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T.R. - 58

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On the relationship between maximum surface temperature and various parameters; with reference to objective forecasting.

De Bilt, 1984

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1.

It is well known that upper air temperature and the maximum temperature T_x at screen level are correlated. Especially the 1000-500 mb thickness during the months April-October is strongly correlated with the maximum surface temperature. Nevertheless, for any given thickness there can be temperature fluctuations near the ground depending on the surface transfer of heat as determined by such factors as wind direction and cloud cover (Boyden, 1962). It was found that during the seven months April-October a useful indication of maximum temperature was given by the following parameters:

1) the midday 1000-500 mb thickness;
2) surface wind direction;
3) sunshine total as a substitute for the sunshine up to the time of the maximum temperature;
4) the month.

The relationships found were based on the surface wind direction at 1200 GMT, the 1000-500 mb thickness at 1200 GMT and the sunshine total vs T_x of the same day of De Bilt (for the years 1947-1978).
They are based on relatively many observations (about 6400) so about 900 cases for every month. The relationships were tested on independent data for the years 1979-1982 (about 850 observations).

2. Systematic investigations of the parameters

During a preliminary investigation a fairly high correlation was found between the 500 mb height and the maximum temperature. For the period 1947-1978 the mean correlation coefficient was r = 0.621. However this parameters was abandoned as the thickness scored r = 0.747, given rise to an increase of the reduction of variance by 17%.
The first three parameters mentioned above were selected and a stratification method was used to test which combination of class intervals for each of the parameters was best.
The surface wind gave rise to a splitting into nine groups whereas the sunshine parameter had four class intervals. Furthermore it was evident that separate allowance had to be made for the month of the year. So the data were divided into seven monthly groups corresponding to each of the months from April until October. The thickness during the months November

until March was poorly correlated to the maximum temperature and could not be used. For each of the combinations of wind direction and sunshine a linear relationship was found between maximum temperature and midday 1000-500 mb thickness.

The correlation coefficients between the maximum temperature and the thickness (h) and sunshine (s) and their combinations are given in table 1.

TABLE 1

Correlation coefficient (%) between T_x and parameters d, s, h or combinations

	wind (d)	sunsh (s)	thickn (h)	dh	ds	sh	dsh
april	40.7	34.2	73.6	77.9	57.8	83.9	88.1
may	46.1	51.8	76.5	79.4	66.5	87.0	89.9
june	43.3	49.9	76.2	80.0	65.1	84.3	87.5
july	48.0	55.6	78.8	82.3	70.2	87.2	89.8
august	47.5	51.6	76.5	80.8	66.2	86.0	88.5
september	32.7	41.9	74.7	77.2	53.4	82.0	84.1
october	27.3	33.6	64.7	69.3	50.4	74.8	80.6
mean	40.8	45.5	74.4	78.1	61.4	83.6	86.9

TABLE 2

Monthly mean thickness, maximum temperature, variances and regression coefficients De Bilt 1947-1978.

	mean h	mean T_x	var T_x	var h	regr.coeff.
april	39.2	12.5	15.8	71.0	0.35
may	46.0	17.0	18.3	56.9	0.44
june	54.0	20.0	18.8	56.5	0.44
july	56.9	21.2	16.1	51.6	0.44
August	57.0	21.3	12.7	43.7	0.41
September	54.8	18.8	11.6	59.7	0.33
October	50.1	14.3	11.8	71.8	0.26
mean			15.0		0.38

