

ReadMe - PROMICE automatic weather station data

Data can be obtained at www.promice.org or from Dirk van As (dva@geus.dk). Questions and comments are most welcome.

Measurement/transmission intervals

The AWSs measure all variables (except those by GPS) every 10 minutes, and transmit hourly averages during summer (days 100-300) and daily averages during winter. Parameters of low variability (height, tilt, etc.) are transmitted (i.e. instantaneous values) every 6 hours in summer, and daily in winter. In the processing, values are calculated from raw logger data. Data gaps are filled making use of transmitted data, if possible. GPS measurements are taken and transmitted every 6 hours / day in summer / winter.

Measurement heights/depths

- Air temperature and humidity are measured at approximately the same height above the surface as recorded by the sonic ranger on the sensor boom (~2.7 m if no snow layer is present).
- Wind speed and direction are measured roughly 40 cm above the height recorded by the sonic ranger on the sensor boom (~3.1 m if no snow layer is present).
- The radiative fluxes are measured roughly 10 cm above the height recorded by the sonic ranger on the sensor boom (~2.8 m if no snow layer is present).
- The ice temperatures are recorded by thermistor string at roughly 1, 2, 3, 4, 5, 6, 7 and 10 m depth at installation. Note that the thermistor strings will melt out in the ablation zone.

Averages

- Daily averages are calculated from hourly averages, requiring a minimum of 20 values per day.
- Monthly averages are calculated from daily averages, requiring a minimum of 24 values per month.

Corrections and calculations

- Spikes in data are removed by setting upper and lower limits. Small spikes may still remain.
- Relative humidity is measured with respect to water. Data files also give relative humidity with values calculated with respect to ice (at sub-freezing temperatures).
- Solar radiation measurements are corrected for tilt (Van As, 2011) and used for albedo calculation (where instantaneous or hourly averages of shortwave radiation and tilt are available). These corrected values should be considered estimates due to the uncertainties in e.g. cloud cover calculation.
- Surface albedo is calculated when solar radiation hits the sensor at angles larger than 20°.
- Cloud cover is estimated from longwave radiation / near-surface air temperature relations. Clear-sky longwave radiation is estimated from temperature using Swinbank (1963), and overcast conditions are assumed to occur when down-welling longwave radiation exceeds the blackbody radiation using air temperature. Cloud cover for any temperature and longwave radiation measurement couple is calculated by linear interpolation between these theoretical clear-sky and overcast values.

- Surface temperature is calculated from up-welling longwave radiation assuming blackbody radiation properties for snow and ice surfaces.
- The sensitivity of sonic ranger readings to air temperature is removed.
- Depth by pressure transducer is corrected for air pressure variability.
- Daily and monthly mean values of GPS latitude, longitude and elevation are calculated for horizontal dilution of precision (HDOP) values smaller than 1, i.e. high precision values.

Nota bene

- The most recent values may be calculated from transmitted data and will be updated after the next station visit (improving data quality and coverage).
- Automatic weather stations occasionally get blown over or covered by snow, in which cases data quality for most parameters will be reduced. Data recorded after/during these periods are not taken out by the automatic processing routine, but may be clearly identifiable.
- There are two measurements of temperature within the same radiation shield. It is believed that the PT100 measurement is more accurate and less likely to experience offsets than the HygroClip measurement.
- The radiation shield is ventilated. Values for the current drawn by the fan are also given (except for TAS, QAS_L and NUK in 2007-2009). For currents below 50-100 mA the fan may not be working properly, causing temperature and relative humidity values to be less accurate under low wind conditions.
- During maintenance visits (in spring or summer) the stations may be moved/leveled. Variables such as height of depth will undergo an easily recognizable shift.

New in version 2 (v02)

- Correction of shortwave radiation are no longer calculated if it requires albedo extrapolation towards the end of the time series.
- Tilt values are only given when actually measured.