

Rediscovering the Dew Point

Milton MA

October 24, 2015



Don Kent – WBZ, Channel 4



Bob Copeland – WHDH/WCVB, Channel 5

Dew Point : The temperature to which the air would have to cool in order to reach saturation.

The temperature to which a given air parcel must be cooled at constant pressure and constant water vapor content in order for saturation to occur.

(AMS Meteorology Glossary)

Project Objectives

1. Create a Database of Dew Point Averages and Extremes for each Day of the Year.
2. Use six long-term climate sites in Southern and Central New England.
3. Make this information available to all.



NNDC CLIMATE DATA ONLINE

Climate Data Online

DataSet/Product Options

- Sample Output:**
[IMPORTANT: Changes](#)
[ASCII Space Delimited](#)
[Printable Web Form](#)
[Hourly Summary](#)
[Inventory](#)
[Map Analysis](#)

[Info / Help](#)

- Surface Data, Global Summary of the Day *
- Surface Data, Hourly Global (Over 10,000 worldwide sites) *
- Surface Data, Monthly (Over 18,000 U.S. some non-US sites) *
- Surface Data, Monthly Extremes - U.S. *

[Access Data/Products](#)

* Free Product

[Privacy Policy](#)



[Disclaimer](#)

<http://www7.ncdc.noaa.gov/CDO/dataproduct>
Downloaded Tue Oct 13 13:57:47 EDT 2015
Production Version
If you have questions or comments, please contact our [support team](#).

Step 1: Get Data at Climate Data Online
www7.ncdc.noaa.gov/CDO/dataproduct/

...and Import Data into EXCEL

1	YR--	MO	DA	HRMN	DIR	SPD	GUS	CLG	SKC	VSB	TEMP	DEWP	SLP	ALT	STP
2	2001	1	1	0	270	25	***	80	BKN	10	27	18	1002.7	29.61	1001.9
3	2001	1	1	54	260	18	28	722	SCT	10	26	18	1003.5	29.64	*****
4	2001	1	1	154	270	23	34	722	SCT	10	26	17	1004.3	29.66	*****
5	2001	1	1	254	270	24	33	130	BKN	10	26	17	1005	29.68	*****
6	2001	1	1	354	280	20	30	722	SCT	10	25	16	1005.9	29.71	*****
7	2001	1	1	454	270	21	28	722	SCT	10	25	15	1006.7	29.73	*****
8	2001	1	1	554	270	18	***	722	SCT	10	25	16	1007.7	29.76	*****
9	2001	1	1	600	270	18	***	722	SCT	10	25	15	1007.7	29.76	1007
10	2001	1	1	654	280	20	***	722	CLR	10	24	15	1008.8	29.79	*****
11	2001	1	1	754	270	20	***	722	CLR	10	24	15	1009.7	29.82	*****
12	2001	1	1	854	280	16	26	722	CLR	10	24	15	1010	29.83	*****
13	2001	1	1	954	280	17	***	722	CLR	10	24	15	1010.9	29.86	*****
14	2001	1	1	1054	280	14	22	722	SCT	10	23	15	1012	29.89	*****
15	2001	1	1	1154	290	16	***	722	CLR	10	23	14	1012.6	29.9	*****
16	2001	1	1	1200	290	16	***	722	CLR	10	23	14	1012.6	29.9	1011.8
17	2001	1	1	1254	290	17	***	722	CLR	10	24	14	1013.2	29.92	*****
18	2001	1	1	1354	280	16	26	722	CLR	10	25	15	1014.3	29.96	*****
19	2001	1	1	1454	280	13	19	722	CLR	10	27	16	1015.7	30	*****
20	2001	1	1	1554	280	13	***	722	CLR	10	29	18	1015.8	30	*****
21	2001	1	1	1654	280	14	18	722	CLR	10	31	19	1015.4	29.99	*****
22	2001	1	1	1754	290	15	21	722	SCT	10	34	21	1015.5	29.99	*****
23	2001	1	1	1800	290	15	***	722	SCT	10	33	21	1015.5	29.99	1014.8
24	2001	1	1	1854	300	17	***	722	SCT	10	35	22	1015.7	30	*****
25	2001	1	1	1954	300	13	***	722	SCT	10	35	22	1016.6	30.02	*****
26	2001	1	1	2054	290	14	***	722	SCT	10	34	21	1017.3	30.05	*****
27	2001	1	1	2154	320	13	***	722	SCT	10	32	22	1017.6	30.05	*****
28	2001	1	1	2254	300	12	***	722	CLR	10	31	22	1018.6	30.08	*****
29	2001	1	1	2354	330	10	***	722	CLR	10	30	21	1019.3	30.1	*****
30	2001	1	2	0	330	10	***	722	CLR	10	30	21	1019.3	30.1	1018.5
31	2001	1	2	54	320	17	22	722	CLR	10	28	21	1019.5	30.11	*****
32	2001	1	2	154	320	14	21	722	CLR	10	26	18	1020.1	30.13	*****
33	2001	1	2	300	320	12	***	722	***	10	24	18	1020.4	30.14	*****
34	2001	1	2	354	320	12	***	722	CLR	10	23	17	1020.6	30.14	*****
35	2001	1	2	454	320	9	***	722	CLR	10	23	16	1020.6	30.14	*****
36	2001	1	2	554	320	13	***	722	CLR	10	21	16	1020.5	30.14	*****
37	2001	1	2	600	320	13	***	722	CLR	10	22	16	1020.5	30.14	1019.9
38	2001	1	2	654	320	10	***	722	CLR	10	21	15	1020.7	30.15	*****
39	2001	1	2	754	330	9	***	23	BKN	10	21	15	1020.8	30.15	*****
40	2001	1	2	836	330	11	***	722	SCT	10	19	14	*****	30.15	*****
41	2001	1	2	854	320	12	***	722	SCT	10	20	14	1020.8	30.15	*****

