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# Hourly Average Air Temperature (2m)

The hourly average air temperature (2m) is created from 1m, 1.5m, 2m and 3m air temperature data values.

The data values have been stored in ‘DAILY\_AirTempDatavalues ‘ table. These data values have been used to calculate daily,monthly, seasonal and yearly data values.

### Procedure

If the data value was a 1.5m or a 2m, both were considered to be 2m air temperature data values.

If the data value was 1m or 3m, then

* If there is both a 1m and a 3m average data value, then
  + Average data value = (3m average data value - 1m average data value)/2 + 1m average data value
* If there is a 1m average data value and no 3m average data value, then
  + Average data value = 1m average data value

If there is a MIN/MAX data value available:

* Average data value = (average maximum data value – average minimum data value ) / 2 + average minimum data value

### Units

Measurement units are Celsius.

Time units are daily

Time zone is UTC.

### Range Threshold

The range of data values in the VIEW ‘HOURLY\_AirTemp’ for the air temperatures (2m) daily data values is:

* Data value >= -66.22C and Data value <=46.11C

# Daily Average Air Temperature (2m)

The daily average air temperature (2m) is created from 1m, 1.5m, 2m and 3m air temperature data values.

The data values have been stored in ‘DAILY\_AirTempDatavalues ‘ table. These data values have been used to calculate monthly, seasonal and yearly data values.

### Procedure

If the data value was a 1.5m or a 2m, both were considered to be 2m air temperature data values.

If the data value was 1m or 3m, then

* If there is both a 1m and a 3m average data value, then
  + Average data value = (3m average data value - 1m average data value)/2 + 1m average data value
* If there is a 1m average data value and no 3m average data value, then
  + Average data value = 1m average data value

If there is a MIN/MAX data value available:

* Average data value = (average maximum data value – average minimum data value ) / 2 + average minimum data value

### Units

Measurement units are Celsius.

Time units are daily

Time zone is UTC.

### Range Threshold

The range of data values in the VIEW ‘DAILY\_AirTemp’ for the air temperatures (2m) daily data values is:

* Data value >= -66.22C and Data value <=46.11C

# Daily Maximum Air Temperature (2m)

The daily maximum air temperature (2m) is created from 1m, 1.5m, 2m and 3m air temperature data values.

The data values have been stored in ‘DAILY\_AirTempMaxDatavalues ‘ table. These data values have been used to calculate monthly, seasonal and yearly data values.

### Procedure

If the data value was a 1.5m or a 2m, both were considered to be 2m air temperature data values.

If the data value was 1m or 3m, then

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

### Units

Measurement units are Celsius.

Time units are daily

Time zone is UTC.

### Range Threshold

The range of data values in the VIEW ‘DAILY\_AirTempMax’ for the air temperatures (2m) daily data values is:

* Data value >= -66.22C and Data value <=46.11C

# Daily Minimum Air Temperature (2m)

The daily minimum air temperature (2m) is created from 1m, 1.5m, 2m and 3m air temperature data values.

The data values have been stored in ‘DAILY\_AirTempMinDatavalues ‘ table. These data values have been used to calculate monthly, seasonal and yearly data values.

### Procedure

If the data value was a 1.5m or a 2m, both were considered to be 2m air temperature data values.

If the data value was 1m or 3m, then

* If there is both a 1m and a 3m minimum data value, then
  + Minimum data value = (3m minimum data value - 1m minimum data value)/2 + 1m minimum data value
* If there is a 1m minimum data value and no 3m minimum data value, then
  + Minimum data value = 1m minimum data value

### Units

Measurement units are Celsius.

Time units are daily

Time zone is UTC.

### Range Threshold

The range of data values in the VIEW ‘DAILY\_AirTempMin’ for the air temperatures (2m) daily data values is:

* Data value >= -66.22C and Data value <=46.11C

# Hourly precipitation

The hourly precipitation data values are the total precipitation for one hour.

The data values are stored in ‘HOURLY\_PrecipDatavalues ‘ and are used to calculate daily,monthly, seasonal and yearly precipitations.

## Units

The measurement units are mm

Time units are hourly

Time zone is UTC.

Precipitation sensors are likely to have spurious data values, especially in the winter months. After reviewing various stations that had undergone quality control procedures, we decided it was worth the effort to apply thresholds by HUC regions. These thresholds are high enough that they will handle data values that are significantly higher than the climate normal, but will take into consideration the wide range of precipitation amounts that can occur in Alaska.

