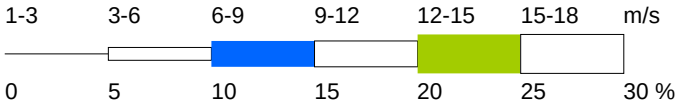
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
MARCH 2006

FIG. C9

Fri Oct 13 13:22:29 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Wind_roses





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 30 days
Start Date: Apr. 01, 2006
End Date: Apr. 30, 2006
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	0.97	2.22	0.83	-	-	-	-	4.03
NE	-	2.50	3.06	0.14	-	-	-	-	5.69
NNE	-	7.08	2.22	0.56	-	-	-	-	9.86
N	-	1.67	0.56	-	-	-	-	-	2.22
NNW	-	0.69	-	-	-	-	-	-	0.69
NW	-	1.25	0.14	-	-	-	-	-	1.39
WNW	-	3.19	5.00	0.28	-	-	-	-	8.47
W	-	3.89	6.94	0.83	-	-	-	-	11.67
WSW	-	3.61	6.94	2.92	0.56	-	-	-	14.03
SW	-	2.50	5.83	6.25	1.39	-	-	-	15.97
SSW	-	2.78	3.75	0.83	0.28	-	-	-	7.64
S	-	1.39	0.42	-	-	-	-	-	1.81
SSE	-	-	-	-	-	-	-	-	-
SE	-	-	-	-	-	-	-	-	-
ESE	-	0.56	0.42	-	-	-	-	-	0.97
E	-	0.42	0.14	-	-	-	-	-	0.56
Calm	15.00	-	-	-	-	-	-	-	15.00
Total (%)	15.00	32.50	37.64	12.64	2.22	-	-	-	100.00

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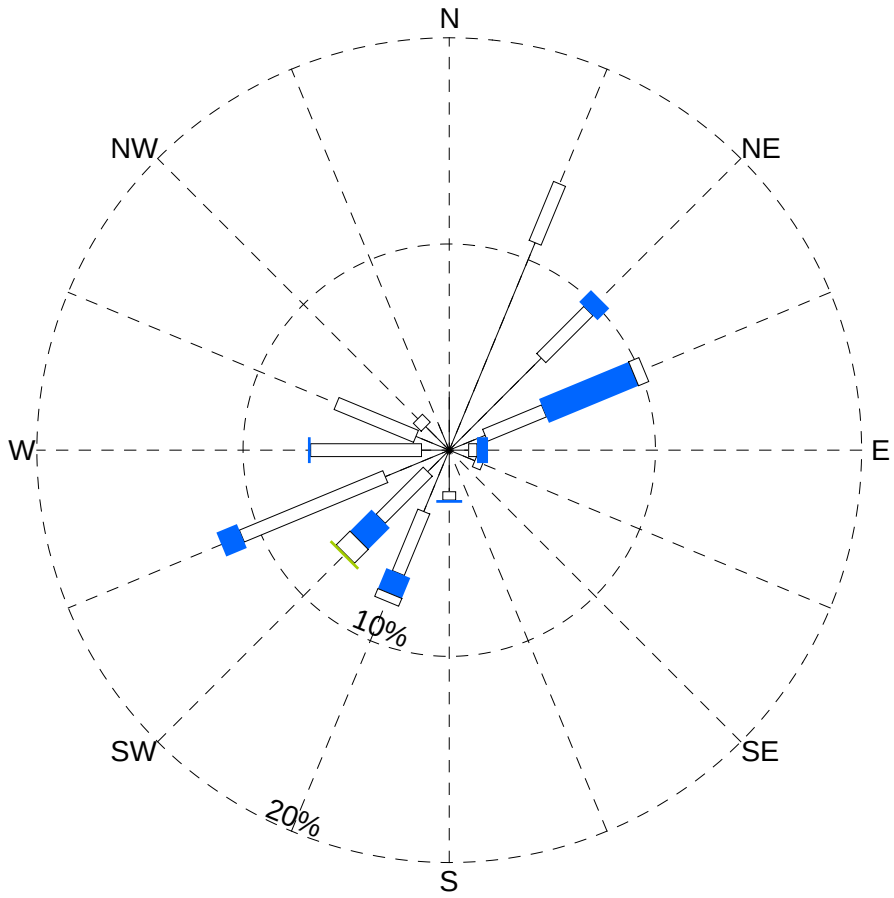
NORTH AMERICAN TUNGSTON CORP LTD

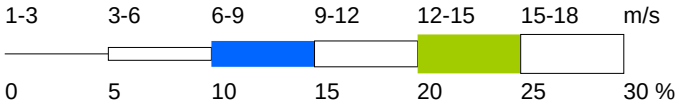
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
APRIL 2006

FIG. C10

Fri Oct 13 13:22:29 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Wind_roses





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 31 days
Start Date: May 01, 2006
End Date: May 31, 2006
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	1.88	3.09	4.70	0.54	-	-	-	10.22
NE	-	6.32	3.23	0.81	-	-	-	-	10.35
NNE	-	10.89	3.09	-	-	-	-	-	13.98
N	-	2.82	-	-	-	-	-	-	2.82
NNW	-	1.34	-	-	-	-	-	-	1.34
NW	-	1.61	0.54	-	-	-	-	-	2.15
WNW	-	1.75	4.17	-	-	-	-	-	5.91
W	-	1.34	5.38	0.13	-	-	-	-	6.86
WSW	-	3.36	7.53	1.08	-	-	-	-	11.96
SW	-	1.48	3.23	1.48	0.94	0.13	-	-	7.26
SSW	-	3.23	3.23	1.08	0.40	-	-	-	7.93
S	-	2.02	0.40	0.13	-	-	-	-	2.55
SSE	-	0.13	-	-	-	-	-	-	0.13
SE	-	0.13	-	-	-	-	-	-	0.13
ESE	-	1.34	0.40	-	-	-	-	-	1.75
E	-	0.94	0.40	0.54	-	-	-	-	1.88
Calm	12.77	-	-	-	-	-	-	-	12.77
Total (%)	12.77	40.59	34.68	9.95	1.88	0.13	-	-	100.00

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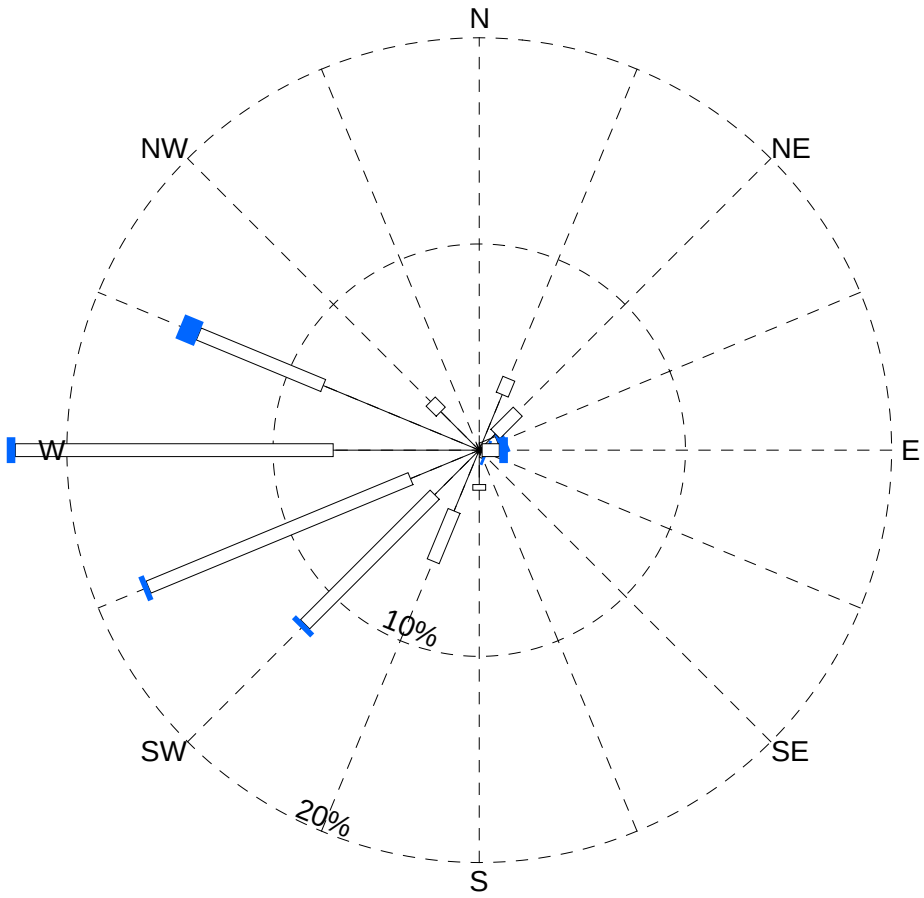
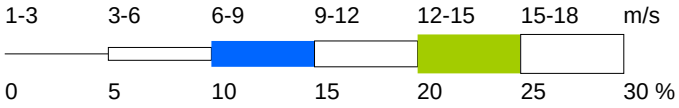
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
MAY 2006