Six major climate sites in Southern New England: Boston, Worcester, Warwick, Windsor Locks, Bridgeport, Concord NH.

For each site, there are well over 400,000 observations from the late 1930's to 2014

Step 2 : Quality Control / Assurance

- Data problems :
 - Human mismeasurements
 - Broken equipment
 - “Dirty mirror”
- Solution: Write program within EXCEL
 - Look for large hourly jumps in the dew point value
 - Outlier long-term high & low values for Calendar Day
 - Compare outlier events with dew points at surrounding sites

Erroneous Data

Worcester MA May 9, 2000

Time (GMT)	ORH			BED	FIT	ORE	CEF	BAF	BDL	
0954	65			M	M	63	59	63	63	
1054	67			M	M	63	61	63	64	
1154	68			M	M	63	63	66	64	
1254	71			M	M	64	64	64	65	
1354	72			M	M	64	64	64	65	
1454	74			66	M	64	M	63	63	
1554	77			66	63	64	59	63	63	
1654	75			64	63	63	57	63	65	
1800	84			63	63	63	57	63	65	
1854	84			64	63	61	57	63	64	

Erroneous Data

Worcester MA May 9, 2000

Time (GMT)	ORH	Regional Average		BED	FIT	ORE	CEF	BAF	BDL	
0954	65	62		M	M	63	59	63	63	
1054	67	63		M	M	63	61	63	64	
1154	68	64		M	M	63	63	66	64	
1254	71	64		M	M	64	64	64	65	
1354	72	64		M	M	64	64	64	65	
1454	74	64		66	M	64	M	63	63	
1554	77	63		66	63	64	59	63	63	
1654	75	63		64	63	63	57	63	65	
1800	84	62		63	63	63	57	63	65	
1854	84	62		64	63	61	57	63	64	

Step 3 : Statistics to be Used

- Temperature
 - Daily High and Low
 - Calculate Average
- Long Term Values
 - Record High and Low
 - Long Term Daily Average

PRELIMINARY LOCAL CLIMATOLOGICAL DATA (WS FORM: F-6)

