

## TITLE

CAMP\_ChaoPhrayaRiver\_Lampang\_20021001\_20030331.twr

## CONTACT

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## DATE OF THIS DOCUMENT

31 Aug. 2004  
Updated 29 May 2006

## 1. 0 DATASET OVERVIEW

### 1.1 Introduction

To clarify the energy and water cycle in the Thailand, it is important to understand the characteristics of the basic meteorological elements.

The purpose of Lampang PBL-Tower (Planetary Boundary Layer -Tower) observation is to monitor these meteorological values and analysis the mechanisms of the energy and water cycle in the Teak Forest in tropical Monsoon areas.

### 1.2 Time period covered by the data

Start: 1 October 2002, 00:00  
End: 31 March 2003, 23:00

### 1.3 Temporal characteristics of the data

All parameters are recoded every hour.

### 1.4 Physical location of the measurement

Latitude : 18.40 N  
Longitude : 99.47 E  
Elevation : 241.0m a.s.l.  
Landscape : Deciduous Tropical Monsoon Forest (38 year old Teak plantation)  
Canopy height : About 17 m  
Soil Characteristics: Sandy soil

### 1.5 Data source

## 1.6 WWW address references

None

## 2.0 INSTRUMENTATION DESCRIPTION

### 2.1 Platform

The sensors are mounted on several heights.

### 2.2 Description of the instrumentation

Parameter	Model	Manufacturer
Station Pressure	PTB220C	VAISALA
Air Temperature	TS-801(pt100)	Okazaki
Relative Humidity	HMP45D	VAISALA
Wind Speed	3 cup anemometer(VS-125) Propeller type(WS-D32)	Komatsu Komatsu
Wind Direction	WS-D32	Komatsu

### 2.3 Instrumentation specification

Station Pressure (0m) : Station Pressure at the 0 m height (hPa)  
Air Temperature (22m) : Air Temperature at the 22m height (deg.C)  
Air Temperature (12m) : Air Temperature at the 12m height (deg.C)  
Relative Humidity (12m) : **Relative** Humidity at the **12m** height (%)  
Relative Humidity (**22m**) : **Relative** Humidity at the 22m height (%)  
Wind Speed (24m) : Wind Speed at the 24m height (m/s)  
Wind Direction (24m) : Wind Direction at the 24m height (deg.)  
Wind Speed (22m) : Wind Speed at the 22m height (m/s)  
Wind Speed (12m) : Wind Speed at the 12m height (m/s)

## 3.0 DATA COLLECTION AND PROCESSING

### 3.1 Description of data collection

Observed Data are sent to the data manager everyday using E-mail tele-communication system established by the Tokyo University of Agriculture and Technology.

### 3.2 Description of derived parameters and processing techniques used

**All the data are averaged/accumulated previous 1 hour.**

**Station Pressure** is measured using a capacitive absolute pressure sensor, a kind of aneroid type barometer. When the pressure changes, the silicon diaphragm bend and changes the height of the vacuum gap in the sensor. This changes the capacitance of the sensor, which is measured and converted into a pressure reading.

**Air temperature** is measured using a Pt100 resistance thermometer.

**Relative humidity** is measured by using a thin-film polymer sensor. The thin polymer film either absorbs or releases water vapor as the relative humidity of the ambient air rises or drops. The dielectric properties of the polymer film depend on the amount of water

contained in it: as the relative humidity changes the dielectric properties of the film change and so the capacitance of the sensor changes. The electronics of the instrument measure the capacitance of the sensor and convert it into a humidity reading.

**Wind speed and direction** is measured using a 3-cup anemometer.

**(Note: Old first-half Wind speed at 12m height was averaged by post one hour. To be consistent with other observed data, we applied previous one hour average.)**

And the **Four** parameters indicated below were computed by using “CEOP Derived Parameter Equations: [http://www.joss.ucar.edu/ghp/ceopdm/refdata\\_report/eqns.html](http://www.joss.ucar.edu/ghp/ceopdm/refdata_report/eqns.html)”. Also put the data flag “I”,