## Region 1

The following HUCs will have an hourly precipitation *range threshold* of:

DataValue >= 0mm and DataValue < 20mm

In the VIEW ‘HOURLY\_Precip’

|  |  |
| --- | --- |
| HUC\_8 | HU\_8\_Name |
| 19050402 | Middle Noatak River |
| 19050403 | Lower Noatak River |
| 19050404 | Wulik-Kivalina Rivers |
| 19050405 | Lisburne Peninsula |
| 19050500 | Kotzebue Sound |
| 19060101 | Kukpowruk River |
| 19060102 | Kokolik River |
| 19060103 | Utukok River |

## Region 2

The following HUCs will have an hourly precipitation *range threshold* of:

DataValue >= 0mm and DataValue < 10mm

|  |  |
| --- | --- |
| HUC\_8 | HU\_8\_Name |
| 19060202 | Northwest Coast |
| 19060203 | Meade River |
| 19060204 | Ikpikpuk River |
| 19060205 | Harrison Bay |

## Region 3

The rest of the HUCs are going into one region for now. It would be nice to be able to regroup these HUCs. The hourly precipitation *range threshold* of:

DataValue >= 0mm and DataValue < 635mm

In the VIEW ‘HOURLY\_Precip’

|  |  |
| --- | --- |
| HUC\_8 | HU\_8\_Name |
| 19040201 | Old Crow River |
| 19040202 | Coleen River |
| 19040203 | Sheenjek River |
| 19040205 | Porcupine Flats |
| 19040301 | Middle Fork-North Fork Chandalar Rivers |
| 19040302 | East Fork Chandalar River |
| 19040303 | Christian River |
| 19040304 | Lower Chandalar River |
| 19040403 | Yukon Flats |
| 19040601 | Upper Koyukuk River |
| 19040602 | South Fork Koyukuk River |
| 19040603 | Alatna River |
| 19040605 | Allakaket |
| 19040608 | Koyukuk Flats |
| 19050301 | Selawik Lake |
| 19050302 | Upper Kobuk River |
| 19050401 | Upper Noatak River |
| 19060301 | Upper Colville River |
| 19060302 | Killik River |
| 19060303 | Chandler-Anaktuvuk Rivers |
| 19060304 | Lower Colville River |
| 19060402 | Sagavanirktok River |
| 19060501 | Canning River |
| 19060502 | Camden Bay |
| 19060503 | Beaufort Lagoon |
| 19050201 | Shishmaref |
| 19050202 | Goodhope-Spafarief Bay |
| 19050303 | Middle Kobuk River |
| 19050304 | Lower Kobuk River |
| 19060201 | Kuk River |
| 19060401 | Kuparuk River |
| 19060403 | Mikkelson Bay |

# Daily precipitation

The daily precipitation data values are the total precipitation for one day.

The data values are stored in ‘DAILY\_PrecipDatavalues ‘ and are used to calculate monthly, seasonal and yearly precipitations.

## Units

The measurement units are mm

Time units are daily

Time zone is UTC.

## Threshold

The following HUCs will have an hourly precipitation *range threshold* of:

DataValue >= 0mm and DataValue < 635mm

In the VIEW ‘HOURLY\_Precip’