STATION: BOSTON MA
 MONTH: OCTOBER
 YEAR: 2015
 LATITUDE: 42 22 N
 LONGITUDE: 71 2 W

TEMPERATURE IN F:		:PCPN:		SNOW:		WIND		:SUNSHINE:		SKY		:PK WND						
1	2	3	4	5	6A	6B	7	8	9	10	11	12	13	14	15	16	17	18
DY	MAX	MIN	AVG	DEP	HDD	CDD	WTR	SNW	DPTH	SPD	SPD	DIR	MIN	PSBL	S-S	WX	SPD	DR
1	59	54	57	-2	8	0	T	0.0	0	17.2	30	40	M	M	9		38	40
2	54	50	52	-7	13	0	0.08	0.0	0	20.4	25	30	M	M	10		36	30
3	54	49	52	-6	13	0	0.01	0.0	0	22.3	29	40	M	M	10	1	37	30
4	56	51	54	-4	11	0	0.00	0.0	0	18.2	28	50	M	M	9		35	50
5	61	48	55	-3	10	0	0.00	0.0	M	9.2	15	30	M	M	7		18	30
6	64	48	56	-1	9	0	0.00	0.0	M	5.5	12	300	M	M	2		15	300
7	72	52	62	5	3	0	0.00	0.0	M	7.2	13	280	M	M	4		17	290
8	62	51	57	0	8	0	0.00	0.0	M	8.8	13	140	M	M	4		18	290
9	72	52	62	6	3	0	0.34	0.0	M	14.7	31	220	M	M	8	1	40	220
10	61	48	55	-1	10	0	0.00	0.0	M	9.8	29	320	M	M	2		37	310
11	68	48	58	2	7	0	0.00	0.0	M	13.8	23	220	M	M	5		28	220
12	76	51	64	9	1	0	0.00	0.0	M	7.7	15	200	M	M	1		M	M
13	72	55	64	9	1	0	0.12	0.0	M	7.6	16	200	M	M	7	12	21	200
SM	831	657			97	0	0.55		0.0	162.4			M		78			
AV	63.9	50.5								12.5	FASTST		M	M	6		MAX(MPH)	
										MISC	---->	# 31 220					# 40	220

[TEMPERATURE DATA]	[PRECIPITATION DATA]	SYMBOLS USED IN COLUMN 16
AVERAGE MONTHLY: 57.2	TOTAL FOR MONTH: 0.55	1 = FOG OR MIST
DPTR FM NORMAL: 0.3	DPTR FM NORMAL: -1.10	2 = FOG REDUCING VISIBILITY TO 1/4 MILE OR LESS
HIGHEST: 76 ON 12	GRTST 24HR 2.46 ON 30-1	3 = THUNDER
LOWEST: 48 ON 11,10		4 = ICE PELLETS
	SNOW, ICE PELLETS, HAIL	5 = HAIL
	TOTAL MONTH: 0.0 INCH	6 = FREEZING RAIN OR DRIZZLE
	GRTST 24HR 0.0	7 = DUSTSTORM OR SANDSTORM: VSBY 1/2 MILE OR LESS
	GRTST DEPTH: 0	8 = SMOKE OR HAZE
		9 = BLOWING SNOW
		X = TORNADO
[NO. OF DAYS WITH]	[WEATHER - DAYS WITH]	
MAX 32 OR BELOW: 0	0.01 INCH OR MORE: 4	
MAX 90 OR ABOVE: 0	0.10 INCH OR MORE: 2	
MIN 32 OR BELOW: 0	0.50 INCH OR MORE: 0	
MIN 0 OR BELOW: 0	1.00 INCH OR MORE: 0	

Step 3 : Statistics to be Used

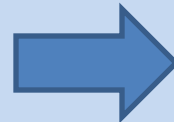
- Dew Point
 - Daily High and Low
 - Calculate Daily Average