FIG. C11

Fri Oct 13 13:22:30 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Wind_roses





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 30 days
Start Date: Jun. 01, 2006
End Date: Jun. 30, 2006
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	0.14	0.83	0.42	-	-	-	-	1.39
NE	-	1.11	1.53	-	-	-	-	-	2.64
NNE	-	2.92	0.83	-	-	-	-	-	3.75
N	-	0.69	-	-	-	-	-	-	0.69
NNW	-	0.42	-	-	-	-	-	-	0.42
NW	-	2.64	0.69	-	-	-	-	-	3.33
WNW	-	8.19	6.53	0.97	-	-	-	-	15.69
W	-	7.08	15.42	0.42	-	-	-	-	22.92
WSW	-	3.61	13.75	0.28	-	-	-	-	17.64
SW	-	3.06	8.89	0.28	-	-	-	-	12.22
SSW	-	3.19	2.64	-	-	-	-	-	5.83
S	-	1.67	0.28	-	-	-	-	-	1.94
SSE	-	0.28	-	-	-	-	-	-	0.28
SE	-	0.14	-	-	-	-	-	-	0.14
ESE	-	0.14	0.14	0.14	-	-	-	-	0.42
E	-	0.14	0.83	0.42	-	-	-	-	1.39
Calm	9.31	-	-	-	-	-	-	-	9.31
Total (%)	9.31	35.42	52.36	2.92	-	-	-	-	100.00

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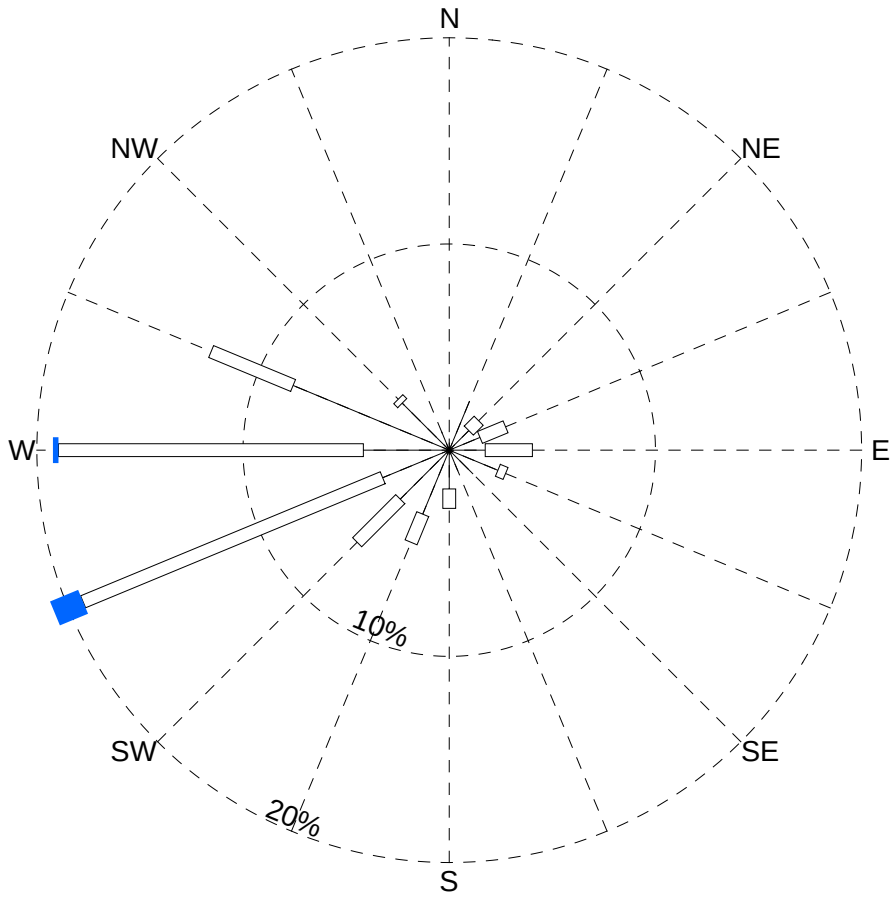
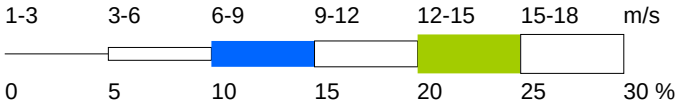
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
JUNE 2006

FIG. C12

Fri Oct 13 13:22:30 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Wind_roses





Station Name: MacTung Camp
NAD 27 Location:
N63° 16' 50.2" W130° 8' 50.1"
Elev. above SL: 1860 m
Tower height: 3 m
Record length: 31 days
Start Date: Jul. 01, 2006
End Date: Jul. 31, 2006
Comment:

Wind Speed & Direction Frequency Distribution Table

	Percent Occurrence (%)								
Direction	**0-1 m/s**	**1-3 m/s**	**3-6 m/s**	**6-9 m/s**	**9-12 m/s**	**12-15 m/s**	**15-18 m/s**	**18+ m/s**	**Total (%)**
ENE	-	1.61	1.34	-	-	-	-	-	2.96
NE	-	1.34	0.67	-	-	-	-	-	2.02
NNE	-	2.55	-	-	-	-	-	-	2.55
N	-	0.54	-	-	-	-	-	-	0.54
NNW	-	0.94	-	-	-	-	-	-	0.94
NW	-	3.23	0.27	-	-	-	-	-	3.49
WNW	-	8.20	4.30	-	-	-	-	-	12.50
W	-	4.17	14.78	0.27	-	-	-	-	19.22
WSW	-	3.49	15.73	1.48	-	-	-	-	20.70
SW	-	3.36	2.96	-	-	-	-	-	6.32
SSW	-	3.36	1.48	-	-	-	-	-	4.84
S	-	1.88	0.94	-	-	-	-	-	2.82
SSE	-	1.08	-	-	-	-	-	-	1.08
SE	-	1.61	-	-	-	-	-	-	1.61
ESE	-	2.55	0.40	-	-	-	-	-	2.96
E	-	1.75	2.29	-	-	-	-	-	4.03
Calm	11.43	-	-	-	-	-	-	-	11.43
Total (%)	11.43	41.67	45.16	1.75	-	-	-	-	100.00