**Dew Point Temperature** is computed by using (Bolton 1980):

$$es = 6.112 * \exp((17.67 * T)/(T + 243.5));$$

$$e = es * (RH/100.0);$$

$$Td = \log(e/6.112)*243.5/(17.67-\log(e/6.112));$$

where:

T = temperature in deg C;

es = saturation vapor pressure in mb;

e = vapor pressure in mb;

RH = Relative Humidity in percent;

Td = dew point in deg C

**Specific Humidity** is computed by using (Bolton 1980):

$$e = 6.112 * \exp((17.67 * Td)/(Td + 243.5));$$

$$q = (0.622 * e)/(p - (0.378 * e));$$

where:

e = vapor pressure in mb;

Td = dew point in deg C;

p = surface pressure in mb;

q = specific humidity in kg/kg.

**U,V Components** were computed by using (GEMPAK):

$$U = -\sin(\text{direction}) * \text{wind\_speed};$$

$$V = -\cos(\text{direction}) * \text{wind\_speed};$$

**NET radiation** (GEMPAK):

$$\text{NET\_radiation} = \text{down (in) short} + \text{down (in) long} - \text{up (out) short} - \text{up (out) long};$$

### 3.3 Data Format Description

[http://www.joss.ucar.edu/ghp/ceopdm/refdata\\_report/ceop\\_met\\_tower\\_format.html](http://www.joss.ucar.edu/ghp/ceopdm/refdata_report/ceop_met_tower_format.html)

## 4.0 QUALITY CONTROL PROCEDURES

For all parameters, the data has been visually checked, looking for extremely and unusual low/high values and/or periods with constant values thorough the CAMP Quality Control Web Interface.

The quality control flags follow the CEOP data flag definition document.

## 5.0 GAP FILLING PROCEDURES

No gap filling procedure was applied.

## 6.0 DATA REMARKS

### 6.1 PI's assessment of the data

#### 6.1.1 Instruments problems

None.

#### 6.1.2 Quality issues

## 7.0 REFERENCE REQUIREMENTS

Original data was collected and is provided by the Coordinated Enhanced Observation Period (CEOP) Asian Monsoon Project (CAMP) supported by Japan Science and Technology Agency (JST).

## 8.0 REFERENCES

None.

## 9.0 Missing Data Periods

-----  
File Name : CAMP\_ChaoPhrayaRiver\_Lampang\_20021001\_20030331.twr  
Data Period : 2002/10/01 00:00 - 2003/03/31 23:00  
-----

Station Pressure (12.00m)  
No missing data.

Station Pressure (22.00m)  
No missing data.

Station Pressure (24.00m)  
No missing data.

Air Temperature (12.00m)  
No missing data.

Air Temperature (22.00m)  
No missing data.

Air Temperature (24.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

Dew Point Temperature (12.00m)  
No missing data.

Dew Point Temperature (22.00m)  
No missing data.

Dew Point Temperature (24.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

Relative Humidity (12.00m)  
No missing data.

Relative Humidity (22.00m)  
No missing data.

Relative Humidity (24.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

Specific Humidity (12.00m)  
No missing data.

Specific Humidity (22.00m)  
No missing data.

Specific Humidity (24.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

Wind Speed (12.00m)  
No missing data.

Wind Speed (22.00m)  
No missing data.

Wind Speed (24.00m)  
No missing data.

Wind Direction (12.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

Wind Direction (22.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

Wind Direction (24.00m)  
No missing data.

U Wind Component (12.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

U Wind Component (22.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

U Wind Component (24.00m)  
No missing data.

V Wind Component (12.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

V Wind Component (22.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

V Wind Component (24.00m)  
No missing data.

## TITLE

CAMP\_ChaoPhrayaRiver\_Lampang\_20030401\_20030930.twr

## CONTACT

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## DATE OF THIS DOCUMENT

29 May 2006

## 1. 0 DATASET OVERVIEW

### 1.7 Introduction

To clarify the energy and water cycle in the Thailand, it is important to understand the characteristics of the basic meteorological elements.

The purpose of Lampang PBL-Tower (Planetary Boundary Layer -Tower) observation is to monitor these meteorological values and analysis the mechanisms of the energy and water cycle in the Teak Forest in tropical Monsoon areas.