	January 2, 1995	January 2, 2000	January 2, 2005
Highest Dew Pt	40	50	29
Average Dew Pt	35	45	22
Lowest Dew Pt	30	40	15

- Long Term Values for each Calendar Day
 - Extreme High and Low
 - Long Term Daily Average

Step 4 : Analyze the EXCEL Data

1	YR--	MO	DA	HRM	DIR	SPD	GUS	CLG	SCK	VS	TEMP	DEWP	SLP	ALT	STP
2	2001	1	1	0	270	25	***	80	BKN	10	27	18	1002.7	29.61	1001.9
3	2001	1	1	54	260	18	28	722	SCT	10	26	18	1003.5	29.64	*****
4	2001	1	1	154	270	23	34	722	SCT	10	26	17	1004.3	29.66	*****
5	2001	1	1	254	270	24	33	130	BKN	10	26	17	1005	29.68	*****
6	2001	1	1	354	280	20	30	722	SCT	10	25	16	1005.9	29.71	*****
7	2001	1	1	454	270	21	28	722	SCT	10	25	15	1006.7	29.73	*****
8	2001	1	1	554	270	18	***	722	SCT	10	25	16	1007.7	29.76	*****
9	2001	1	1	600	270	18	***	722	SCT	10	25	15	1007.7	29.76	1007
10	2001	1	1	654	280	20	***	722	CLR	10	24	15	1008.8	29.79	*****
11	2001	1	1	754	270	20	***	722	CLR	10	24	15	1009.7	29.82	*****
12	2001	1	1	854	280	16	26	722	CLR	10	24	15	1010	29.83	*****
13	2001	1	1	954	280	17	***	722	CLR	10	24	15	1010.9	29.86	*****
14	2001	1	1	1054	280	14	22	722	SCT	10	23	15	1012	29.89	*****
15	2001	1	1	1154	290	16	***	722	CLR	10	23	14	1012.6	29.9	*****
16	2001	1	1	1200	290	16	***	722	CLR	10	23	14	1012.6	29.9	1011.8
17	2001	1	1	1254	290	17	***	722	CLR	10	24	14	1013.2	29.92	*****
18	2001	1	1	1354	280	16	26	722	CLR	10	25	15	1014.3	29.96	*****
19	2001	1	1	1454	280	13	19	722	CLR	10	27	16	1015.7	30	*****
20	2001	1	1	1554	280	13	***	722	CLR	10	29	18	1015.8	30	*****
21	2001	1	1	1654	280	14	18	722	CLR	10	31	19	1015.4	29.99	*****
22	2001	1	1	1754	290	15	21	722	SCT	10	34	21	1015.5	29.99	*****
23	2001	1	1	1800	290	15	***	722	SCT	10	33	21	1015.5	29.99	1014.8
24	2001	1	1	1854	300	17	***	722	SCT	10	35	22	1015.7	30	*****
25	2001	1	1	1954	300	13	***	722	SCT	10	35	22	1016.6	30.02	*****
26	2001	1	1	2054	290	14	***	722	SCT	10	34	21	1017.3	30.05	*****
27	2001	1	1	2154	320	13	***	722	SCT	10	32	22	1017.6	30.05	*****
28	2001	1	1	2254	300	12	***	722	CLR	10	31	22	1018.6	30.08	*****
29	2001	1	1	2354	330	10	***	722	CLR	10	30	21	1019.3	30.1	*****
30	2001	1	2	0	330	10	***	722	CLR	10	30	21	1019.3	30.1	1018.5
31	2001	1	2	54	320	17	22	722	CLR	10	28	21	1019.5	30.11	*****
32	2001	1	2	154	320	14	21	722	CLR	10	26	18	1020.1	30.13	*****
33	2001	1	2	300	320	12	***	722	***	10	24	18	1020.4	30.14	*****
34	2001	1	2	354	320	12	***	722	CLR	10	23	17	1020.6	30.14	*****
35	2001	1	2	454	320	9	***	722	CLR	10	23	16	1020.6	30.14	*****
36	2001	1	2	554	320	13	***	722	CLR	10	21	16	1020.5	30.14	*****
37	2001	1	2	600	320	13	***	722	CLR	10	22	16	1020.5	30.14	1019.9
38	2001	1	2	654	320	10	***	722	CLR	10	21	15	1020.7	30.15	*****
39	2001	1	2	754	330	9	***	23	BKN	10	21	15	1020.8	30.15	*****
40	2001	1	2	836	330	11	***	722	SCT	10	19	14	*****	30.15	*****
41	2001	1	2	854	320	12	***	722	SCT	10	20	14	1020.8	30.15	*****