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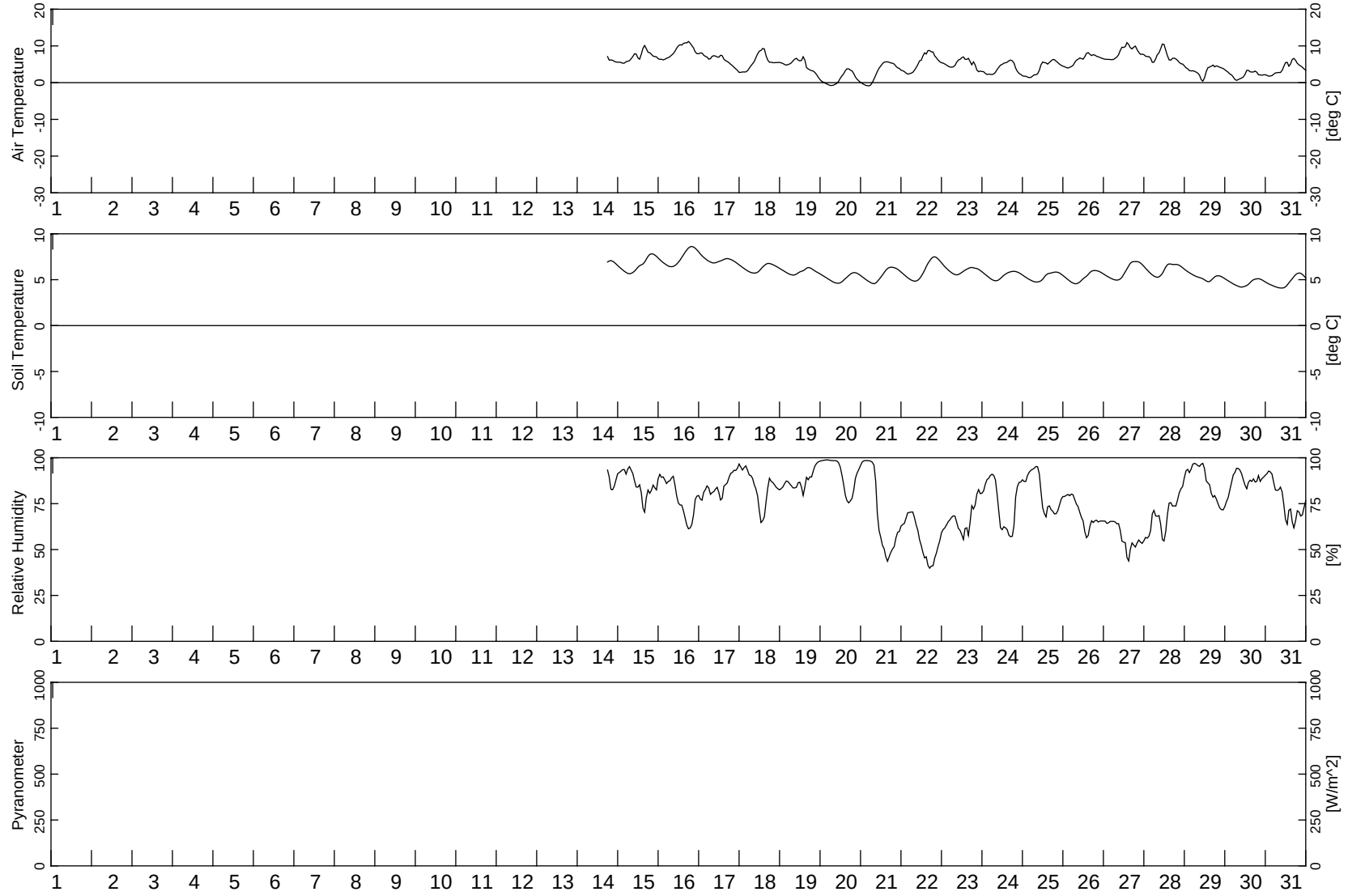
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

WIND ROSE
JULY 2006

FIG. C13

Fri Oct 13 13:22:30 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Wind_roses

APPENDIX D
SUMMARY OF MONTHLY WEATHER PARAMETERS
JULY 2005 TO JULY 2006



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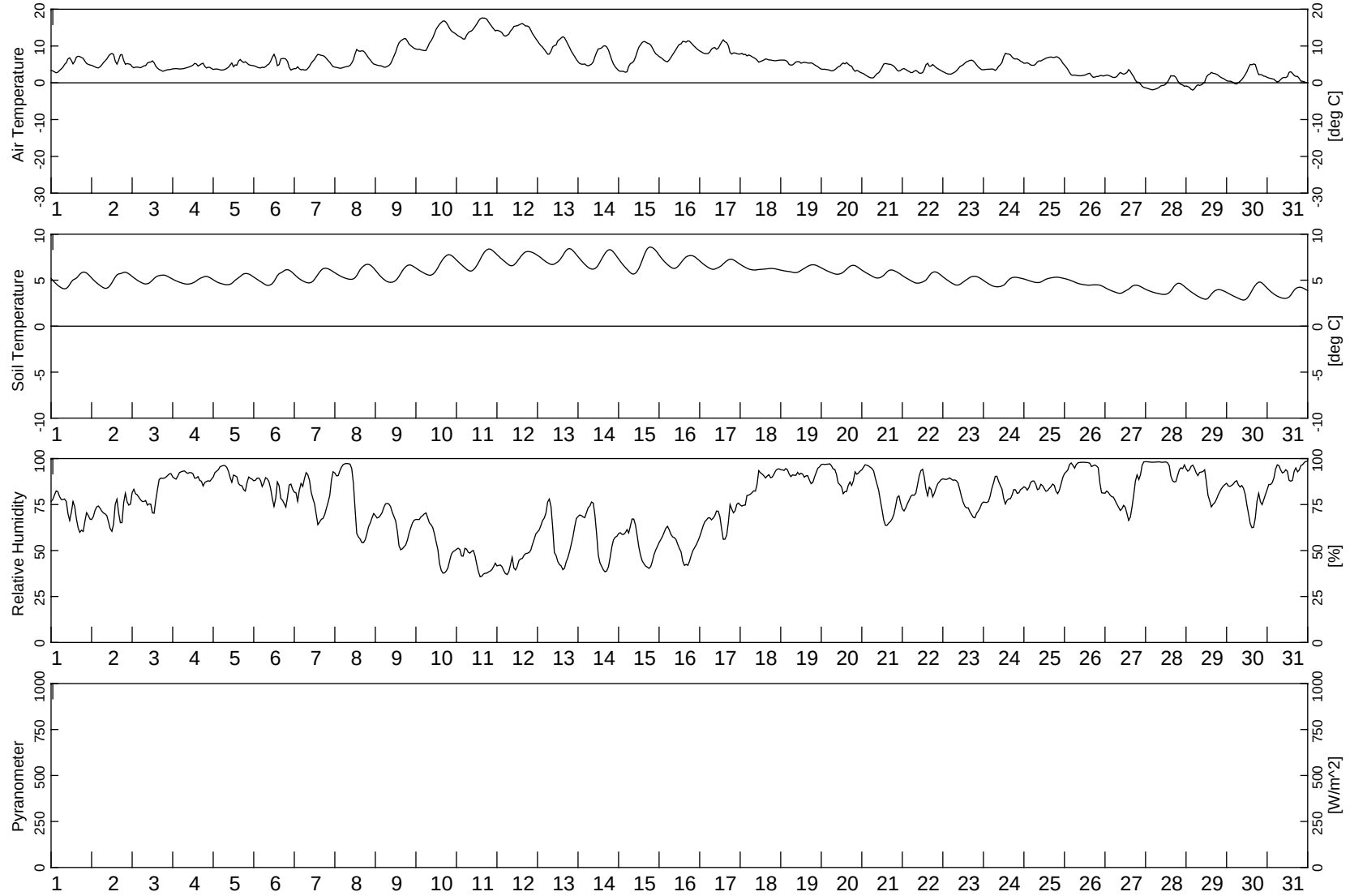
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
JULY 2005