### 1.8 Time period covered by the data

Start: 1 April 2003, 00:00  
End: 30 September 2003, 23:00

### 1.9 Temporal characteristics of the data

All parameters are recoded every hour.

### 1.10 Physical location of the measurement

Latitude : 18.40 N  
Longitude : 99.47 E  
Elevation : 241.0m a.s.l.  
Landscape : Deciduous Tropical Monsoon Forest (38 year old Teak plantation)  
Canopy height : About 17 m  
Soil Characteristics: Sandy soil

### 1.11 Data source

### 1.12 WWW address references

None

## 2.0 INSTRUMENTATION DESCRIPTION

### 2.1 Platform

The sensors are mounted on several heights.

### 2.2 Description of the instrumentation

Parameter	Model	Manufacturer
Station Pressure	PTB220C	VAISALA
Air Temperature	TS-801(pt100)	Okazaki
Relative Humidity	HMP45D	VAISALA
Wind Speed	3 cup anemometer(VS-125) Propeller type(WS-D32)	Komatsu Komatsu
Wind Direction	WS-D32	Komatsu

### 2.4 Instrumentation specification

Station Pressure (0m) : Station Pressure at the 0 m height (hPa)  
Air Temperature (22m) : Air Temperature at the 22m height (deg.C)  
Air Temperature (12m) : Air Temperature at the 12m height (deg.C)  
Relative Humidity (12m) : Relative Humidity at the 12m height (%)  
Relative Humidity (22m) : Relative Humidity at the 22m height (%)  
Wind Speed (24m) : Wind Speed at the 24m height (m/s)  
Wind Direction (24m) : Wind Direction at the 24m height (deg.)  
Wind Speed (22m) : Wind Speed at the 22m height (m/s)  
Wind Speed (12m) : Wind Speed at the 12m height (m/s)

## 3.0 DATA COLLECTION AND PROCESSING

### 3.1 Description of data collection

Observed Data are sent to the data manager everyday using E-mail tele-communication system established by the Tokyo University of Agriculture and Technology.

### 3.2 Description of derived parameters and processing techniques used

All the data are averaged/accumulated previous 1 hour.

**Station Pressure** is measured using a capacitive absolute pressure sensor, a kind of aneroid type barometer. When the pressure changes, the silicon diaphragm bend and changes the height of the vacuum gap in the sensor. This changes the capacitance of the sensor, which is measured and converted into a pressure reading.

**Air temperature** is measured using a Pt100 resistance thermometer.

**Relative humidity** is measured by using a thin-film polymer sensor. The thin polymer film either absorbs or releases water vapor as the relative humidity of the ambient air rises or drops. The dielectric properties of the polymer film depend on the amount of water contained in it: as the relative humidity changes the dielectric properties of the film change



and so the capacitance of the sensor changes. The electronics of the instrument measure the capacitance of the sensor and convert it into a humidity reading.

**Wind speed and direction** is measured using a 3-cup anemometer.

And the Four parameters indicated below were computed by using "CEOP Derived Parameter Equations: [http://www.joss.ucar.edu/ghp/ceopdm/refdata\\_report/eqns.html](http://www.joss.ucar.edu/ghp/ceopdm/refdata_report/eqns.html)". Also put the data flag "I",

**Dew Point Temperature** is computed by using (Bolton 1980):

$$e_s = 6.112 * \exp((17.67 * T)/(T + 243.5));$$

$$e = e_s * (RH/100.0);$$

$$T_d = \log(e/6.112) * 243.5 / (17.67 - \log(e/6.112));$$

where:

T = temperature in deg C;

e<sub>s</sub> = saturation vapor pressure in mb;

e = vapor pressure in mb;

RH = Relative Humidity in percent;

T<sub>d</sub> = dew point in deg C

**Specific Humidity** is computed by using (Bolton 1980):

$$e = 6.112 * \exp((17.67 * T_d)/(T_d + 243.5));$$

$$q = (0.622 * e) / (p - (0.378 * e));$$

where:

e = vapor pressure in mb;

T<sub>d</sub> = dew point in deg C;

p = surface pressure in mb;

q = specific humidity in kg/kg.

