TARFALA RESEARCH STATION

Tarfala RS AWS

METADATA REPORT

February, 2019

Contents

1 Station setup

1.1 History and aim

The *Tarfala RS AWS* (Fig.1) was established in September 2013. It stands on the Eastern side of Tarfala research station (TRS) (*SWEREF99TM*, N7537422, E1651517, $1143\,\mathrm{m}$ a.s.l.) The station replaces the *Tarfala Met* station which stood on the Northern side of TRS until September 2017.

Figure. 1. The automatic weather station in summer (left) and winter (right). The photo is taken towards Northeast.

1.2 Instrumentation

The station setup is automatic and the data is saved in a ***Campbell Scientific*** *data logger* and continuously downloaded to a TRS server and uploaded online. This raw data can be viewed at *tarfala.insitu.se*. The stations consists of the instruments listed in Table 1.

Table. 1. Instrumentation setup at Tarfala RS AWS.

Instrument	Active	Sensor accuracy
CR1000, Data logger	Sep. 2013– ongoing	
HC2S3, Temperature and Relative Humidity Probe	Sep. 2013– ongoing	$\pm$ 0.1–0.3°C, $\pm$ 0.8–3.3%
HC2S3, Temperature and Relative Humidity Probe*	Sep. 2013– ongoing	$\pm$ 0.1–0.3°C, $\pm$ 0.8–3.3%
ML-01, Si-Pyranometer	Sep. 2013– ongoing	$\pm$ 5%
05108, Wind Monitor (HD-Alpine)	Sep. 2013– ongoing	$\pm$ 0.3–1.0$\mathrm{m\,s^{-1}}$, $\pm$ 3°
52203, Tipping Bucket Raingauge	Sep. 2013– ongoing	$\pm$ 2–3%
Setra 278, Barometric Pressure Transducer	Sep. 2013– ongoing	$\pm$ 1.5hPa

*ventilated

2 Data management

2.1 Data file description

The data is presented as files with *comma-separated values* (csv). One file has retained the log interval but with an automatic removal of distinctly unreliable values (section 2.2) and one file with calculated hourly values. Table 2 translate the column headers of the data files.

*Table. 2. Header translation of the csv-files. The header consists of a **parameter abbreviation** (first), a **statistical method** (last) and an additional number if several measurements of the same parameter exists (middle). All header components are separated by an underscore.*

Header component	Description	Unit
TIMESTAMP	Date and time (yyyy-mm-dd HH:MM)	
aT	Air temperature	$^{\circ}\mathrm{C}$
aTv	Air temperature, ventilated	$^{\circ}\mathrm{C}$
RH	Relative humidity	$\%$
RHv	Relative humidity, ventilated	$\%$
SW	Incoming short wave radiation	$\mathrm{W\,m^{-2}}$
WS	Wind speed	$\mathrm{m\,s^{-1}}$
WD	Wind direction	$^{\circ}$
Prec	Rainfall	mm
BA	Barometric pressure	hPa
mom	Sample	
avg	Average	
tot	Total	
std	Standard deviation	
max	Highest measured value	
min	Lowest measured value	

2.2 Changes made to the raw data set

Before compiling the csv-files a Matlab script is run to remove indisputable errors in the data. For manually removed data a specific year, see the *readme*-file in that year's folder. **Note that errors may still occur in the data set**.

2.2.1 General

Automatic removal of general errors in the data:

— Gaps in data are filled with Time stamp and *NaN*

— Values equal -6999 (an error output from the Campbell Sc. data logger) are replaced with *NaN*

From the September 2013 to September 2017 the TRSAWS and the TarMet station ran simultaneously. During this period good values from TarMet are filled in where there are gaps in the TRSAWS data.

2.2.2 Temperature

Automatic removal of errors in the temperature data:

— Values outside the temperature sensor range (-40–60 $^{\circ}\mathrm{C}$) are replaced with *NaN*

— Values with a *moving standard deviation* (5 values) greater than 1.0 are replaced with NaN

2.2.3 Relative humidity

Automatic removal of errors in the relative humidity data:

— Values outside the relative humidity sensor range (0–100 $\%$) are replaced with *NaN*

— Values with a *moving standard deviation* (5 values) greater than 20 are replaced with *NaN*

2.2.4 Radiation

Automatic removal of errors in the radiation data:

— Values outside the short wave radiation sensor range (<2000 $\mathrm{W\,m^{-2}}$) are replaced with *NaN*

Additional calibration changes are done. Using values from *Swedish Meteorological and Hydrological Institute* (SMHI) shows that the differences between the sensors are greater than the sensor error range (September, 2017). A simple regression (Fig. 2) is done to fit the TRSAWS values to be within the sensor error range.

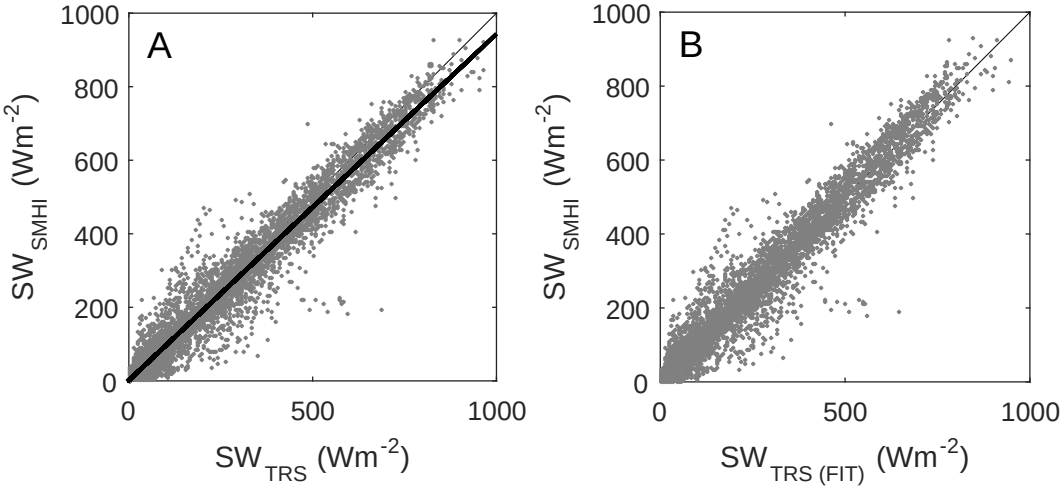

Figure. 2. Shortwave radiation at Tarfala research station recorded from the station (TRS) and from the Swedish Meteorological and Hydrological Institute (SMHI). ***A*** *shows the original data with the regression curve in black.* ***B*** *shows the data when TRS has been fitted agains the regression curve.*

2.2.5 Wind

Automatic removal of errors in the wind data:

— Values outside the wind speed sensor range (0–100 $\mathrm{m\,s^{-1}}$) are replaced with *NaN*

— Values outside the wind direction sensor range (0–360 $^\circ$ at wind speed $\geq$1.1 $\mathrm{m\,s^{-1}}$) are replaced with *NaN*

2.2.6 Precipitation

The precipitation data should be treated with caution. We suspect that the tipping bucket vibrates in high wind speeds. However, there is not always recorded high precipitation at high wind speeds and rain in high wind speeds are common. Therefore, pinpointing incorrect values is not possible. It is therefore likely that incorrect values exist in the data set.
Automatic removal of errors in the precipitation data:

— When the air temperature is below 1°C the precipitation values are replaced with *NaN*

2.2.7 Barometric pressure

Automatic removal of errors in the barometric pressure data:

— Values outside the barometric pressure sensor range are replaced with *NaN*