FIG. D1

Wed Oct 25 13:11:08 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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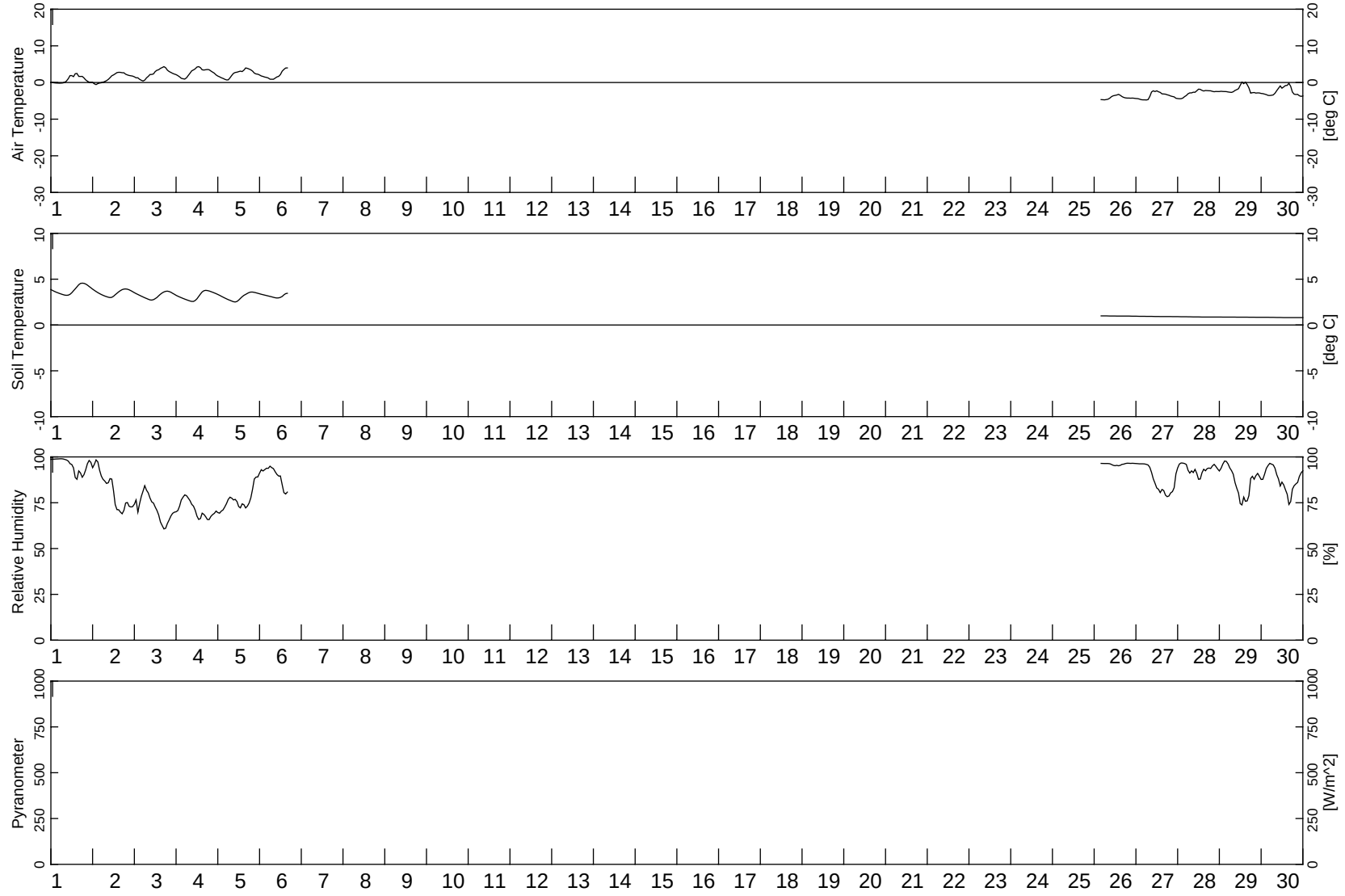
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
AUGUST 2005

FIG. D2

Wed Oct 25 13:11:10 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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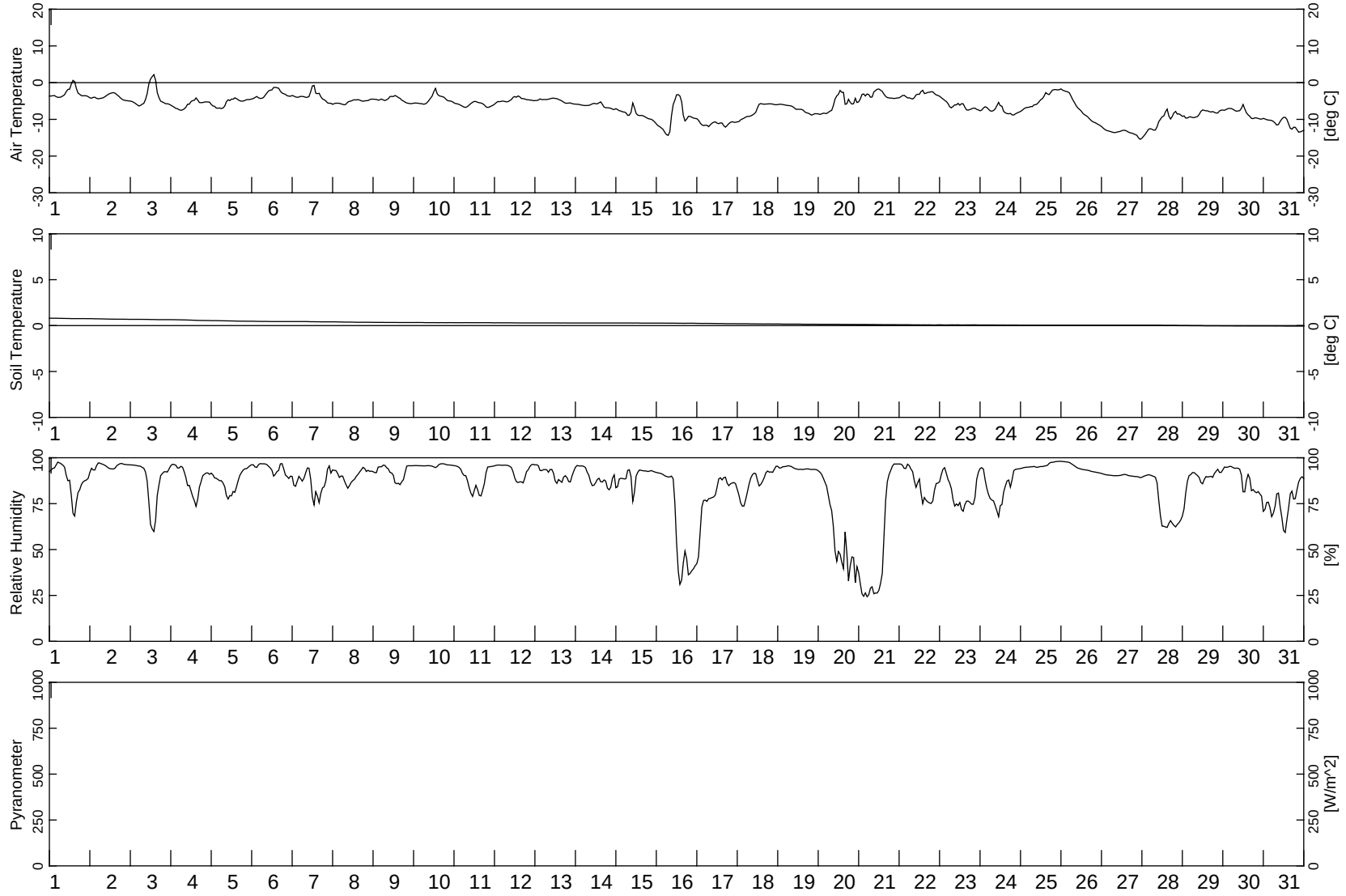
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
SEPTEMBER 2005

FIG. D3

Wed Oct 25 13:11:11 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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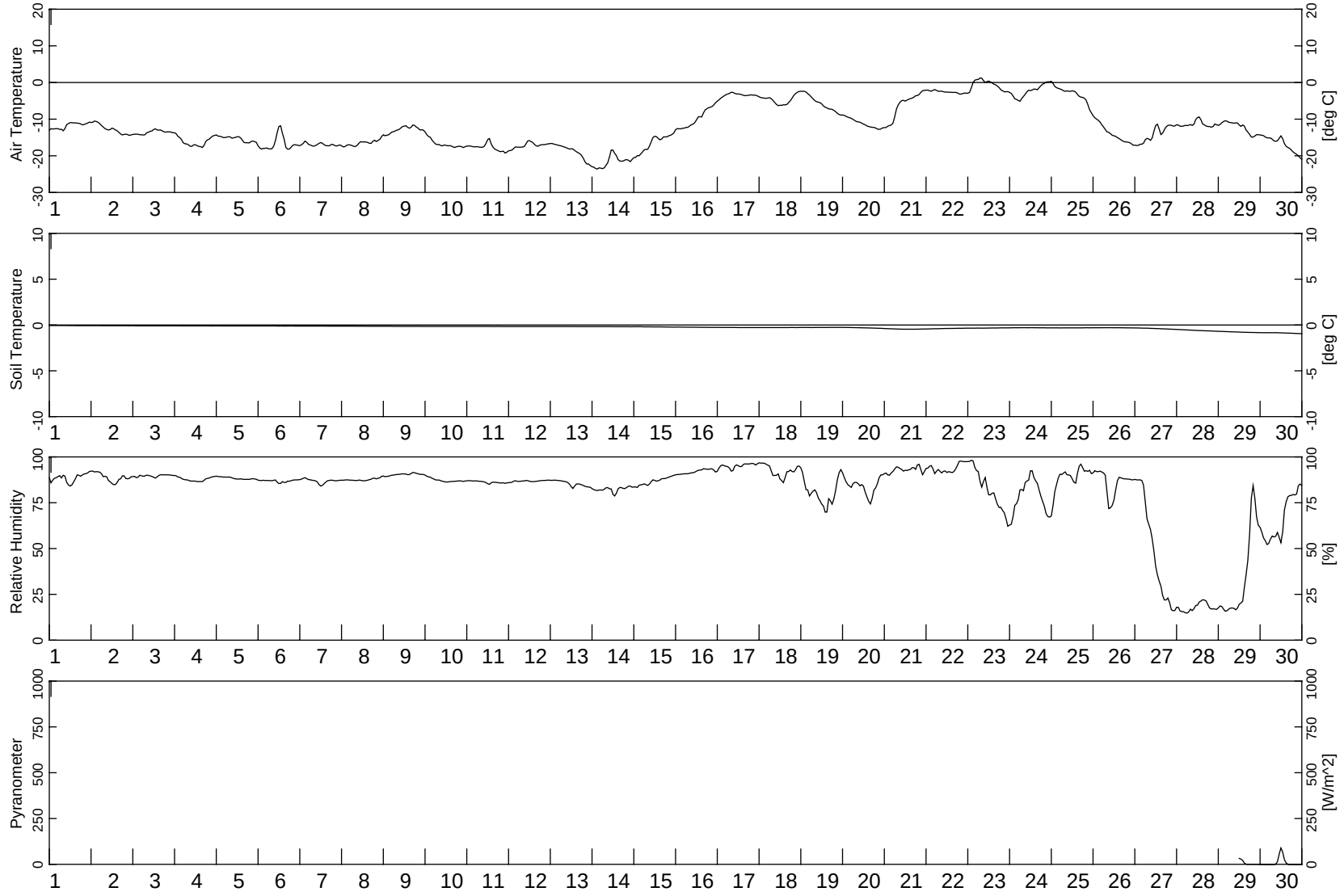
2006 HYDROMETEOROLOGICAL SURVEY
Mactung project