**U,V Components** were computed by using (GEMPAK):

$$U = -\sin(\text{direction}) * \text{wind\_speed};$$

$$V = -\cos(\text{direction}) * \text{wind\_speed};$$

**NET radiation** (GEMPAK):

$$\text{NET\_radiation} = \text{down (in) short} + \text{down (in) long} - \text{up (out) short} - \text{up (out) long};$$

## 4.0 QUALITY CONTROL PROCEDURES

For all parameters, the data has been visually checked, looking for extremely and unusual low/high values and/or periods with constant values thorough the CAMP Quality Control Web Interface.

The quality control flags follow the CEOP data flag definition document.

## 5.0 GAP FILLING PROCEDURES

No gap filling procedure was applied.

## 6.0 DATA REMARKS

### 6.1 PI's assessment of the data

### 6.1.1 Instruments problems

None.

### 6.1.2 Quality issues

## 7.0 REFERENCE REQUIREMENTS

Original data was collected and is provided by the Coordinated Enhanced Observation Period (CEOP) Asian Monsoon Project (CAMP) supported by Japan Science and Technology Agency (JST).

## 8.0 REFERENCES

None.

## 9.0 Missing Data Periods

-----  
File Name : CAMP\_ChaoPhrayaRiver\_Lampang\_20021001\_20030331.twr  
Data Period : 2002/10/01 00:00 - 2003/03/31 23:00  
-----

Station Pressure (12.00m)  
No missing data.

Station Pressure (22.00m)  
No missing data.

Station Pressure (24.00m)  
No missing data.

Air Temperature (12.00m)  
No missing data.

Air Temperature (22.00m)  
No missing data.

Air Temperature (24.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

Dew Point Temperature (12.00m)  
No missing data.

Dew Point Temperature (22.00m)  
No missing data.

Dew Point Temperature (24.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

Relative Humidity (12.00m)  
No missing data.

Relative Humidity (22.00m)  
No missing data.

Relative Humidity (24.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

Specific Humidity (12.00m)  
No missing data.

Specific Humidity (22.00m)  
No missing data.

Specific Humidity (24.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

Wind Speed (12.00m)  
No missing data.

Wind Speed (22.00m)  
No missing data.

Wind Speed (24.00m)  
No missing data.

Wind Direction (12.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

Wind Direction (22.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

Wind Direction (24.00m)  
No missing data.

U Wind Component (12.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

U Wind Component (22.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

U Wind Component (24.00m)  
No missing data.

V Wind Component (12.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

V Wind Component (22.00m)  
2002/10/01 00:00 - 2003/03/31 23:00 (ALL)

V Wind Component (24.00m)  
No missing data.

## TITLE

CAMP\_ChaoPhrayaRiver\_Lampang\_20031001\_20041231.twr

## CONTACT

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Fax : +81-42-367-6078  
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## DATE OF THIS DOCUMENT

29 Nov 2006

## 1. 0 DATASET OVERVIEW

### 1.13 Introduction

To clarify the energy and water cycle in the Thailand, it is important to understand the characteristics of the basic meteorological elements.

The purpose of Lampang PBL-Tower (Planetary Boundary Layer -Tower) observation is to monitor these meteorological values and analysis the mechanisms of the energy and water cycle in the Teak Forest in tropical Monsoon areas.

### 1.14 Time period covered by the data

Start: 1 October 2003, 00:00  
End: 31 December 2004, 23:00

### 1.15 Temporal characteristics of the data

All parameters are recoded every hour.

### 1.16 Physical location of the measurement

Latitude : 18.40 N  
Longitude : 99.47 E  
Elevation : 241.0m a.s.l.  
Landscape : Deciduous Tropical Monsoon Forest (38 year old Teak plantation)  
Canopy height : About 17 m  
Soil Characteristics: Sandy soil

### 1.17 Data source

### 1.18 WWW address references

None

## 2.0 INSTRUMENTATION DESCRIPTION

### 2.1 Platform

The sensors are mounted on several heights.