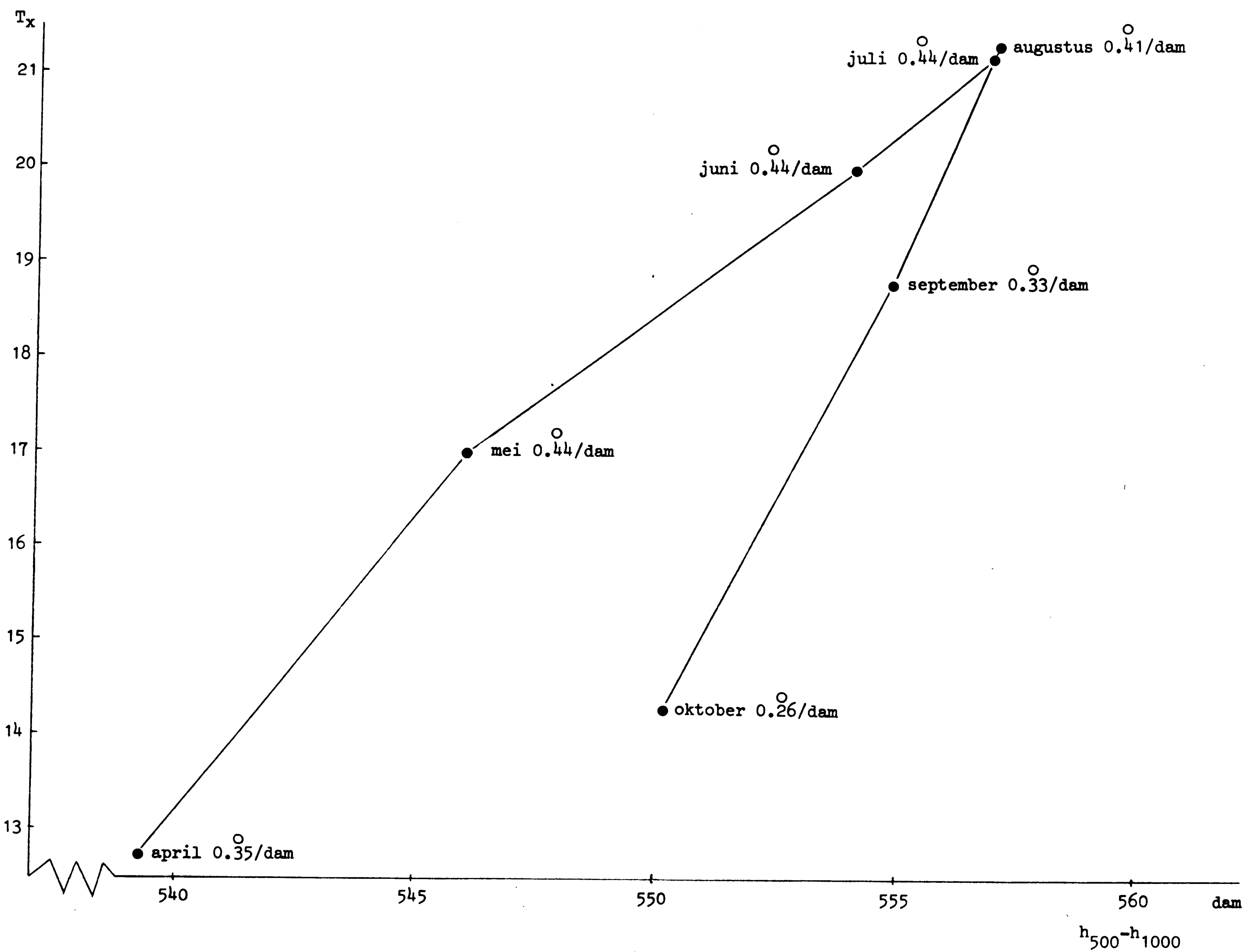

Fig. 1

Monthly mean thickness, maximum temperature, variances and regression coefficients
De Bilt 1947-1978 (see also table 2)

The mean correlation coefficient between T_x and the three-parameter combinations amounts to 86.9 % in the dependent data (6400 cases) whereas application to a set of independent data (900 cases) resulted in r = 85.1%. The long period of record yields a stable relation as expected.
Table 1 shows that the 1000-500 mb thickness is the best parameter. Wind speed, humidity and often rainfall were found to add little or nothing to the quality of the relations.
Figure 1 shows the relationship between monthly mean maximum temperature and monthly mean thickness for the period 1947-1978. The years show two distinct "seasons", a "warm season" from April to August when the mean maximum temperature is relatively high and a "cold season" for the remaining months. For each of the months of the period April to October a diagram is constructed showing the linear relationship between maximum temperature and the combinations of wind direction, sunshine and midday 1000-500 mb thickness (diagrams 1-7).