|  |  |
| --- | --- |
| HUC\_8 | HU\_8\_Name |
| 19040201 | Old Crow River |
| 19040202 | Coleen River |
| 19040203 | Sheenjek River |
| 19040205 | Porcupine Flats |
| 19040301 | Middle Fork-North Fork Chandalar Rivers |
| 19040302 | East Fork Chandalar River |
| 19040303 | Christian River |
| 19040304 | Lower Chandalar River |
| 19040403 | Yukon Flats |
| 19040601 | Upper Koyukuk River |
| 19040602 | South Fork Koyukuk River |
| 19040603 | Alatna River |
| 19040605 | Allakaket |
| 19040608 | Koyukuk Flats |
| 19050301 | Selawik Lake |
| 19050302 | Upper Kobuk River |
| 19050401 | Upper Noatak River |
| 19060301 | Upper Colville River |
| 19060302 | Killik River |
| 19060303 | Chandler-Anaktuvuk Rivers |
| 19060304 | Lower Colville River |
| 19060402 | Sagavanirktok River |
| 19060501 | Canning River |
| 19060502 | Camden Bay |
| 19060503 | Beaufort Lagoon |
| 19050201 | Shishmaref |
| 19050202 | Goodhope-Spafarief Bay |
| 19050303 | Middle Kobuk River |
| 19050304 | Lower Kobuk River |
| 19050402 | Middle Noatak River |
| 19050403 | Lower Noatak River |
| 19050404 | Wulik-Kivalina Rivers |
| 19050405 | Lisburne Peninsula |
| 19050500 | Kotzebue Sound |
| 19060101 | Kukpowruk River |
| 19060102 | Kokolik River |
| 19060103 | Utukok River |
| 19060201 | Kuk River |
| 19060202 | Northwest Coast |
| 19060203 | Meade River |
| 19060204 | Ikpikpuk River |
| 19060205 | Harrison Bay |
| 19060401 | Kuparuk River |
| 19060403 | Mikkelson Bay |

# Daily Wind Speed

The daily wind speed data values are the average wind speed values over one day.

The data values are stored in the table ‘DAILY\_AvgWindSpeedDatavalues ‘ and are used to calculate monthly, seasonal and yearly data values.

## Units

The measurement units are meters per second (m/s)

Time units are daily

Time zone is UTC.

## Range Threshold

The VIEW ‘DAILY\_AvgWindSpeed’ has the data value range threshold of:

DataValue >= 0 m/s and DataValue < 50 m/s

# Hourly Snow Depth (Average)

The hourly snow depth is the average snow depth.

The data values are stored in the table ‘HOURLY\_SnowDepthDataValues ‘ and are used to calculate monthly, seasonal and yearly data values.

## Units

The measurement units are meters (m)

Time units are hourly

Timestamp is UTC

## Range Thresholds

The view ‘DAILY\_SnowDepth’ has the data value range:

* DataValue >= 0m and DataValue <= 6.096m

# Daily Snow Depth

The daily snow depth is the average snow depth.

The data values are stored in the table ‘DAILY\_SnowDepthDatavalues ‘ and are used to calculate monthly, seasonal and yearly data values.

## Units

The measurement units are meters (m)

Time units are daily

Time zone is UTC

## Range Thresholds

The view ‘DAILY\_SnowDepth’ has the data value range:

* DataValue >= 0m and DataValue <= 6.096m

# Daily Snow Water Equivalent (Average)

The daily snow water equivalent data values are the average snow water equivalent.

The data values are stored in the table ‘DAILY\_SWEDataValues ‘ and are used to calculate monthly, seasonal and yearly data values.

## Units

The measurement units are millimeters (mm)

Time units are daily

Time zone is UTC.

## Range Threshold

The VIEW ‘DAILY\_SWE’ has the data value range:

* DataValue >= 0mm and DataValue <= 609.6mm

# Hourly Relative Humidity (2m)

The data values have been stored in ‘HOURLY\_RHDatavalues ‘ table. These data values have been used to calculate daily, monthly, seasonal and yearly data values

Relative humidity cannot be averaged. It has to be computed from an air temperature and a dew point temperature value.

The dew point temperature value can be computed by using air temperature and relative humidity.

## Procedure for 1m and 3m, air temperature and relative humidity

To do this, the 1m air temperature cannot be null and the 1m relative humidity has to be greater than zero. The 3m air temperature and 3m relative humidity can be null, since we will just use the 1m air temperature and 1m relative humidity for the calculation.

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

1. Calculate the hourly dew point:

LOG((0.611\*(EXP((17.3\*at1)/(at1+237.3))))\*rh1/100)+0.4926)/(0.0708-0.00421\*LOG((0.611\*(EXP((17.3\*at1)/(at1+237.3))))\*rh1/100)) as dew1,at3,(LOG((0.611\*(EXP((17.3\*at3)/(at3+237.3))))\*rh3/100)+0.4926)/(0.0708-0.00421\*LOG((0.611\*(EXP((17.3\*at3)/(at3+237.3))))\*rh3/100)) as dew3

With ‘at’ being air temperature, ‘rh’ being relative humidity, ‘dew3’ being the dew point that includes 3m air temperature and 3m relative humidity.