### 2.2 Description of the instrumentation

Parameter	Model	Manufacturer
Station Pressure	PTB220C	VAISALA
Air Temperature	TS-801(pt100)	Okazaki
Relative Humidity	HMP45D	VAISALA
Wind Speed	3 cup anemometer(VS-125) Propeller type(WS-D32)	Komatsu Komatsu
Wind Direction	WS-D32	Komatsu

### 2.5 Instrumentation specification

Station Pressure (0m) : Station Pressure at the 0 m height (hPa)  
Air Temperature (22m) : Air Temperature at the 22m height (deg.C)  
Air Temperature (12m) : Air Temperature at the 12m height (deg.C)  
Relative Humidity (12m) : Relative Humidity at the 12m height (%)  
Relative Humidity (22m) : Relative Humidity at the 22m height (%)  
Wind Speed (24m) : Wind Speed at the 24m height (m/s)  
Wind Direction (24m) : Wind Direction at the 24m height (deg.)  
Wind Speed (22m) : Wind Speed at the 22m height (m/s)  
Wind Speed (12m) : Wind Speed at the 12m height (m/s)

## 3.0 DATA COLLECTION AND PROCESSING

### 3.1 Description of data collection

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**Air temperature** is measured using a Pt100 resistance thermometer.

**Relative humidity** is measured by using a thin-film polymer sensor. The thin polymer film either absorbs or releases water vapor as the relative humidity of the ambient air rises or drops. The dielectric properties of the polymer film depend on the amount of water

contained in it: as the relative humidity changes the dielectric properties of the film change and so the capacitance of the sensor changes. The electronics of the instrument measure the capacitance of the sensor and convert it into a humidity reading.

**Wind speed and direction** is measured using a 3-cup anemometer.

And the Three parameters indicated below were computed by using "CEOP Derived Parameter Equations: [http://www.joss.ucar.edu/ghp/ceopdm/refdata\\_report/eqns.html](http://www.joss.ucar.edu/ghp/ceopdm/refdata_report/eqns.html)". Also put the data flag "I",

**Dew Point Temperature** is computed by using (Bolton 1980):

$$e_s = 6.112 * \exp((17.67 * T)/(T + 243.5));$$
$$e = e_s * (RH/100.0);$$
$$T_d = \log(e/6.112) * 243.5 / (17.67 - \log(e/6.112));$$

where:

- T = temperature in deg C;
- $e_s$  = saturation vapor pressure in mb;
- e = vapor pressure in mb;
- RH = Relative Humidity in percent;
- $T_d$  = dew point in deg C

**Specific Humidity** is computed by using (Bolton 1980):

$$e = 6.112 * \exp((17.67 * T_d)/(T_d + 243.5));$$
$$q = (0.622 * e) / (p - (0.378 * e));$$

where:

- e = vapor pressure in mb;
- $T_d$  = dew point in deg C;
- p = surface pressure in mb;
- q = specific humidity in kg/kg.

**U,V Components** were computed by using (GEMPAK):

$$U = -\sin(\text{direction}) * \text{wind\_speed};$$
$$V = -\cos(\text{direction}) * \text{wind\_speed};$$

## 4.0 QUALITY CONTROL PROCEDURES

For all parameters, the data has been visually checked, looking for extremely and unusual low/high values and/or periods with constant values thorough the CAMP Quality Control Web Interface.

The quality control flags follow the CEOP data flag definition document.

## 5.0 GAP FILLING PROCEDURES

No gap filling procedure was applied.

## 6.0 DATA REMARKS

### 6.1 PI's assessment of the data

#### 6.1.1 Instruments problems

None.

### 6.1.2 Quality issues

## 7.0 REFERENCE REQUIREMENTS

Original data was collected and is provided by the Coordinated Enhanced Observation Period (CEOP) Asian Monsoon Project (CAMP) supported by Japan Science and Technology Agency (JST).

## 8.0 REFERENCES

None.

