CEOP BALTEX Norunda Reference Site

1. IDENTIFICATION INFORMATION

Name	CEOP BALTEX Norunda Reference Site
Metadata Identifier	CEOP_BALTEX_Norunda20221122134008-DIAS20221121113753-en

2. CONTACT

2.1 CONTACT on DATASET

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2.2 CONTACT on PROJECT

2.2.1 Data Integration and Analysis System

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3. DOCUMENT AUTHOR

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4. DATASET CREATOR

Name	Dr. Meelis M lder
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5. DATE OF THIS DOCUMENT

2022-11-22

6. DATE OF DATASET

creation : 2010-03-31

7. DATASET OVERVIEW

7.1 Abstract

Norunda site, 60.08 N, 17.48 E, alt. 45 m.

7.2 Topic Category(ISO19139)

climatologyMeteorologyAtmosphere

7.3 Temporal Extent

Begin Date	2002-10-01 00:00:00
End Date	2003-09-30 23:59:00
Temporal Characteristics	30minute

7.4 Geographic Bounding Box

North bound latitude	60.08
West bound longitude	17.48
Eastbound longitude	17.48
South bound latitude	60.08

7.5 Grid

7.6 Geographic Description

7.7 Keywords

7.7.1 Keywords on Dataset

Keyword Type	Keyword	Keyword thesaurus Name
theme	Climate, Water	GEOSS

7.7.2 Keywords on Project

7.7.2.1 Data Integration and Analysis System

Keyword Type	Keyword	Keyword thesaurus Name
theme	DIAS > Data Integration and Analysis System	No_Dictionary

7.8 Online Resource

: http://www.eol.ucar.edu/projects/ceop/dm/insitu/sites/baltex/norunda/norunda/

file download : https://data.diasjp.net/dl/storages/filelist/dataset:124

7.9 Data Environmental Information

7.10 Distribution Information

name	version	specification
PRN	no information	CEOP Unified Format

8. DATA PROCESSING

8.1 Data Processing (1)

8.1.1 General Explanation of the data producer’s knowledge about the lineage of a dataset

SURFACE METEOROLOGY AND RADIATION INSTRUMENTATION AND DESCRIPTION:

Station pressure is measured at the automatic weather station site, 200 m South-West of the main tower. The instrument is a Paroscientific 1016B-01. Provisions are made against dynamic pressure effects. Calibration is done at KNMI. Instruments are replaced after 26 month. Accuracy is 0.1 hPa. Resolution is 0.1 hPa. Datalogging is with the KNMI XP1-SIAM Pressure.

Air Temperature Air temperature are measured at 1.5 m. Air temperature is measured with a KNMI Pt500-element in an unventilated KNMI temperature hut. This hut is open in construction. Heating of the sensor, the metal filter and the open hut improves the functioning during high humidity conditions.

Calibration is done at KNMI. Temperature sensors are replaced each 38 month. Accuracy is 0.1 oC. Resolution is 0.1 oC. Data logging is done with the KNMI XU2-SIAM Temperatuur/Vocht HMP243.

Dew point - (1.5 m derived)

Relative humidity is measured at 1.5 m with a Vaisala HMP243 heated relative humidity sensor with a metal filter in a separate Vaisala unventilated hut. This hut is open in construction. Heating of the sensor, the metal filter and the open hut improves the functioning during high humidity conditions. Calibration is done at KNMI. Dew point sensors are subject to contamination and drift of calibration this makes it nescessary to replace them each 8 month. Accuracy is 3.5% RH. Resolution is 0.1oC. Data logging is done with the KNMI XU2-SIAM Temperatuur/Vocht HMP243.

Specific humidity (1.5 m derived)

Wind speed is measured at 10 m. To avoid too large flow obstruction from the mast and the main building measurements are taken at two separate masts South (B-mast) and North (C-mast) of the main building. For each 10 minute interval instruments are selected that are best exposed to the undisturbed wind. Still some flow obstruction remains due to the presence of the tower and the supporting booms. Corrections are applied according to Wessels (1983). Corrections in the wind speed are maximal 3% and corrections in wind direction are maximal 3 degrees.