RECORDED WEATHER PARAMETERS
OCTOBER 2005

FIG. D4

Wed Oct 25 13:11:12 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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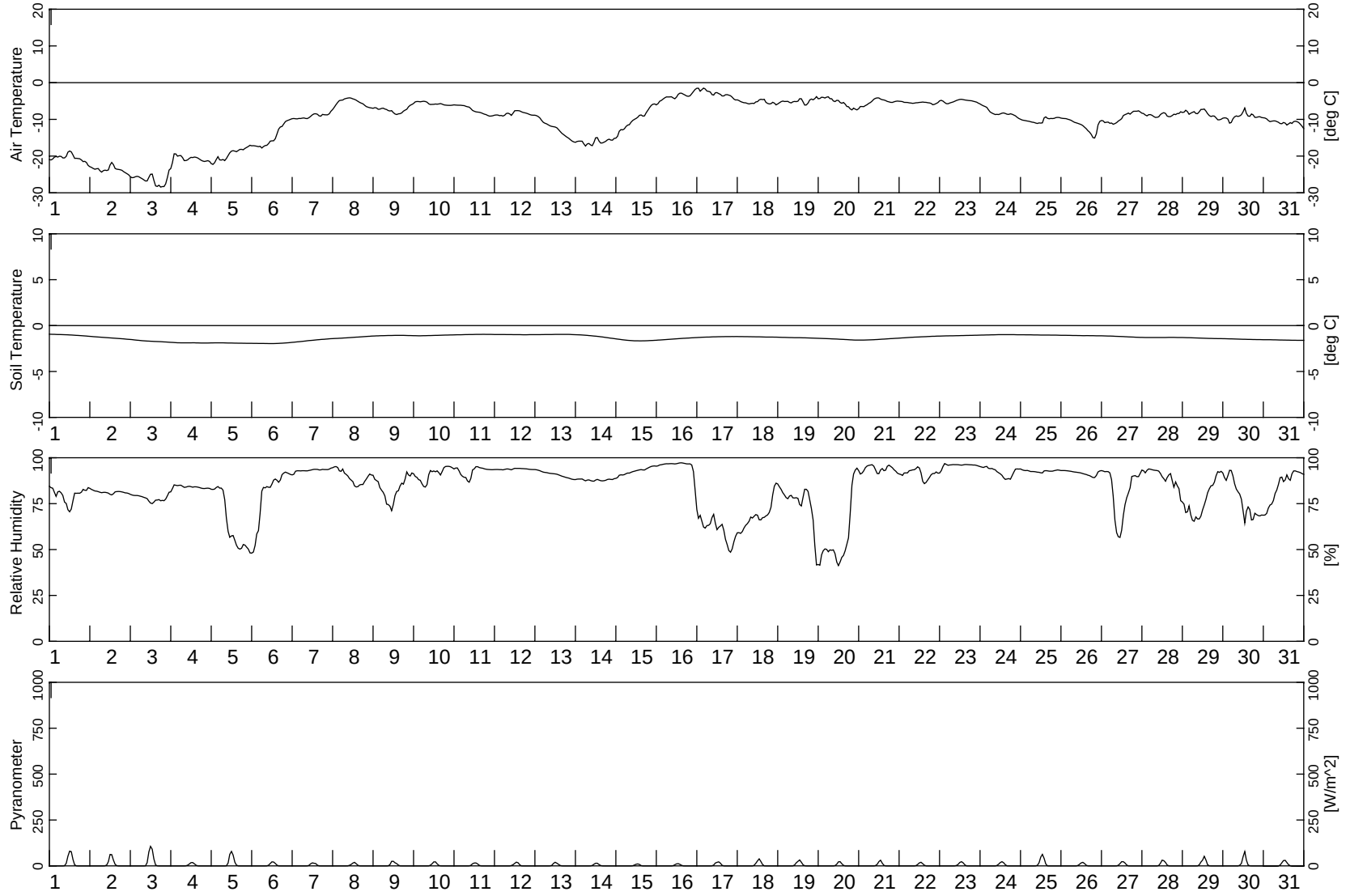
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
NOVEMBER 2005

FIG. D5

Wed Oct 25 13:11:14 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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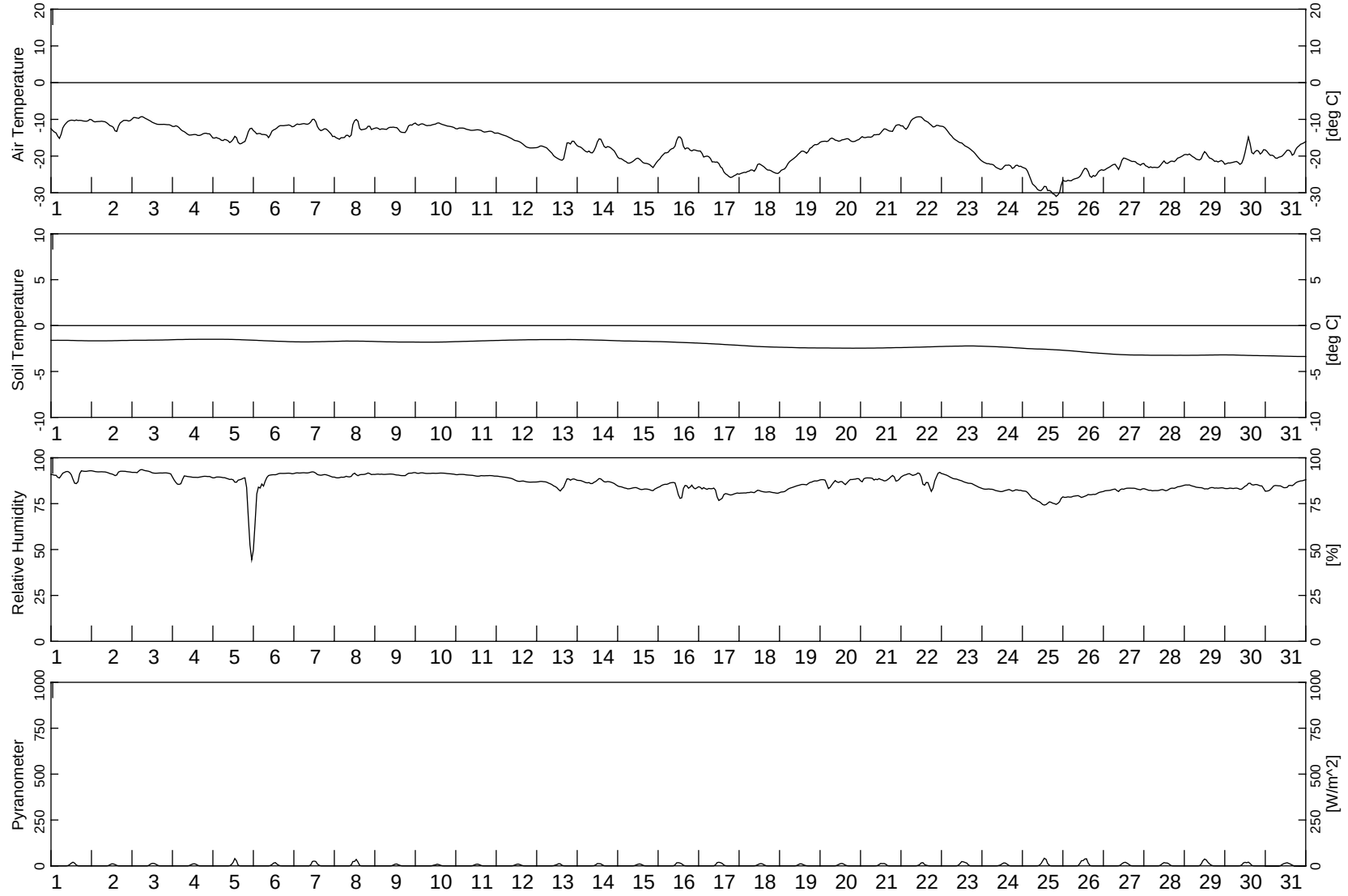
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
DECEMBER 2005