## 9.0 Missing Data Periods

-----  
File Name : CAMP\_ChaoPhrayaRiver\_Lampang\_20031001\_20041231.twr  
Data Period : 2003/10/01 00:00 - 2004/12/31 23:00  
-----

### Station Pressure

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)



Air Temperature (12.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)

Air Temperature (22.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)

2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)

Dew Point Temperature (12.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)

Dew Point Temperature (22.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)

2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)

Relative Humidity (12.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)

Relative Humidity (22.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00

2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)

#### Specific Humidity (12.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)

Specific Humidity (22.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)

Wind Speed (12.00m)

2003/10/03 18:00 - 2003/10/04 17:00 (24)  
2003/10/24 11:00 - 2003/11/20 17:00 (655)  
2003/12/14 18:00 - 2003/12/15 17:00 (24)  
2003/12/22 14:00 - 2003/12/24 01:00 (36)  
2003/12/31 03:00 - 2003/12/31 17:00 (15)  
2004/01/01 09:00  
2004/01/18 20:00 - 2004/01/21 10:00 (63)  
2004/01/24 18:00 - 2004/01/27 11:00 (66)  
2004/04/19 02:00 - 2004/06/30 11:00 (1738)  
2004/07/20 11:00 - 2004/07/21 03:00 (17)  
2004/07/24 10:00 - 2004/07/28 01:00 (88)  
2004/08/15 02:00 - 2004/08/16 08:00 (31)  
2004/08/20 02:00 - 2004/08/22 01:00 (48)  
2004/08/30 04:00 - 2004/08/31 01:00 (22)  
2004/09/02 02:00 - 2004/09/03 01:00 (24)  
2004/09/26 11:00 - 2004/09/28 10:00 (48)  
2004/10/05 02:00 - 2004/10/06 10:00 (33)  
2004/10/24 11:00 - 2004/10/26 10:00 (48)  
2004/11/02 02:00 - 2004/11/03 10:00 (33)  
2004/11/06 11:00 - 2004/11/12 10:00 (144)  
2004/11/14 00:00 - 2004/11/14 02:00 (3)

2004/11/14 19:00 - 2004/11/15 02:00 (8)  
2004/11/15 22:00 - 2004/11/16 03:00 (6)  
2004/11/20 11:00 - 2004/11/27 10:00 (168)  
2004/12/05 03:00 - 2004/12/08 10:00 (80)  
2004/12/26 00:00 - 2004/12/26 10:00 (11)  
2004/12/31 18:00 - 2004/12/31 23:00 (6)

Wind Speed (22.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)

Wind Speed (24.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)

2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)

#### Wind Direction (24.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)

#### U Wind Component (24.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)

2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)

#### V Wind Component (24.00m)

2003/10/03 17:00 - 2003/10/04 16:00 (24)  
2003/10/24 10:00 - 2003/11/20 16:00 (655)  
2003/12/14 17:00 - 2003/12/15 16:00 (24)  
2003/12/22 13:00 - 2003/12/24 00:00 (36)  
2003/12/31 02:00 - 2003/12/31 16:00 (15)  
2004/01/01 08:00  
2004/01/18 19:00 - 2004/01/21 09:00 (63)  
2004/01/24 17:00 - 2004/01/27 10:00 (66)  
2004/04/19 01:00 - 2004/06/30 10:00 (1738)  
2004/07/20 10:00 - 2004/07/21 02:00 (17)  
2004/07/24 09:00 - 2004/07/28 00:00 (88)  
2004/08/15 01:00 - 2004/08/16 07:00 (31)  
2004/08/20 01:00 - 2004/08/22 00:00 (48)  
2004/08/30 03:00 - 2004/08/31 00:00 (22)  
2004/09/02 01:00 - 2004/09/03 00:00 (24)  
2004/09/26 10:00 - 2004/09/28 09:00 (48)  
2004/10/05 01:00 - 2004/10/06 09:00 (33)  
2004/10/24 10:00 - 2004/10/26 09:00 (48)  
2004/11/02 01:00 - 2004/11/03 09:00 (33)  
2004/11/06 10:00 - 2004/11/12 09:00 (144)  
2004/11/13 23:00 - 2004/11/14 01:00 (3)  
2004/11/14 18:00 - 2004/11/15 01:00 (8)  
2004/11/15 21:00 - 2004/11/16 02:00 (6)  
2004/11/20 10:00 - 2004/11/27 09:00 (168)  
2004/12/05 02:00 - 2004/12/08 09:00 (80)  
2004/12/25 23:00 - 2004/12/26 09:00 (11)  
2004/12/31 17:00 - 2004/12/31 23:00 (7)