3. Evaluation and discussion

These diagrams can be used to forecast the maximum temperature if the parameters are forecast. Thus we are left with predictive parameters which, apart from sunshine, are given by routine forecast charts of the surface pressure pattern and the 1000-500 mb thickness, and call for no knowledge of current or past temperatures. It can be concluded from table 1 that 75% of the temperature variance is explained by the three-predictor combination. It is mainly brought about by the thickness so the quality of the temperature forecast depends strongly on the accuracy of the prognostic upper air charts. Therefore the thickness forecasts over De Bilt of ECMWF were verified (period April 1 - November 1 1983). The results of this verification can be found in table 3.

TABLE 3

RMS error of 1000-500 mb thickness forecasts (dam).

lead time in days →

1	2	3	4	5	6
2.1	3.2	4.3	5.4	6.7	7.2

From table 1 and table 2 it may be concluded that the mean temperature variance i.e. 15.0 (corresponding to a rms error of 3.9°) can be reduced to $(1 - 0.869^2)15.0 = 3.67$ (corresponding to a rms error of 1.9°). This is the minimum error using a perfect prog. This error will increase mainly as a result of the increasing error of the thickness forecasts corresponding to increasing lead time (table 3). The effect of the thickness error has not been assessed explicitly. However estimations have been made and the results can be found in table 4. They are made by using the relation var (a+b) = var a + var b. In the same table the results of persistency forecasts are given as a measure of comparison.

TABLE 4

RMS error of T_x-forecasts (F) and persistency forecasts (P). (°C)

lead time in days →

1	2	3	4	5	6
2.1	2.3	2.6	2.9	3.3	3.5
3.1	4.0	-	4.7	-	5.1

4. Abstract

It was found that a useful indication of maximum temperature may be obtained from the midday 1000-500 mb thickness, the surface wind direction, the sunshine total and the month. The relationship represents a mean reduction of variance of about 75% (during April-October). This gives rise to a rms error of 1.9°C. The quality of temperature forecasts made on the basis of the relationship are mainly determined by the quality of the thickness (1000-500 mb) forecasts.

Acknowledgement

Mr. A. Grendel was very helpful with the preparation of this paper.

References

Boyden, C.J., 1962: Forecasting of maximum surface temperatures from 1000-500 mb thickness lines. Met. Magazine, Vol. 91.

diagram 1

MAXIMUMTEMPERATUUR DE BILT VOOR MIDDEN-APRIL,

In afhankelijkheid van de dikte $H_{500}-H_{1000}$ = ΔH en de windrichting aan de grond, beide van 12 GMT, bovendien opgesplitst naar de zonneschijnklassen 0, 1, 2 en 3, met zonneschijnpercentages 0, 1-29, 30-59 en 60% of meer. DE PARAMETERKLASSEN WAARVOOR GEEN TEMPERATUREN ZIJN INGEVULD ZIJN TOT NU TOE NIET VOORGEKOMEN. Materiaal 1947-1978 (810 gevallen). De onderstreepte temperaturen geven de kolomgemiddelden aan.