Wind speed is measured with the KNMI cup-anemometer. Cup diameter is 105 mm and the distance between the centre of the cups to the rotation axis is 100 mm. Wind direction is measured with the KNMI wind vane. Distance between axis and the outer side of the vane is 535 mm. The azimuth of the wind vane plugs at the tip of the booms are determined with a camera relative to distant objects at close to the horizon. The instruments are logged with the KNMI wind SIAM. Wind gusts are determined from a running 3 sec mean value. Calibration of the cup anemometers is done in the wind tunnel of KNMI. Wind vanes are balanced and the direction of the vane is tested. Sensors are replaced after 26 month. The cup anemometer contains a photo-chopper with 32 slits. The accuracy is 0.5 m/s. The treshold velocity is 0.5 m/s. The resolution is 0.1 m/s. The response length is 2.5 m. The wind vane contains a code disk. Accuracy is 3o. Resolution is 1o.

Wind direction is measured at 10 m. To avoid too large flow obstruction from the mast and the main building measurements are taken at two separate masts South (B-mast) and North (C-mast) of the main building. For each 10 minute interval instruments are selected that are best exposed to the undisturbed wind. Still some flow obstruction remains due to the presence of the tower and the supporting booms. Corrections are applied according to Wessels (1983). Corrections in the wind speed are maximal 3% and corrections in wind direction are maximal 3 degrees.

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U wind component (derived) (10 m)

V wind component (derived) (10 m)

Precipitation - Rain amount and duration is measured at the radation field South of the main tower. To surpress flow obstruction the rain gauge is positioned in a circular pit of 3 m diameter, wich is surrounded by a circular slope. Rain duration is derived from the rain gauge observations. Rain is measured with the KNMI rain gauge. Calibration is done at KNMI. Instruments are replaced after 14 month. Accuracy is 0.2 mm. Resolution is 0.1 mm. Datalogging is with the KNMI XR2-SIAM Neerslag.

Snow depth - Not Measured

Incoming shortwave radiation - Short wave upward and downward radiation are measured at the radiation field South of the tower at 1.5 m height. The downward looking sensor (albedo) is on a boom of 1 m length. The porting structure is painted black to get a wel defined radiation condition. Since December 2002 the instruments are ventilated and heated to avoid formation of dew, snow and rime. The instruments are Kipp&Zn CM11 pyranometers. Data logging is done with the KNMI XQ1/XD0/XF0-SIAM Radiation. Calibration is done at KNMI against a reference instrument which itself is calibrated at Davos (Switserland).

Outgoing shortwave radiation - Short wave upward and downward radiation are measured at the radiation field South of the tower at 1.5 m height. The downward looking sensor (albedo) is on a boom of 1 m length. The porting structure is painted black to get a wel defined radiation condition. Since

December 2002 the instruments are ventilated and heated to avoid formation of dew, snow and rime. The instruments are Kipp&Zn CM11 pyranometers. Data logging is done with the KNMI XQ1/XDO/XFO-SIAM Radiation. Calibration is done at KNMI against a reference instrument which itself is calibrated at Davos (Switserland).

Incoming longwave radiation - Long wave upward and downward radiation are measured at the radiation field South of the tower at 1.5 m height. The sensors are on a boom of xx m length. The instruments are mounted in one housing to get equal house temperatures. They are ventilated to avoid formation of dew, snow and rime and to minimise heating of the domes through irradiation. The domes are equipped with small thermistors. Corrections are applied for heating of the domes. The instruments are Eppley pyrgeometers (PIR). Data logging is done with the KNMI XLO-SIAM Eppley Radiation. Calibration is done in Davos (Switserland).

Outgoing longwave radiation - Long wave upward and downward radiation are measured at the radiation field South of the tower at 1.5 m height. The sensors are on a boom of xx m length. The instruments are mounted in one housing to get equal house temperatures. They are ventilated to avoid formation of dew, snow and rime and to minimise heating of the domes through irradiation. The domes are equipped with small thermistors. Corrections are applied for heating of the domes. The instruments are Eppley pyrgeometers (PIR). Data logging is done with the KNMI XLO-SIAM Eppley Radiation. Calibration is done in Davos (Switserland).

Net radiation (1.5 m; derived)

Skin temperature - Data is collected, but no information available.

Incoming Photosynthetically Active Radiation (PAR) - Not measured.

