

The Kühtai data set: 25 years of lysimetric, snow pillow and meteorological measurements

Readme

This file presents a dataset of long-term observations from an experimental snow lysimeter plot in Kühtai (Austrian Alps). The data set includes 15 minutes data of snow water equivalent from a 10 m² snow pillow, snow melt outflow from a 10 m² snow lysimeter placed at the same location as the pillow, meteorological data (precipitation, incoming global radiation, reflected short wave radiation, air temperature, relative air humidity and wind speed), and other data (snow depths, snow temperatures at seven heights) from the period October, 1990 – May, 2015. All data have been quality checked, and gaps in the meteorological data have been filled in. The format of the data file (snowdata_kuhtai_1990-2015.txt) is a header indicating the variables names (columns) followed by the data values (in 15 minute time step). The delimiter is a semicolon. NA indicates missing values.

The column names represent:

- 1) DATE=Date in format DD.MM.YEAR
- 2) TIME=Time in format HH:MM
- 3) AIRT= air temperature (°C)
- 4) RH= relative air humidity (%)
- 5) GLO= incoming global radiation (W.m⁻²)
- 6) WS= wind speed (m.s⁻¹)
- 7) PREC= precipitation (mm/15min.)
- 8) SWE= snow water equivalent (mm) from snow pillow
- 9) LYSIM= lysimeter melt outflow (mm/15min.)
- 10) SND=snow depth (cm) measured by an ultrasonic device
- 11) SNDM=manually observed snow depth (cm) at 7:00
- 12) REFL=reflected shortwave radiation (W.m⁻²)
- 13) PST20= profile snow temperature at 20 cm height from the ground
- 14) PST40= profile snow temperature at 40 cm height from the ground
- 15) PST60= profile snow temperature at 60 cm height from the ground
- 16) PST80= profile snow temperature at 80 cm height from the ground
- 17) PST100= profile snow temperature at 100 cm height from the ground
- 18) PST120= profile snow temperature at 120 cm height from the ground
- 19) PST140= profile snow temperature at 140 cm height from the ground
- 20) F_AIRT=flag values for air temperature correction
- 21) F_RH=flag values for relative air humidity correction
- 22) F_GLO=flag values for incoming global radiation correction
- 23) F_WS=flag values for wind speed correction
- 24) F_PREC=flag values for precipitation correction
- 25) F_SWE=flag values for snow water equivalent correction
- 26) F_LYSIM=flag values for snow lysimeter outflow correction
- 27) F_SND=flag values for snow depth correction
- 28) F_REFL=flag values for reflected shortwave radiation
- 29) F_PST20=flag for removed profile snow temperature at 20cm height from ground
- 30) F_PST40=flag for removed profile snow temperature at 40cm height from ground

- 31) F_PST60=flag for removed profile snow temperature at 60cm height from ground
 32) F_PST80=flag for removed profile snow temperature at 80cm height from ground
 33) F_PST100=flag for removed profile snow temperature at 100cm height from ground
 34) F_PST120=flag for removed profile snow temperature at 120cm height from ground
 35) F_PST140=flag for removed profile snow temperature at 140cm height from ground

Table1 List of flag values and corresponding corrections.

Variable	Flag value	Description
Air temperature	11	Linear interpolation of gaps shorter than 1 hour (4 time steps)
Air temperature	12	Linear regression with data from Hoarlach Alm
Relative air humidity	13	Filling shorter gaps (less than 1 hour) by linear interpolation
Relative air humidity	14	Filling longer gaps by linear regression with data from Innsbruck University
Relative air humidity	15	Filling longer gaps by linear regression with data from Patscherkofel
Incoming global radiation, reflected shortwave radiation	21	Night values set to zero
Incoming global radiation	22	If albedo>1 incoming global radiation replaced by reflected shortwave radiation
Incoming global radiation	23	Filling shorter gaps (less than 1 hour) by linear interpolation
Incoming global radiation	24	Filling longer gaps by linear regression with data from Oberbergbach
Incoming global radiation	25	Filling longer gaps by linear regression with data from Innsbruck University
Incoming global radiation	26	Filling longer gaps by linear regression with data from Jenbach
Reflected shortwave radiation	27	Negative values are replaced by NA
Wind speed	31	Filling gaps by percentile matching with data from Innsbruck University
Wind speed	32	Filling gaps by percentile matching with data from Innsbruck Airport
Wind speed	33	Filling gaps by logarithmic rescaling of measurements at 10m height at Kühtai
Precipitation	41	Filling gaps with zero if precipitation zero at Hoarlach Alm and St. Sigmund im Sellrain
Precipitation	42	Filling gaps with zero if relative air humidity <50%
Precipitation	43	Filling gaps with zero if no change in snow depth and air temperature<0°C
Precipitation	44	Filling longer gaps by delta change procedure with data from Hoarlach Alm

Precipitation	45	Filling longer gaps by delta change procedure with data from St. Sigmund im Sellrain
Precipitation	46	Correcting and rescaling the precipitation difference to SWE, if daily increase in SWE>5 mm and the difference between daily precipitation and SWE was larger than 60%
Snow water equivalent	51	Correcting of SWE <2mm to zero
Snow water equivalent	52	Filling shorter gaps (less than 1 hour) by linear interpolation
Snow water equivalent	53	Filling and correcting SWE to zero if snow depth was zero
Snow water equivalent	54	Correcting (smoothing) diurnal SWE increase, if precipitation and snow depth change are zero
Lysimeter	55	Removing values if mass balance difference >50%
Snow depth	61	Removing artificial jumps larger than 50 cm
Snow depth	62	Marking difference between original and filtered snow depth
Profile snow temperature (20,40,60,80,100,120,140 cm)	71	Removing values if snow depth below the height of sensor
Profile snow temperature (20,40,60,80,100,120,140 cm)	72	Removing values if profile snow temperature>0°C