1. Find the hourly 2m air temperature:

(at3-at1)/2+at1

With ‘at3’ being 3m air temperature and ‘at1’ being 1m air temperature

1. Find the hourly 2m dew point temperature:

(dew3-dew1)/2+dew1

With ‘dew3’ being 3m dew point temperature and ‘dew1’ being 1m dew point temperature

Next, make sure that the calculated dew point temperature is not higher than the air temperature.

If not, then calculate the hourly relative humidity:

(0.611 \* EXP((17.3 \* avg\_dew)/(avg\_dew + 237.3))) / (0.611 \* EXP((17.3 \* avg\_airtemp)/(avg\_airtemp + 237.3))) \* 100.0 as rel;

With ‘avg\_dew’ being the hourly average dew point temperature, ‘avg\_airtemp’ being the hourly average air temperature and ‘rel’ being the hourly relative humidity.

If only 1m air temperature and relative humidity is available, we do not need to do any calculations. These would be our hourly values.

## Units

Measurement units are percent

Time units are daily

Time zone is UTC.

## Range Threshold

The data value range for the VIEW ‘DAILY\_RH’ for the relative humidity (2m) daily data values is:

* DataValue > 0% and DataValue <= 100%

# Daily Relative Humidity (2m)

The data values have been stored in ‘DAILY\_RHDatavalues ‘ table. These data values have been used to calculate monthly, seasonal and yearly data values.

## Procedure for 1.5m or 2m, hourly average air temperature and relative humidity

Relative humidity cannot be averaged. It has to be computed from an air temperature and a dew point temperature value.

The dew point temperature value can be computed by using air temperature and relative humidity.

To do this, air temperature cannot be null and the relative humidity has to be greater than zero.

1. If hourly dew point temperature is not provided, compute the hourly dew point temperature:

LOG((0.611\*(EXP((17.3\*at)/(at+237.3))))\*rh/100)+0.4926)/(0.0708-0.00421\*LOG((0.611\*(EXP((17.3\*at)/(at+237.3))))\*rh/100)) as dew

With ‘at’ being hourly air temperature, ‘rh’ being hourly relative humidity and ‘dew’ being the hourly dew point.

1. Find the average daily dew point temperature and the average daily air temperature from the hourly dew point temperature values and hourly air temperature data values.

Next, you need to make sure that the calculated dew point temperature is not higher than the air temperature.

If it is not, then calculate the daily relative humidity:

(0.611 \* EXP((17.3 \* avg\_dew)/(avg\_dew + 237.3))) / (0.611 \* EXP((17.3 \* avg\_airtemp)/(avg\_airtemp + 237.3))) \* 100.0 as rel;

with ‘avg\_dew’ being the daily average dew point temperature, ‘avg\_airtemp’ being the daily average air temperature and ‘rel’ being the daily relative humidity.

## Units

Measurement units are percent

Time units are daily

Time zone is UTC.

## Range Threshold

The data value range for the VIEW ‘DAILY\_RH’ for the relative humidity (2m) daily data values is:

* DataValue > 0% and DataValue <= 100%

# Hourly Wind Direction

The data values have been stored in ‘HOURLY\_WindDirectionDatavalues ‘ table.

These data values have been used to calculate daily, monthly, seasonal and yearly data values.

## Procedure

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 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

## Units

Measurement units are degrees

Time units are hourly

Time zone is UTC.

## Range Threshold

The VIEW ‘HOURLY\_WindDirection’ has the data value range:

Data Value >= 0 degrees and Data Value <= 360 degrees

# Daily Wind Direction

The data values have been stored in ‘HOURLY\_WindDirectionDatavalues ‘ table.

These data values have been used to calculate daily, monthly, seasonal and yearly data values.

## Procedure

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 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

## Units

Measurement units are degrees

Time units are daily

Time zone is UTC.

## Range Threshold

The VIEW ‘DAILY\_WindDirection’ has the data value range:

Data Value >= 0 degrees and Data Value <= 360 degrees

# Daily Discharge

The daily discharge data values are the average discharge for one day.

The data values are stored in the table ‘DAILY\_DischargeDatavalues ‘ and are used to calculate monthly, seasonal and yearly discharge data values.

## Units

Measurement units are cubic meters per second

Time units are daily

Time zone is UTC.

## Range Threshold

The VIEW ‘DAILY\_Discharge has the data values range of:

* Data value >= 0 cms