Daily/Hourly 2m average air temperature

MIN: -62.22 MAX: 46.11 UNITS: Degrees Celsius

TIME PERIOD: hourly or daily TIME ZONE: UTC

If the average air temperature is at 1.5m or 2m, both are considered to be 2m average air temperatures.

If the average air temperature is 1m or 3m, then

- If there is both a 1m and a 3m average air temperature, then
    - 2m average air temperature = (3m average air temperature - 1m average air temperature)/2 + 1m average air temperature
- If there is a 1m average air temperature and no 3m average air temperature, then
    - 2m average air temperature = 1m average air temperature

If there is a minimum and maximum air temperature:

- 2m average air temperature = (2m maximum air temperature – 2m minimum air temperature / 2 + 2m minimum air temperature

Daily 2m maximum air temperature

MIN: -66.22 MAX: 46.11 UNITS: Degrees Celsius

TIME PERIOD: daily TIME ZONE: UTC

If the maximum air temperature is at 1.5m or 2m, both are considered to be 2m maximum air temperatures.

If there is a 1m or 3m maximum air temperature, then

- If there is both a 1m and a 3m maximum air temperature data value, then
    - 2m maximum air temperature = (3m maximum air temperature - 1m maximum air temperature)/2 + 1m maximum air temperature
- If there is a 1m maximum air temperature and no 3m maximum air temperature, then
    - 2m maximum air temperature = 1m maximum air temperature

Daily 2m minimum air temperature

MIN: -66.22 MAX: 46.11 UNITS: Degrees Celsius

TIME PERIOD: daily TIME ZONE: UTC

If the minimum air temperature is at 1.5m or 2m, both are considered to be 2m minimum air temperatures.

If there is a 1m or 3m minimum air temperature, then

- If there is both a 1m and a 3m minimum air temperature, then
  - 2m minimum air temperature = (3m minimum air temperature - 1m minimum air temperature)/2 + 1m minimum air temperature
- If there is a 1m minimum air temperature and no 3m minimum air temperature, then
  - 2m minimum air temperature = 1m minimum air temperature

Daily/Hourly Average Relative Humidity (2m)

MIN: 0 MAX: 100 UNITS: %

TIME PERIOD: hourly or daily TIME ZONE: UTC

Given that:
at1m : 1m air temperature
at2m : hourly average air temperature
at3m : 3m air temperature
dew1m : 1m dew point temperature
dew2m : average 2m dew point temperature
dew3m: 3m dew point temperature
rel : hourly relative humidity

For only 1m air temperature and 1m relative humidity data values, the 2m average relative humidity would be the 1m average relative humidity.

If both the 1m and 3m air temperature are available, and the 1m and 3m relative humidity are available, then

1. Calculate the hourly dew point, **dew1** and **dew3**:

LOG((0.611*(EXP((17.3***at1m**)/(**at1m**+237.3))))*rh1m/100)+0.4926)/(0.0708-0.00421*LOG((0.611*(EXP((17.3***at1m**)/(**at1m**+237.3))))*rh1m/100)) as d**ew1m**

LOG((0.611*(EXP((17.3***at3m**)/(**at3m**+237.3))))*rh3m/100)+0.4926)/(0.0708-0.00421*LOG((0.611*(EXP((17.3***at3m**)/(**at3m**+237.3))))*rh3m/100)) as **dew3m**

2. Find the 2m dew point:

   (**dew3m-dew1m**)/2+**dew1m** = **dew2m**

3. Find the 2m average air temperature:

   (**at3m-at1m**)/2+**at1m = at2m**

If the 2m dew point temperature is not higher than the 2m air temperature, then calculate the average relative humidity, either over an hourly or daily time period, of all values in given time period:

(0.611 * EXP((17.3 * AVG(**dew2m**))/(AVG(**dew2m)** + 237.3))) / (0.611 * EXP((17.3 * AVG(**at2m)**)/(AVG(**at2m)** + 237.3))) * 100.0 as **rel**;

Daily/Hourly Wind Speed

MIN: 0 MAX: 50 UNITS: m/s

TIME PERIOD: hourly or daily TIME ZONE: UTC

Calculated average wind speed for the maximum offset available, for all non-NULL values, per hour or per day.

Daily/Hourly Average Wind Direction

MIN: 0 MAX:360 UNITS: Angular degrees

Calculate average wind direction for the maximum offset available, for all non-NULL values, per hour or per day.

1. Create vector components:
   x = AVG(Wind Speed * COS(Wind Direction * PI/180))
   y = AVG(Wind Speed * SIN(Wind Direction * PI/180))

2. Find offsets, used to go from vector back to radial:

if (x > 0 and y > 0) Offset=0
if (x < 0) Offset=180
if (x > 0) and y < 0) Offset=360

3. Calculate average wind direction

if x <> 0, and x and y are not null
Wind Direction = ARCTAN(y/x)*180/PI + Offset
else if x = 0
Wind Direction = 0
Else
Wind Direction = null

Daily/Hourly Average Snow Depth

MIN: 0 MAX 6.096 UNITS: meters

TIME PERIOD: hourly or daily TIME ZONE: UTC

Calculated average snow depth for all non-NULL values, per hour or per day.

Daily/Hourly Average Snow Water Equivalent

MIN: 0 MAX: 609.6 UNITS: mm

TIME PERIOD: hourly or daily TIME ZONE: UTC

Calculated average snow water equivalent for all non-NULL values, per hour or per day.

Procedure Daily Average Discharge

MIN: 0 MAX: UNITS: cms

Calculated average discharge for all non-NULL values, per hour or per day.

Hourly/Daily total precipitation

MIN: 0 MAX: 635 UNITS: mm

TIME PERIOD: daily TIME ZONE: UTC

Calculated total precipitation for all values, per hour or per day.

Daily Water Temperature

MIN: MAX: UNITS: degrees Celsius

TIME PERIOD: DAILY TIME ZONE: UTC

Calculated average water temperature for all non-NULL values, for all depths, per day.