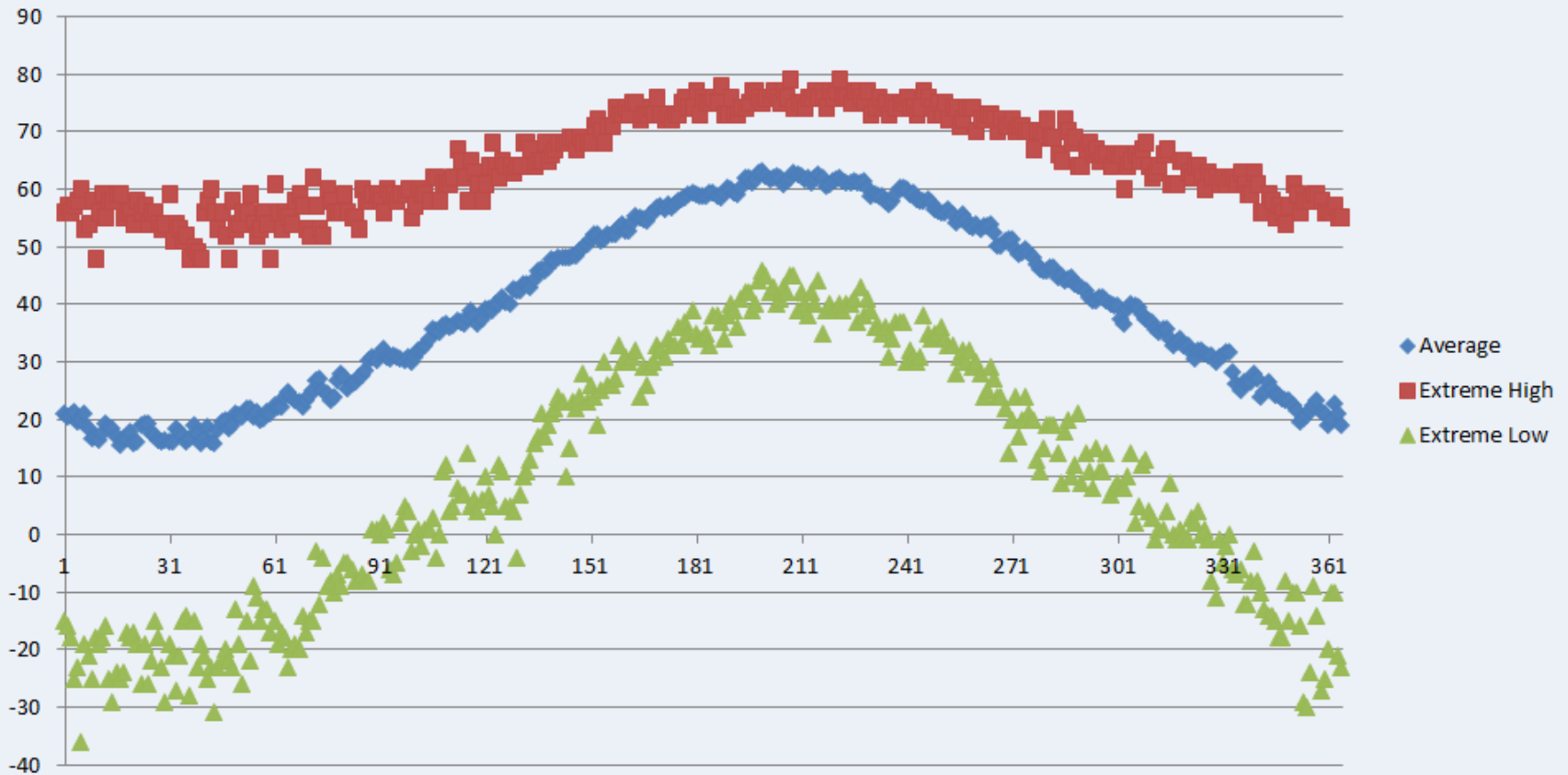


```

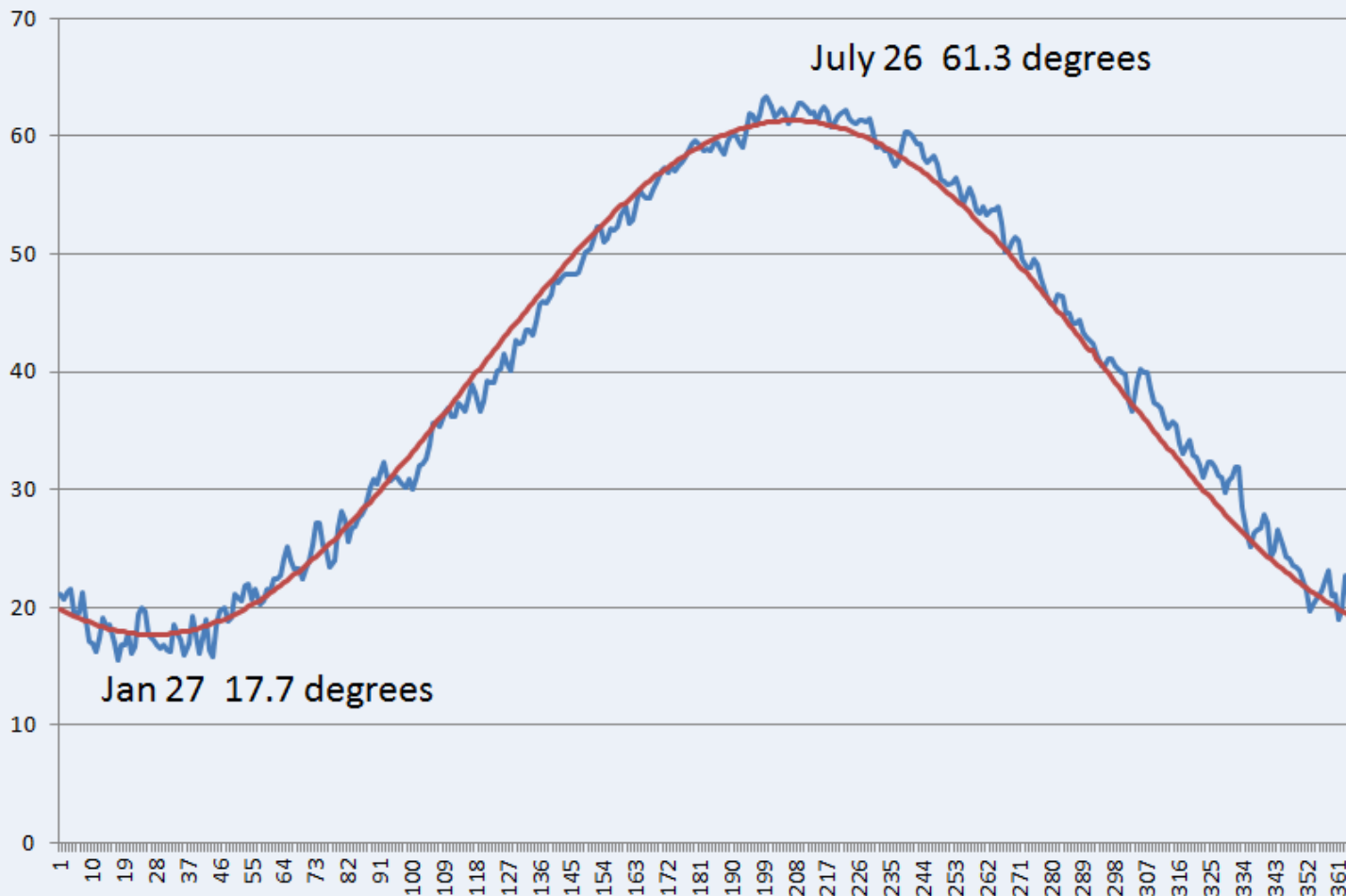
Sub BOSAnalyze ()
    ' AnalyzeDewpt Macro
    '
    Dim MAXDP(1 To 12, 1 To 31, 1936 To 2014) As Variant
    Dim MINDP(1 To 12, 1 To 31, 1936 To 2014) As Variant
    Dim AVEPDP(1 To 12, 1 To 31, 1936 To 2014) As Variant
    Dim SQRAVEP(1 To 12, 1 To 31, 1936 To 2014) As Variant
    Dim RECHMAXDP(1 To 12, 1 To 31) As Variant
    Dim RECHMINDP(1 To 12, 1 To 31) As Variant
    Dim SUMSQRAVEP(1 To 12, 1 To 31) As Variant
    Dim SUMSQAWEP(1 To 12, 1 To 31) As Variant
    Dim LIAVEPDP(1 To 12, 1 To 31) As Variant
    Dim RECHMAXIR(1 To 12, 1 To 31) As Variant
    Dim RECHMINIR(1 To 12, 1 To 31) As Variant