Outgoing Photosynthetically Active Radiation (PAR) - Not measured.

The tower for standard meteorological measurements (click for full resolution):

METEOROLOGICAL TOWER INSTRUMENTATION AND DESCRIPTION: The 10, 20, 40, 80, 140, and 200 m heights include observations of air temperature, dew point, relative humidity, specific humidity, wind speed, wind direction, U wind component, and V wind component. The 2 m height includes observations of air temperature, dew point, relative humidity, and specific humidity.

Station pressure - Surface pressure is measured at the automatic weather station site, 200 m South-West of the main tower. The instrument is a Paroscientific 1016B-01. Provisions are made against dynamic pressure effects. Calibration is done at KNMI. Instruments are replaced after 26 month. Accuracy is 0.1 hPa. Resolution is 0.1 hPa. Datalogging is with the KNMI XP1-SIAM Pressure.

Air Temperature - Air- and dewpoint temperature are measured at seven levels, 200, 140, 80, 40, 20, 10 and 1.5 m. The highest 4 levels are measured at the South-East booms of the main tower . The lowest three levels are measured at the B-mast, South of the main building. Air temperature is measured with a KNMI Pt500-element in an unventilated KNMI temperature hut. Dew point temperature is measured with a Vaisala HMP243 heated relative humidity sensor with a metal filter in a separate Vaisala unventilated hut. This hut is open in construction. The humidity data often overestimates during drying episodes after dew, fog or rain, because of a wet shielding or sensor. This may result in observed dewpoint temperatures higher than the air temperature. Heating of the sensor, the change to metal filter and the open hut improves the functioning during high humidity conditions.

Calibration is done at KNMI. Temperature sensors are replaced each 38 month. Accuracy is 0.1 oC. Resolution is 0.1 oC. Dew point sensors are subject to contamination and drift of calibration this makes it nescessary to replace them each 8 month. Accuracy is 3.5% RH. Resolution is 0.1oC. Data logging is done with the KNMI XU2-SIAM Temperatuur/Vocht HMP243.

Dew point (derived)

Relative humidity - Air- and dewpoint temperature are measured at seven levels, 200, 140, 80, 40, 20, 10 and 1.5 m. The highest 4 levels are measured at the South-East booms of the main tower . The lowest three levels are measured at the B-mast, South of the main building. Air temperature is measured with a KNMI Pt500-element in an unventilated KNMI temperature hut. Dew point temperature is measured with a Vaisala HMP243 heated relative humidity sensor with a metal filter in a separate Vaisala unventilated hut. This hut is open in construction. The humidity data often overestimates during drying episodes after dew, fog or rain, because of a wet shielding or sensor. This may result in observed dewpoint temperatures higher than the air temperature. Heating of the sensor, the change to metal filter and the open hut improves the functioning during high humidity conditions.

Calibration is done at KNMI. Temperature sensors are replaced each 38 month. Accuracy is 0.1 oC. Resolution is 0.1 oC. Dew point sensors are subject to contamination and drift of calibration this makes it nescessary to replace them each 8 month. Accuracy is 3.5% RH. Resolution is 0.1oC. Data logging is done with the KNMI XU2-SIAM Temperatuur/Vocht HMP243.

Specific humidity (derived)

Wind speed - Wind speed and wind direction is measured at six levels, 200, 140, 80, 40, 20 and 10 m. To avoid too large flow obstruction from the mast and the main building measurements are taken on booms in three different directions. At the levels 200, 140, 80 and 40 m the wind direction is measured at all three booms and wind speed is measured at two booms (South-West and North). At the levels 20 and 10 m the wind direction and wind speed are measured at two separate masts South (B-mast) and North (C-mast) of the main building. For each 10 minute interval instruments are selected that are best exposed to the undisturbed wind. Still some flow obstruction remains due to the presence of the tower and the supporting booms. Corrections are applied according to Wessels (1983). Corrections in the wind speed are maximal 3% and corrections in wind direction are maximal 3 degrees.