FIG. D6

Wed Oct 25 12:58:55 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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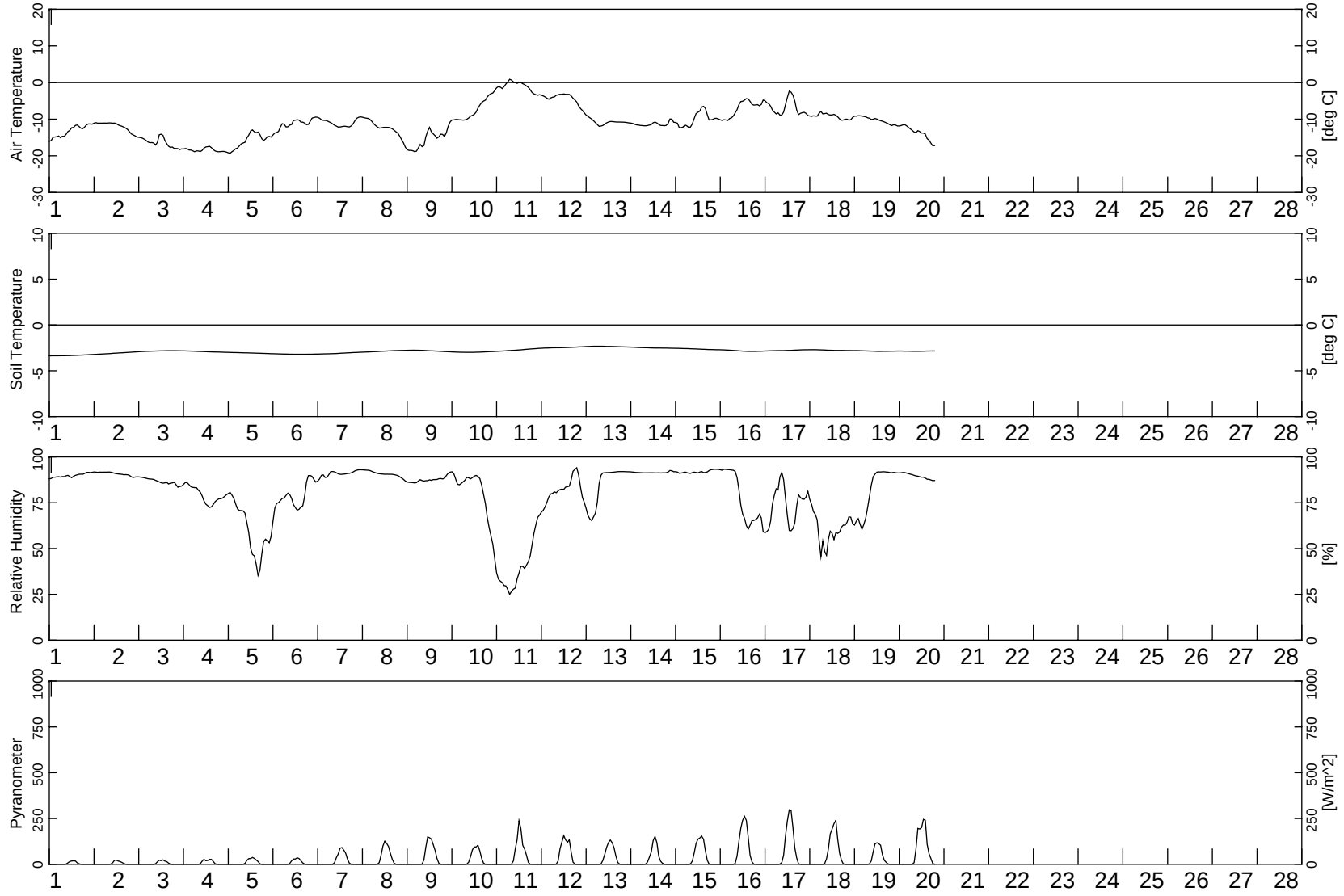
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
JANUARY 2006

FIG. D7

Wed Oct 25 12:58:56 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
FEBRUARY 2006

FIG. D8

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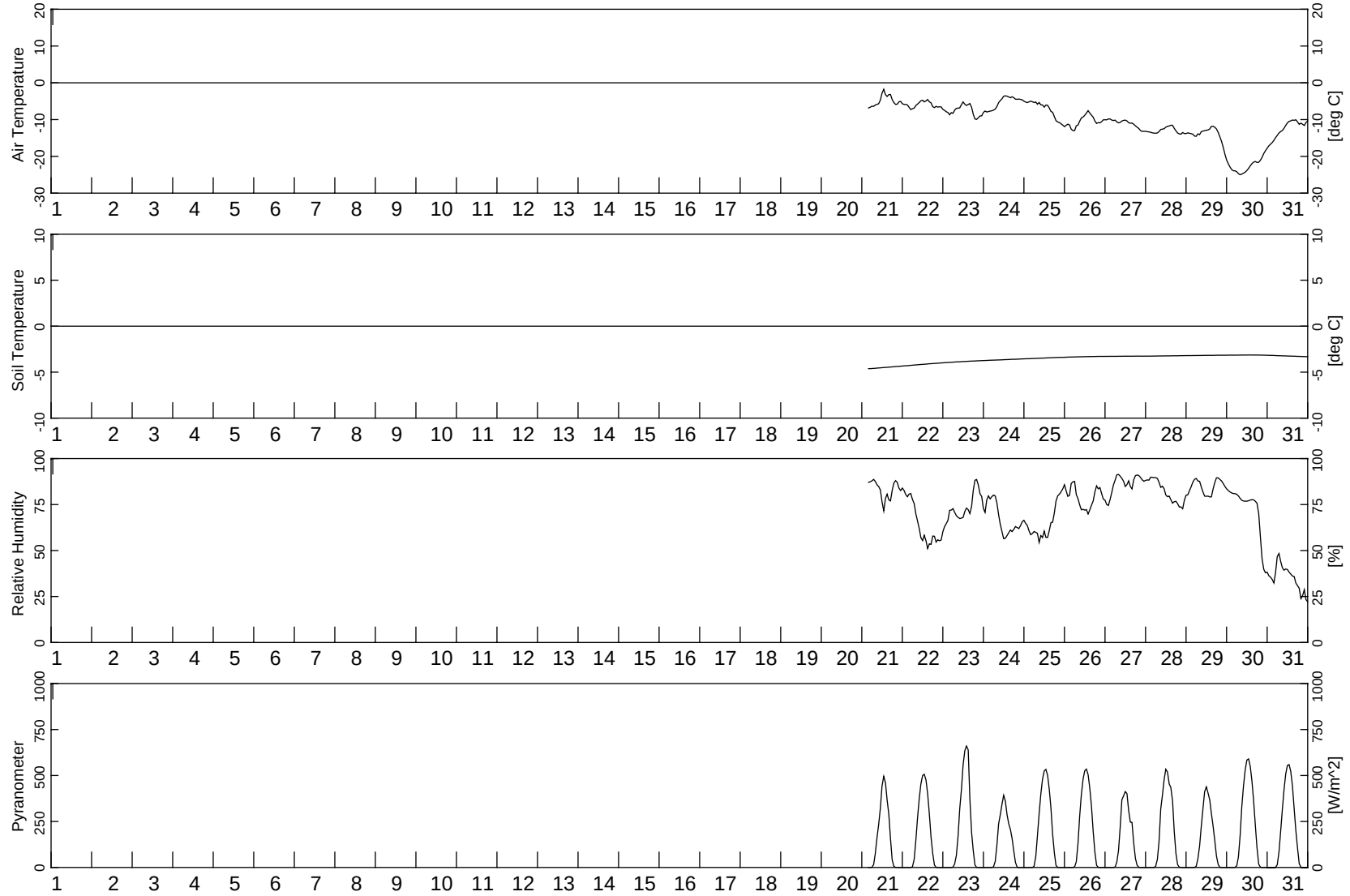

