THE CENTRAL REGION ASOS FILES

UNDERSTANDING THE AUTOMATED SURFACE OBSERVING SYSTEM (ASOS)
Ambient Temperature and Dew Point

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The objective elements in ASOS are: ambient temperature, dew point temperature, wind, pressure and precipitation accumulation. These are elements that are directly measured. The measurement and processing of temperature and dew point will be discussed in this attachment.

The hygrothermometer used in ASOS is a slight modification to the modern, fully-automated "HO-83" hygrothermometer which has been in operational use since 1985. This instrument uses a Resistive Temperature Device (RTD) to measure ambient temperature and a chilled mirror to determine the dew point temperature. A platinum wire RTD, used to determine temperature, operates on the principle that electrical resistance varies with temperature. To determine dew point temperature, a mirror is cooled by a thermoelectric or Peltier cooler until dew or frost begins to condense on the surface. When the optics detect the condensation the mirror surface is in vapor pressure equilibrium, indicating saturation vapor pressure. The temperature required to maintain this equilibrium is by definition the dew point temperature.

The ASOS hygrothermometer continuously samples ambient temperature and dew point temperature, and takes measurements nominally once every 30 seconds. From these samples a one-minute average temperature and dew point are determined. Once each minute a five-minute average ambient temperature and dew point temperature are calculated from the one-minute averages (provided at least four valid one-minute averages are available). These five-minute averages are rounded to the nearest degree F and reported once each minute as the current five-minute average ambient temperature and dew point temperature. If there are less than four valid, one-minute average ambient temperatures or dew point temperatures within the last five minutes, then the current five-minute average for ambient temperature or dew point temperatures is not computed. In this case, ASOS will use the most recent five-minute average values calculated within the last 15 minutes as the current, reported 5-minute average. If no valid five-minute average ambient temperature or dew point temperature is available within the past 15-minutes, then there respective ambient or dew point temperature is reported as "missing" and a sensor failure recorded. This 15-minute "hold-off" allows the once per day 15-minute recalibration

heat cycle to occur without adverse measurement affect.

The stored data are used in further computations as listed below:

1. Once per hour, at the hourly observation time, the maximum and minimum ambient temperatures are computed and they are stored in memory for 24 hours.

2. The current 12-hour average ambient temperature is computed once per minute for use in calculating the current sea level pressure.

3. Once each hour (at hourly time) and once each day (at midnight LST), the highest and lowest hourly ambient temperatures for the current day are computed. The calendar day maximum and minimum ambient temperatures (computed at midnight LST) are stored in the memory for 31 days as part of the Daily Summary Product.

4. Once each day (at midnight LST), the highest and lowest calendar day ambient temperatures for the current calendar month and the dates of occurrence, thus far, are computed and stored in memory until the end of the following month. On the first day of the following month, ASOS will output the monthly maximum and minimum temperatures and date(s) of occurrence.

Additional temperature parameters are derived from the Calendar Day and Monthly Maximum and Minimum Temperature data and may be reported in the daily and/or monthly summary messages as appropriate.

NGM MOS GUIDANCE

COOL SEASON EXAMPLE

```
NGM MOS GUIDANCE  DCA   3/06/91  0000 UTC
DAY  / MARCH  6          / MARCH  7                / MARCH  8
HOUR   06 09 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12
MX/MN                    59          39          54          24
TEMP   37 34 33 38 45 53 52 49 46 43 40 42 47 51 42 39 35 30 24
DEWPT  27 28 28 30 32 36 40 38 41 41 37 33 28 27 25 21 20 19 19
CLDS   OV OV OV OV OV OV OV OV OV OV BK    BK    SC    CL    CL
WDIR   26 18 08 12 14 14 15 18 24 27 28 29 29 29 29 33 01 02 00
WSPD   01 04 06 10 11 12 16 18 13 15 12 20 24 22 14 12 14 08 00
POP06        4     9     46    85    62    3     0     12    8
POP12                    49          91          8           19
QPF        0/    0/    2/3   3/    2/4   1/    0/3   0/    0/0
TSV06     2/ 0  3/ 0  4/ 1 15/11  6/ 2 16/13 17/11  8/ 0  0/ 0
TSV12           9/ 0       16/12       21/14       9/ 0
PTYPE  S  S  S  S  R  R  R  R  R  R  R     R     R     S     Z
POZP   8 10 12  6  0  0  0  0  0  1  3     0     2     24    35
POSN  65 67 70 48 31 14 11 13 15 16 20     9     16    50    42
SNOW       0/    2/    0/2   0/    0/0   0/    0/0   0/    0/0
CIG    4  5  4  4  5  6  7  6  3  2  1     5     6
VIS    3  4  3  5  5  5  5  4  2  2  1     3     4
OBVIS  H  H  H  N  N  N  N  F  F  F  F     H     N
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WARM SEASON EXAMPLE

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NGM MOS GUIDANCE  DCA   7/14/91  0000 UTC
DAY  / JULY  14          / JULY  15                / JULY  16
HOUR   06 09 12 15 18 21 00 03 06 09 12 15 18 21 00 03 06 09 12
MX/MN                    82          68          88          73
TEMP   67 63 67 76 82 83 79 75 72 69 72 80 86 87 82 79 75 73 74
DEWPT  49 49 50 51 52 54 56 59 61 61 63 65 65 67 68 69 67 65 68
CLDS   CL CL CL CL CL CL CL CL CL CL CL    SC    SC    BK    BK
WDIR   02 02 04 14 16 16 15 17 18 18 19 19 19 18 18 19 20 18 17
WSPD   06 05 03 04 04 05 06 06 04 05 04 06 09 07 07 04 03 05 04
POP06        4     0     0     3     7     2     11    28    42
POP12                    0           4           19          48
QPF        1/    1/    1/1   1/    1/2   1/    1/1   1/    1/1
TSV06     3/ 0  0/ 0  0/ 0  6/ 0  4/ 1  4/ 0 11/ 0 34/ 4 44/10
TSV12           0/ 0       20/12       11/10       27/14
CIG    7  7  7  7  7  7  7  7  7  7  7     7     6
VIS    5  5  5  5  5  5  5  5  5  5  5     5     4
OBVIS  N  N  N  N  N  N  N  N  N  N  N     N     N
NNNN
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