Wind speed is measured with the KNMI cup-anemometer. Cup diameter is 105 mm and the distance between the centre of the cups to the rotation axis is 100 mm. Wind direction is measured with the KNMI wind vane. Distance between axis and the outer side of the vane is 535 mm. The azimuth of the wind vane plugs at the tip of the booms are determined with a camera relative to distant objects at close to the horizon. The instruments are logged with the KNMI wind SIAM. Wind gusts are determined from a running 3 sec mean value. Calibration of the cup anemometers is done in the wind tunnel of KNMI. Wind vanes are balanced and the direction of the vane is tested. Sensors are replaced after 26 month. The cup anemometer contains a photo-chopper with 32 slits. The accuracy is 0.5 m/s. The treshold velocity is 0.5 m/s. The resolution is 0.1 m/s. The response length is 2.5 m. The wind vane contains a code disk. Accuracy is 3o. Resolution is 1o.

Wind direction - Wind speed and wind direction is measured at six levels, 200, 140, 80, 40, 20 and 10 m. To avoid too large flow obstruction from the mast and the main building measurements are taken on booms in three different directions. At the levels 200, 140, 80 and 40 m the wind direction is measured at all three booms and wind speed is measured at two booms (South-West and North). At the levels 20 and 10 m the wind direction and wind speed are measured at two separate masts South (B-mast) and North (C-mast) of the main building. For each 10 minute interval instruments are selected that are best exposed to the undisturbed wind. Still some flow obstruction remains due to the presence of the tower and the supporting booms. Corrections are applied according to Wessels (1983). Corrections in the wind speed are maximal 3% and corrections in wind direction are maximal 3 degrees.

Wind speed is measured with the KNMI cup-anemometer. Cup diameter is 105 mm and the distance between the centre of the cups to the rotation axis is 100 mm. Wind direction is measured with the KNMI wind vane. Distance between axis and the outer side of the vane is 535 mm. The azimuth of the wind vane plugs at the tip of the booms are determined with a camera relative to distant objects at close to the horizon. The instruments are logged with the KNMI wind SIAM. Wind gusts are determined from a running 3 sec mean value. Calibration of the cup anemometers is done in the wind tunnel of KNMI. Wind vanes are balanced and the direction of the vane is tested. Sensors are replaced after 26 month. The cup anemometer contains a photo-chopper with 32 slits. The accuracy is 0.5 m/s. The treshold velocity is 0.5 m/s. The resolution is 0.1 m/s. The response length is 2.5 m. The wind vane contains a code disk. Accuracy is 3o. Resolution is 1o.

U wind component (derived)

V wind component (derived)

The Cabauw Tower (on right; click for full resolution):

FLUX INSTRUMENTATION AND DESCRIPTION: Turbulent surface fluxes are measured at 5 m height approximately 200 m South of the 200 m main tower. A sonic anemometer/thermometer is used to measure turbulent fluctuations of the three wind components and (sonical) temperature. The sonical temperature is measured along the vertical transducer pair. An open path infrared fluctuation meter is used to measure turbulent fluctuations of humidity and carbondioxide. The sonic anemometer has an azimuthal opening angle of 120o for horizontal wind measurements. The open path sensor is positioned vertically just behind the sonic probe at a distance of 0.3 m from the vertical sonical path. The instruments are mounted on a 1 m thin vertical cylinder to avoid a too strong flow obstruction due to the supporting mast. The vertical cylinder is supported by a rotator which is controlled by a wind direction tracking system and automatically turned into the mean wind direction each 2 hours. An inclinometer is positioned between the rotator and the supporting cylinder. The instrument are positioned vertically within 1 degree.

The sonic anemometer is a Kaijo-Denki, probe type TR60-A, electronic unit DAT-300 or DAT-600. The sonic path is 0.2 m. Resolution is 0.1 K. The H2O/CO2-sensor is a KNMI Infrared Fluctuation meter. Pathlength is 0.3 m. Resolution is 0.003 g/m3 H2O and 0.15 ppm CO2.

Calibration of the sonic anemometer is done, approximately each second year, in a wind tunnel of TNO-Apeldoorn. The temperature, humidity and co2 calibration is done at KNMI also approximately each second year.

Sensible Heat Flux (5.37 m)

Latent Heat Flux (5.37 m)

CO2 Flux (5.37 m)

Soil Heat Flux (0, -5, -10 cm) - Soil heat flux is measured at the soil-terrain, 100 m South of the main tower, with six soil heat flux plates. The six plates are burried at the three vertices of an equilateral triangle with sides of 2 m at depths of 0.05 and 0.10 m.