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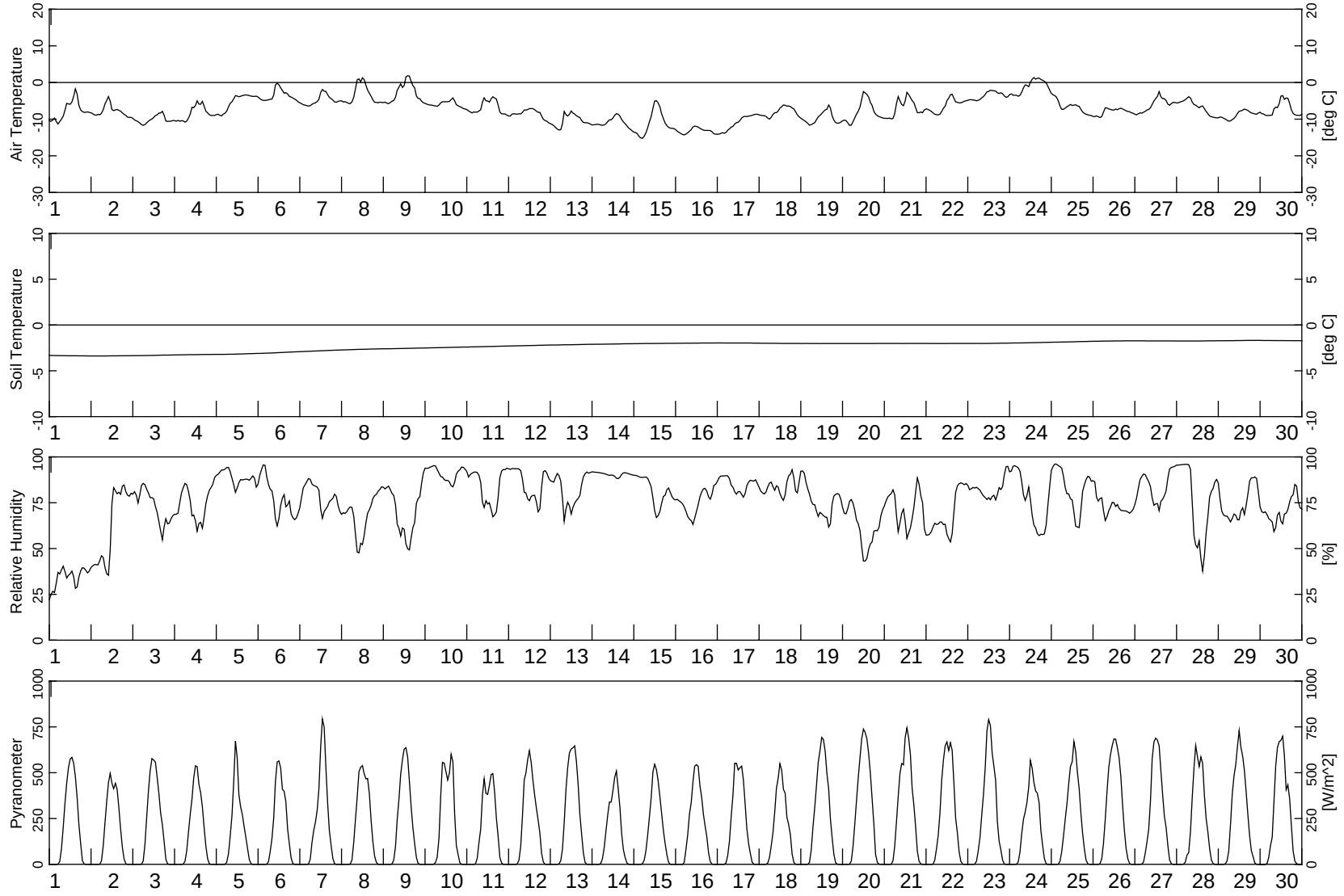
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
MARCH 2006

FIG. D9

Wed Oct 25 12:58:59 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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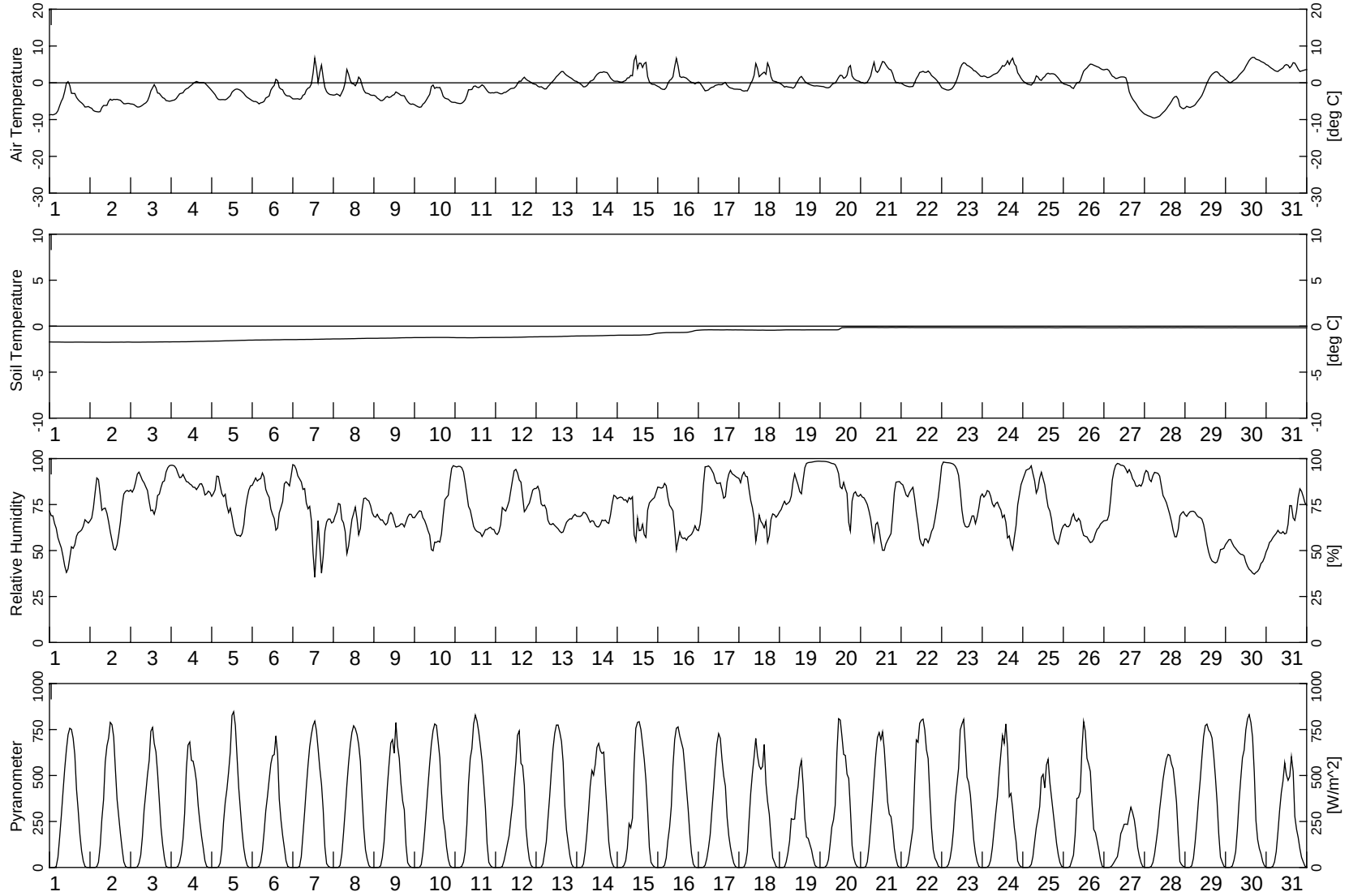
MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
APRIL 2006