    Dim STDEVPDP(1 To 12, 1 To 31) As Variant
    Dim TWOPLUSSDDP(1 To 12, 1 To 31) As Variant
    Dim TWOMINUSSDDP(1 To 12, 1 To 31) As Variant
    ' Initialize
    For MO = 1 To 12
        For DA = 1 To 31
            RECHMINDP(MO, DA) = 100
            RECHMAXDP(MO, DA) = -100
            For YR = 1936 To 2014
                MAXDP(MO, DA, YR) = -100
                MINDP(MO, DA, YR) = 100
            Next YR
        Next DA
    Next MO
    ' Read the data from each worksheet, assemble dewpoint values, determine daily max/min dewpoint
    For G = 2 To 64000
        MO = Sheets("BOS1936-40").Cells(G, 2).Value
        DA = Sheets("BOS1936-40").Cells(G, 3).Value
        YR = Sheets("BOS1936-40").Cells(G, 1).Value
        DEW = Sheets("BOS1936-40").Cells(G, 12).Value
        If YR = "" Then
            G = 64000
            GoTo cycle0
        End If
        If DEW = "*****" Then GoTo cycle0
        If DEW > MAXDP(MO, DA, YR) Then MAXDP(MO, DA, YR) = DEW
        If DEW < MINDP(MO, DA, YR) Then MINDP(MO, DA, YR) = DEW
    cycle0: Next G
    For G = 2 To 64000
        MO = Sheets("BOS1941-45").Cells(G, 2).Value
        DA = Sheets("BOS1941-45").Cells(G, 3).Value
        YR = Sheets("BOS1941-45").Cells(G, 1).Value
        DEW = Sheets("BOS1941-45").Cells(G, 12).Value
        If YR = "" Then
            G = 64000
            GoTo cycle0
        End If
    cycle0: Next G
    End Sub
    
```