The instruments are manufactured by TNO-Delft. Type: WS31S, principle: thermo-pile, diameter 0.11 m, thickness 5 mm, sensitive surface: central square of 25*25 mm2. Calibration is done by TNO-Delft.

Flux tower (on left; click for full resolution):

SOIL INSTRUMENTATION AND DESCRIPTION: Soil measurements are performed west of the radiation measurements.

Soil temperature (-0.04, -0.08, -0.12, -0.20, -0.30, and -0.50 m) - Soil temperatures are measured at the soil-terrain 100 m South of the main tower. The temperature needles are burried horizontally at depths of 0.04, 0.08, 0.12, 0.20, 0.30 and 0.50 m.

Instruments are manufactured at KNMI. They are Nickle wired needles with an electric resistance of 500 Ohm and a sensitive length of 0.35 m. Calibration is done at KNMI. Datalogging is at a Campbell Scientific CR21X datalogger.

Soil moisture (-0.20 m starting 6 December 2002). Soil water content is measured at the soil-terrain, 100 m South of the main tower, with a TDR-sensor at a depth of 0.20 m.

The instruments are manufactured by Campbell Scientific. TypeCS615, principle: Time domain reflectometry, rod length = 30 cm, width between the two rods: 32 mm. Calibration is done by Campbell Scientific. Data logging is with a Campbell Scientific CR21X datalogger. Measurements are taken 5 times in a 10 minute interval. Averages over 10 minutes are saved.

RADIOSONDE INSTRUMENTATION AND DESCRIPTION: The radiosonde is of type Vaisala RS90-Loran C. The files contain operational ascents at 10 sec. resolution. Quantities archived are: pressure (hPa), geopotential height (m), temperature (C), dew point temperature (C), relative humidity (%), wind speed (m/s) and wind direction (degrees).

Radiosondes are launched in principle two times a day (12 and 24 h UTC).

8.1.2 Data Source

Data Source Citation Name	Description of derived parameters and processing techniques used

9. DATA REMARKS

10. DATA POLICY

10.1 Data Policy by the Data Provider

1. No financial implications are involved for the CEOP reference site data exchange.

2. Commercial use and exploitation of CEOP reference site data is prohibited.

3. Any re-export or transfer of the original data received from the CDA archive to a third party is prohibited.

4. The origin of CEOP reference site data being used for publication of scientific results must be acknowledged and referenced in the publication.

5. CEOP reference site data users are strongly encouraged to establish direct contact with data providers for complete interpretation and analysis of data for publication purposes.

6. Co-authorship of data users and CEOP reference site Principle Investigators on papers making extensive use of CEOP data is justifiable and highly recommended.

see http://www.eol.ucar.edu/projects/ceop/dm/documents/ceop_policy.html

10.2 Data Policy by the Project

10.2.1 Data Integration and Analysis System

If data provider does not have data policy, DIAS Terms of Service (https://diasjp.net/en/terms/) and DIAS Privacy Policy (https://diasjp.net/en/privacy/) apply.

If there is a conflict between DIAS Terms of Service and data provider’s policy, the data provider’s policy shall prevail.

11. LICENSE

12. DATA SOURCE ACKNOWLEDGEMENT

12.1 Acknowledge the Data Provider

A minimum requirement is to reference CEOP as:

The in-situ data is provided under the framework of the ”Coordinated Energy and Water Cycle Observations Project (CEOP).”

for the Coordinated Energy and Water Cycle Observations Project data (2005), and as:

The satellite data is provided under the framework of the ”Coordinated Enhanced Observing Period (CEOP).”

for the Coordinated Enhanced Observing Period data (2001 - 2004).

12.2 Acknowledge the Project

12.2.1 Data Integration and Analysis System

If you plan to use this dataset for a conference presentation, paper, journal article, or report etc., please include acknowledgments referred to following examples. If the data provider describes examples of acknowledgments, include them as well.

” In this study, [Name of Dataset] provided by [Name of Data Provider] was utilized. This dataset was also collected and provided under the Data Integration and Analysis System (DIAS), which was developed and operated by a project supported by the Ministry of Education, Culture, Sports, Science and Technology. ”

13. REFERENCES