FIG. D10



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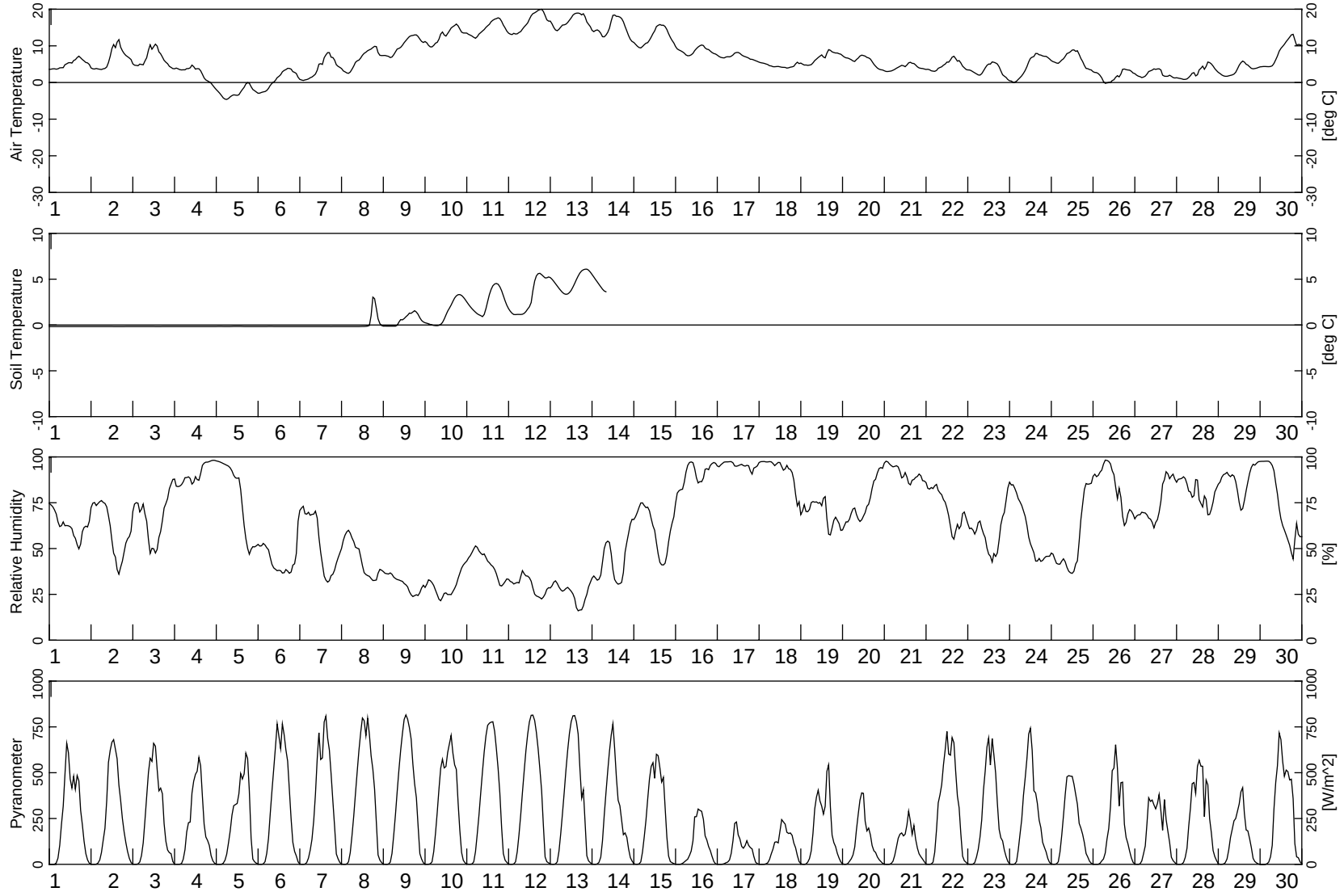
MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
MAY 2006

FIG. D11

Wed Oct 25 12:59:01 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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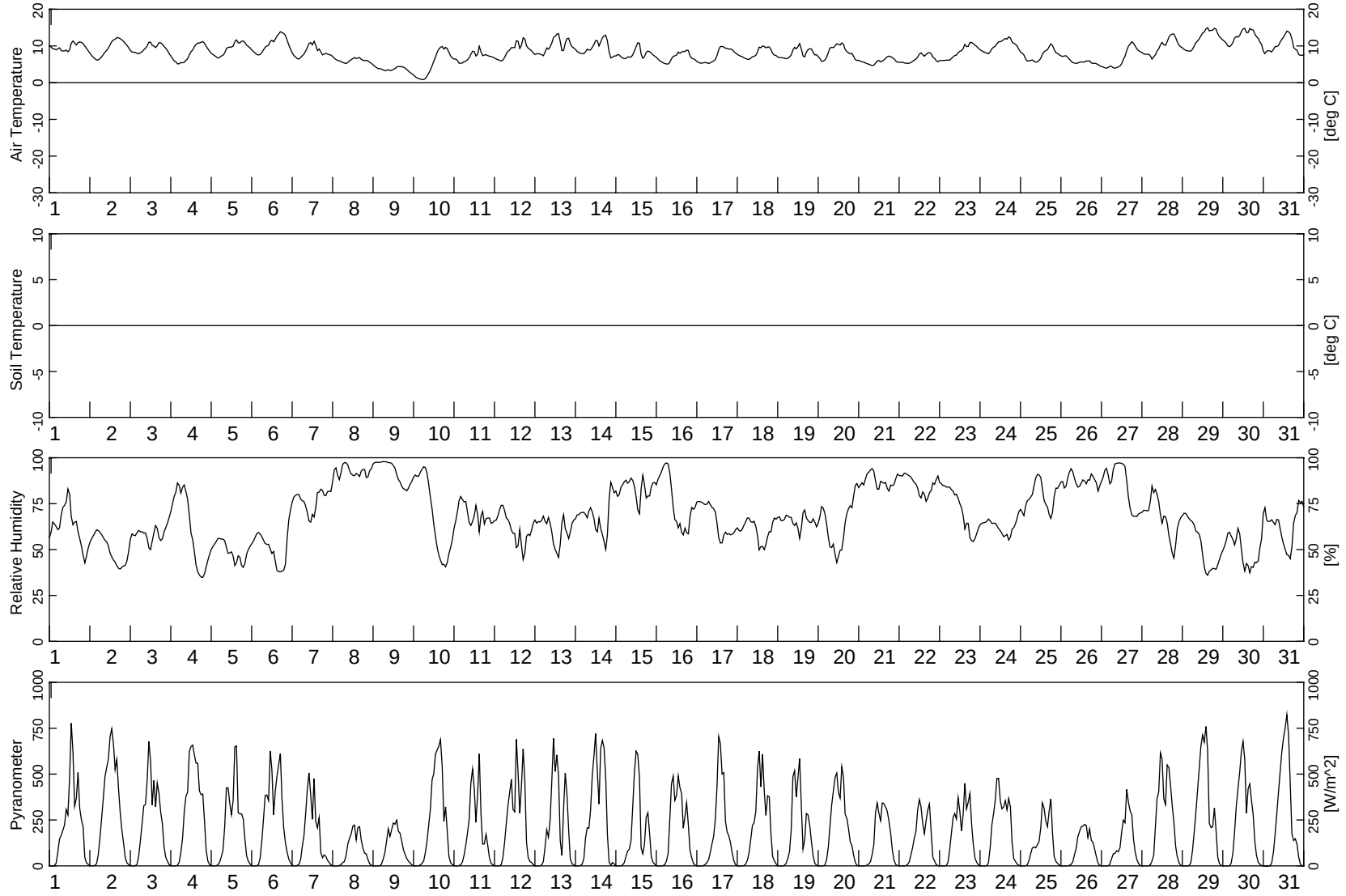
2006 HYDROMETEOROLOGICAL SURVEY
MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
JUNE 2006

FIG. D12

Wed Oct 25 12:59:02 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction



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MACTUNG PROJECT

RECORDED WEATHER PARAMETERS
JULY 2006

FIG. D13

Wed Oct 25 12:59:03 2006:Q:\Vancouver\Data\0201-WHI\PROJECTS\1200163 - Mactung\Mactung\RED\Meteorology\Met_data_reduction