

Heat Burst in West Central and Central Minnesota: July 17, 2006

An interesting weather phenomena called a "Heat Burst" happened over west central and central Minnesota during the overnight hours of Sunday July 16th to Monday July 17th. A heat burst is caused by a dying thunderstorm with very warm air aloft. The temperature at Canby jumped from 91 degrees to 100 degrees in 40 minutes (from 10:35 pm to 11:15 pm) at the same time the dew point dropped from 63 to 32 degrees. The Chanhassen National Weather Service featured a summary of the event that can be found [here](#) and also issued a Public Service Statement below.

PUBLIC INFORMATION STATEMENT
NATIONAL WEATHER SERVICE TWIN CITIES/CHANHASSEN MN
242 PM CDT MON JUL 17 2006

...HEAT BURSTS AFFECTED PORTIONS OF WEST CENTRAL AND CENTRAL MINNESOTA LAST NIGHT...

RESIDENTS OF WEST CENTRAL AND CENTRAL MINNESOTA WERE TREATED TO AN UNUSUAL METEOROLOGICAL PHENOMENON LATE SUNDAY NIGHT AND EARLY MONDAY MORNING. DYING THUNDERSTORMS...AND A VERY WARM AND DRY LOWER AND MIDDLE ATMOSPHERE...LED TO THE OCCURRENCE OF SEVERAL HEAT BURSTS...MAINLY IN A NORTHEASTERLY SWATH FROM NEAR CANBY...IN YELLOW MEDICINE COUNTY...TO NEAR PAYNESVILLE IN SOUTHWESTERN STEARNS COUNTY. EVIDENCE OF THE BURSTS WERE DETECTED BY WEATHER OBSERVING EQUIPMENT AT CANBY...MONTEVIDEO...BENSON...APPLETON...WILLMAR...AND PAYNESVILLE.

A HEAT BURST IS CHARACTERIZED BY A DRAMATIC...ALMOST INSTANTANEOUS...RISE IN TEMPERATURE AND FALL IN DEW POINT TEMPERATURE. MOST...BUT NOT ALL HEAT BURSTS...ARE ALSO ACCOMPANIED BY A DROP IN SURFACE PRESSURE...LITTLE TO NO PRECIPITATION...AND GUSTY...RAPIDLY SHIFTING WINDS. THE MOST DRAMATIC HEAT BURSTS CAN EVEN CAUSE SEVERE WIND GUSTS THAT RESULT IN PROPERTY DAMAGE. ALTHOUGH NO DAMAGE WAS REPORTED...OBSERVING EQUIPMENT AT THE CANBY AIRPORT REPORTED WIND GUSTS TO 63 MPH AS A RESULT OF THE HEAT BURST.

HEAT BURSTS ARE TYPICALLY A LATE SPRING AND SUMMER...AS WELL AS A LATE EVENING AND NIGHTTIME PHENOMENON. THE TWO PRIMARY REASONS FOR THIS ARE THE ONSET OF THE NIGHTTIME INVERSION AND THUNDERSTORM CLIMATOLOGY. MOST HEAT BURSTS ARE ALSO DETECTED IN THE PLAINS STATES...BUT HEAT BURSTS HAVE ALSO BEEN RECORDED OVERSEAS...INCLUDING THE UNITED KINGDOM AND YEMEN.

ALTHOUGH MANY REGARD THE HEAT BURST AS A FAIRLY RARE PHENOMENON...HEAT BURSTS ACTUALLY OCCUR MORE OFTEN THAN MANY THINK. AREAS THAT HAVE A DENSE OBSERVATION NETWORK...SUCH AS THE STATE OF OKLAHOMA...TYPICALLY DETECT MULTIPLE HEAT BURSTS PER YEAR. IN OTHER AREAS OF THE PLAINS...WHERE OBSERVATION NETWORKS ARE LESS DENSE...HEAT BURSTS ARE DIFFICULT TO DETECT AND ARE NOT REPORTED TO THE NATIONAL WEATHER SERVICE UNLESS THEY RESULT IN WIND DAMAGE...OR HAPPEN TO AFFECT ONE OF THE FEW OBSERVING STATIONS.

SPECIFIC INFORMATION ON LAST NIGHTS HEAT BURSTS DETECTED AT EACH AFFECTED OBSERVING STATION ARE FOUND BELOW. THE INCREASE IN TEMPERATURE AND DECREASE IN DEW POINT AS A RESULT OF THE BURSTS ARE DENOTED IN PARENTHESES TO THE RIGHT OF THE MAXIMUM TEMPERATURE AND MINIMUM RECORDED DEW POINT.

| LOCATION | TIME | TEMP | DEW POINT | MAX WIND GUST |
|------------|---------|----------|-----------|---------------|
| CANBY | 1115 PM | 100 (+9) | 32 (-38) | 63 MPH |
| APPLETON | 1255 AM | 91 (+14) | 54 (-22) | 37 MPH |
| MONTEVIDEO | 115 AM | 90 (+6) | 52 (-16) | 23 MPH |

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|-------------|--------|----------|----------|--------|
| BENSON | 135 AM | 97 (+15) | 37 (-36) | 37 MPH |
| WILLMAR | 235 AM | 97 (+18) | 45 (-28) | 44 MPH |
| PAYNESVILLE | 235 AM | 88 (+7) | 57 (-15) | 24 MPH |

THIS PARTICULAR HEAT BURST OCCURRED AS DECAYING THUNDERSTORMS IN EASTERN SOUTH DAKOTA MOVED INTO WESTERN AND CENTRAL MINNESOTA SHORTLY BEFORE MIDNIGHT. RESEARCH HAS SHOWN THAT THE RADAR ECHOES ASSOCIATED WITH HEAT BURST ACTIVITY OFTEN TAKE ON A THIN... WAVY... SNAKE-LIKE APPEARANCE. THE RADAR ECHOES FROM BOTH THE CHANHASSEN RADAR AND THE ABERDEEN SOUTH DAKOTA RADAR HAD THIS APPEARANCE.

WITH THE UNSEASONABLY HOT TEMPERATURES THE REGION HAD EXPERIENCED THE PAST SEVERAL DAYS... VERY WARM... DRY... AND UNSTABLE AIR WAS IN PLACE OVER THE AREA. DATA FROM LAST NIGHTS WEATHER BALLOONS AT CHANHASSEN AND ABERDEEN SOUTH DAKOTA SHOWED THE WARM AND DRY AIR EXTENDED FROM THE SURFACE TO 17000 AND 20000 FEET... RESPECTIVELY. WHEN THE THUNDERSTORMS IN SOUTH DAKOTA AND WESTERN MINNESOTA BEGAN TO DECAY... A DOWNDRAFT FORMED BENEATH THEM... AND DUE TO THE UNSTABLE AIR IN PLACE... THE AIR ACCELERATED RAPIDLY. EVAPORATION OF RAIN BENEATH THE DECAYING THUNDERSTORMS ALSO FUELED THE DOWNWARD ACCELERATION. AS THE DOWNDRAFT APPROACHED THE SURFACE... IT WARMED AND DRIED... WHICH CAUSED THE DRASTIC INCREASE IN TEMPERATURE AND DROP IN DEW POINT.



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URL: <http://climate.umn.edu/doc/journal/heatburst070717.htm>

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