

TITLE

CAMP_Himalayas_Pheriche_20080101_20081231.sfc

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1. 0 DATASET OVERVIEW

1.1 Introduction

Intensive meteorological observations in the Khumbu Valley, Nepal Himalayas, have been conducted since the middle 90's (Ueno et al., 1996; Tartari et al., 1999; Bertolani et al., 2000; Ueno et al., 2001; Bollasina et al., 2002; Ueno and Pokhrel, 2002; Ueno et al. 2008; Ueno and Aryal) in order to provide long-term monitoring of the monsoon at high altitude. This area, being located on the windward side of the Range with respect to the Indian monsoon, is well exposed to the summer winds. The studies conducted have demonstrated that the region is a significant point of observation both of local climate and large-scale circulation. A network of Automated Weather Stations (AWSs) has been established in the Eastern Himalayas: the AWSs are located at different altitudes, over a 40 km stretch oriented approximately south to north.

1.2 Time period covered by the data

Start: January 1, 2008, 00:00
End: December 31, 2008, 23:00

1.3 Temporal characteristics of the data

All parameters are recorded hourly. Hour is UTC.

1.4 Physical location of the measurement

Latitude: 27° 53' 43.3" N
Longitude: 86° 49' 7.5" E
Elevation: 4260 m a.s.l.

1.5 Data source

Original data provided by the Ev-K2-CNR Committee.

1.6 WWW address references

<http://www.evk2cnr.org>

2.0 INSTRUMENTATION DESCRIPTION

2.1 Platform

The sensors are mounted on a 2-m and a 5-m masts.

2.2 Description of the instrumentation

| Parameter | Model | Manufacturer |
|------------------------------|--------|------------------------------|
| Air Temperature | DMA570 | Lsi-Lastem (Italy) |
| Precipitation | DQA035 | Lsi-Lastem (Italy) |
| Relative Humidity | DMA570 | Lsi-Lastem (Italy) |
| Atmospheric Pressure | CX115P | Lsi-Lastem (Italy) |
| Wind Speed | DNA022 | Lsi-Lastem (Italy) |
| Wind Direction | DNA022 | Lsi-Lastem (Italy) |
| Downward Shortwave Radiation | CM6B | Kipp&Zonen (The Netherlands) |

2.3 Instrumentation specification

| Parameter | Sensor Type | Height of sensor (m) | Accuracy | Resolution |
|------------------------------|------------------------|----------------------|-------------------------------------|------------|
| Air Temperature | Thermoresistance | 2 | 0.1°C | 0.025°C |
| Precipitation | Tipping Bucket | 1.5 | 1% (0-1 mm/min); 2% (1-3 mm/min) | 0.2 mm |
| Relative Humidity | Capacitive Plate | 2 | 2.5% | 0.2% |
| Atmospheric Pressure | Slice of Silica | 2 | 1 hPa | 0.1 hPa |
| Wind Speed | 3-cup anemometer | 5 | 0.1 m/s | 0.05 m/s |
| Wind Direction | Potentiometer | 5 | 1% | 0.1° |
| Downward Shortwave Radiation | Temperature Difference | 2 | 5% (daily total) | - |

3.0 DATA COLLECTION AND PROCESSING

3.1 Description of data collection

Data are downloaded from the AWS twice every year, in spring and autumn. Then, data are sent to Italy, where they are processed.

3.2 Description of derived parameters and processing techniques used

Temperature, relative humidity and solar radiation are instantaneous values. Precipitation is accumulated on the previous hour. Atmospheric pressure is averaged over the previous hour. Wind speed and direction are the *resulting* average speed and direction over the previous hour (calculated by the datalogger by means of data recorded every 5 seconds): this to minimize data unreliability due to sudden gusts. Both of them are calculated weighting the frequency distribution of both variables within each hour.

The three parameters indicated below were computed by using “CEOP Derived Parameter Equations” available at: http://www.joss.ucar.edu/ghp/ceopdm/refdata_report/eqns.html. These data have the flag “I”. In the case of calculated by using dubious value flagged “D”, the data flag was put D”.

Dew Point Temperature was computed by using (Bolton 1980):

$$\begin{aligned} es &= 6.112 * \exp((17.67 * T)/(T + 243.5)); \\ e &= es * (RH/100.0); \\ Td &= \log(e/6.112)*243.5/(17.67-\log(e/6.112)); \end{aligned}$$

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 was computed by using (Bolton 1980):

$$\begin{aligned} e &= 6.112*\exp((17.67*Td)/(Td + 243.5)); \\ q &= (0.622 * e)/(p - (0.378 * e)); \end{aligned}$$

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):

$$\begin{aligned} U &= -\sin(\text{direction}) * \text{wind_speed}; \\ V &= -\cos(\text{direction}) * \text{wind_speed}; \end{aligned}$$

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. Nocturnal radiation data has been checked for non-zero values; wind speed and direction for sensor freezing and/or unusual high values; precipitation data has been checked for delayed measurement due to the melting of solid precipitation. Where possible, cross-checking among the variation of different measured parameters (e.g., precipitation with relative humidity) was also

performed to assure the consistency among the variations of different variables under the same conditions.

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

Due to sensor freezing, in some cases wind speed and direction were recorded as 0 and 360, respectively, and, thus, considered bad. Sometimes, unusual high values were recorded and they were classified as bad. Due to slow melting of solid precipitation in the not-heated rain gauge, precipitation is sometimes recorded with delay in case of below-zero air temperature. Zero-precipitation is also recorded during snowfall if air temperature is below 0°C. All these data were considered dubious. There is a general tendency of the sensor to over-estimate relative humidity and to reach saturation conditions.

6.2 Missing data periods

All data are missing from October 24, 2008 at 11:00 to October 25, 2008 at 5:00.

In particular, due to sensor malfunctioning, in September and in October, many times, the data of relative humidity are missing only during the night hours. The relative humidity data are missing also from October 16, 2008 at 2:00 from October 19, 2008 at 8:00 and from October 21, 2008 at 2:00 to October 23, 2008 at 9:00.

Solar radiation data and total precipitation are missing also from June 4, 2008 at 9:00 to October 25, 2008 at 5:00.

Wind Speed and Direction data are missing in different periods during the year, in particular in January and February.

7.0 REFERENCE REQUIREMENTS

Original data was collected and is provided within the framework of the Ev-K2-CNR/NAST Joint Scientific and Technological Research Project, funded by Italian Ministries and National Research Council through the Ev-K2-CNR Committee.

8.0 REFERENCES

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