Boston Calendar Day Values

BOS Dewpoint Distribution



Boston Average Dew Points 1938-2014



PROGRAMING BY:
David Radell, NWS ERH

Equations for Average Dew Points

- Boston:
 - $y = 39.51 - 19.3 * \cos(2\pi(\text{DOY})/366) - 10.2 * \sin(2\pi(\text{DOY})/366)$
- Providence-Warwick
 - $y = 39.98 - 19.6 * \cos(2\pi(\text{DOY})/366) - 10.4 * \sin(2\pi(\text{DOY})/366)$
- Windsor Locks
 - $y = 38.74 - 20.7 * \cos(2\pi(\text{DOY})/366) - 10.3 * \sin(2\pi(\text{DOY})/366)$
- Bridgeport
 - $y = 41.53 - 19.7 * \cos(2\pi(\text{DOY})/366) - 10.5 * \sin(2\pi(\text{DOY})/366)$
- Worcester
 - $y = 36.58 - 20.2 * \cos(2\pi(\text{DOY})/366) - 10.5 * \sin(2\pi(\text{DOY})/366)$
- Concord NH
 - $y = 35.90 - 21.3 * \cos(2\pi(\text{DOY})/366) - 10.4 * \sin(2\pi(\text{DOY})/366)$

NWS Taunton Dew Point Climatology

www.weather.gov/box/dewpointclimo

News Headlines

- [U.S. Winter Outlook: 2015-2016](#)
- [Wanted! Rain and Snow Observers in CT, MA, and RI. Join CoCoRaHS Today!](#)

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Boston, MA

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October Dew Points

Years marked with a * are the latest of multiple occurrences

Day	Highest Value	Year	Average	Lowest Value	Year
1	71	1986	50	20	1981
2	70	1959	50	24	1992
3	70	2002	49	21	1945
4	67	1995*	49	20	1945
5	70	2002	49	13	1984
6	70	1991	48	11	1984
7	70	2013	48	15	1984
8	72	2008	47	19	1954
9	69	1976	47	19	2010
10	69	1959	47	19	1993
11	66	1936	46	14	1964
12	65	1990*	46	9	1963
13	72	1983	46	18	1993*
14	70	1983	45	20	1993
15	68	1995*	45	10	1996
16	69	1954	45	12	1996
17	64	2014	44	21	1972
18	64	1980*	44	9	1939
19	67	2007	44	14	1970*
20	68	2007	43	11	1972
21	66	1993	43	8	1952
22	67	1993*	42	15	1940
23	65	1979	42	11	1969
24	66	1959	42	11	1974
25	66	2001*	41	14	1962
26	64	1975	41	7	1941
27	66	2010*	41	8	1974
28	66	2010	40	9	1974
29	66	2003	40	8	1991
30	60	1946	39	8	1991
31	64	1949	39	10	1966

Period of Record: Extremes 1936 to 2014
Averages 1939 to 1942, 1945 to 2014

News Headlines

- [U.S. Winter Outlook: 2015-2016](#)
- [Wanted! Rain and Snow Observers in CT, MA, and RI. Join CoCoRaHS Today!](#)

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[January](#) [February](#) [March](#) [April](#) [May](#) [June](#) [July](#) [August](#) [September](#) [October](#) [November](#) [December](#) [Misc](#)

Earliest/Latest

55

Earliest 1st	Jan 1 1973, 1945, 1937
Average 1st	March 8
Latest 1st	June 3 1967
Earliest Last	Oct 16 1952
Average Last	December 1
Latest Last	December 31 1990

All Time Extremes:

Highest		Lowest	
79	July 27 1940	-36	Jan 6 1959
	August 10 2001		
78	July 7 1994	-31	Feb 13 1967
77	July 22 2003	-30	Dec 21 1955
	11 earlier dates		
		-29	Jan 15 1957
			Dec 20 1955
			Jan 30 1948

60

Earliest 1st	January 6 2007
Average 1st	May 6
Latest 1st	June 9 1967
Earliest Last	September 23 1981
Average Last	November 9
Latest Last	December 17 2000

65

Earliest 1st	April 23 1977
Average 1st	May 29
Latest 1st	June 26 1980
Earliest Last	September 5 1966
Average Last	October 9
Latest Last	November 16 2008

70

Earliest 1st	June 1 2010
Average 1st	June 23
Latest 1st	July 22 1951
Earliest Last	August 3 1975
Average Last	September 11
Latest Last	October 14 1987

Period of Record: Extremes 1936 to 2014
Averages 1939 to 1942, 1945 to 2014