	S				SW				W				NW				N				NE				E				SE				LV				
ΔH	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	
>560																																			24		>560
59																																			23		59
58				24		17																				22	22								22		58
57				24		17				18																22	22	23							22		57
56		18		23	13	17			13	17																21	21	23							21		56
55		18		23	12	16			13	17			12							19				21		21	21	22						20	21		55
54		18		22	12	16	19	19	13	16		20	12				13			19				20		20	20	22	15		21			20	20	21	54
53		18	21	22	12	16	19	19	13	16		19	12			19	13			18				20		20	20	21	15	20	21			19	20	21	53
52	13	17	21	21	12	15	19	19	13	15		19	12		15	19	13		15	18			16	19		19	19	21		19	20	22	16	19	19	20	52
51	12	17	20	21	12	15	18	18	13	15	15	18	11	14	15	18	12	12	15	18			16	19		19	19	20		19	20	21	15	19	19	20	51
550	12	17	20	20	11	15	18	18	13	15	15	18	11	14	15	18	12	12	15	17	10	15	16	19		18	18	20		18	19	20	14	18	18	19	550
49	12	16	19	20	11	14	17	17	13	14	15	17	11	14	14	17	12	12	14	17	10	15	16	18		18	18	19		18	19	20	13	17	18	19	49
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44	10	15	17	17	11	13	15	15	11	13	14	15	10	12	13	15	10	11	13	14	8	13	14	16		15	16	17		15	16	17	10	15	16	16	44
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42	9	14	16	16	10	12	14	14	10	12	13	15	9	12	12	14	9	10	12	13	7	12	14	15	12	14	15	16		14	15	16	9	14	15	15	42
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29		10	10			9	10	10		9	10	10	6	8	9	9		7	9	9		10	11	11		8						11		8	9		29
28		9	10			8	10			8	9	10	5	8	9	9		7	8	9		10	10	11		7						10		8	9		28
27		9				8	9			8	9	10	5	8	9	9		7	8	9		10				7								8	8		27
26		9				8	9			8	9	9	5	7	8	8		6	8	9						7								8	8		26
25		8				8	9			8	8	9		7	8	8		6	8	9														8			25
24		8				7	8			7	8	9		7	8	8		6	7	8														8			24
23		8				7	8			7	7	8			7	8		5	7	8														8			23
22						7	8			7	7	8			7	8		5	7	8														8			22
21							7			6	7				7	8			6	8																	21
520							7								7	8			6	7																	520
19							7								7	7			5	7																	19
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17							7								6					6																	17
16															6																						16
<515															6																						<515
(810)	12	33	29	11	16	53	29	8	17	47	24	22	7	38	35	21	11	29	40	46	13	14	22	51	2	14	13	28	2	8	10	14	14	26	22	19	

diagram 2

MAXIMUMTEMPERATUREN MIDDEN-MEI in afhankelijkheid van $\Delta H = H_{500}-H_{1000}$ en windrichting aan de grond, beide van 12 GMT, bovendien opgesplitst naar de zonneschijnklassen 0,1,2 en 3 met resp. zonneschijnpercentages 0, 1-29, 30-59 en 60% of meer. De parametercombinaties waarvoor geen temperaturen zijn ingevuld zijn tot nu toe niet voorgekomen.

Materiaal 1947-1978 (983 gevallen). De onderstreepte temperaturen geven de kolomgemiddelden aan.

	S				SW				W				NW				N				NE				E				SE				LV				
ΔH	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	
>570																																30					>570
69																																29					69
68				29				27																								29					68
67				28				27																				28				28					67
66				28				26																				28			28	28					66
65				27				26																27				27			28	28					65
64				27				25				26												27				27			27	27					64
63				26				25				26												26				26			27	27					63
62				26				24				25												26		24	26	26		25	26	26					62
61			25	25				24				25			25									25		23	26	25		24	26	26					61
560			25	25				23				24			24	25								25		23	25	25		24	25	25			24	26	560
59			24	24			23	23				24			24	24				23		20		24		22	25	24		23	25	25	14	18	24	25	59
58			24	24			22	22				23			23	24	14			23		20		24		22	24	24		23	24	24	14	18	23	25	58
57		21	23	23	16		22	22		18	20	23	14	17	23	23	14	20	22	23		19		23		21	24	23		22	24	24	14	18	23	24	57
56		20	23	23	15		21	22		18	20	22	13	17	22	23	14	19	22	22		19		23		21	23	23		22	23	24	13	17	22	24	56
55		20	22	22	15	18	21	21		18	20	22	13	17	22	22	14	19	21	22		18	21	22	16	21	23	22		21	23	23	13	17	22	23	55
54		19	22	22	15	18	20	21		17	19	21	13	16	21	22	14	18	21	21		18	21	22	16	20	22	22		21	22	23	13	17	21	23	54
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52	16	18	21	21	14	17	19	20	14	17	19	20	13	16	20	21	13	17	20	20	14	17	20	21	15	19	21	21		20	21	22	13	16	21	21	52
51	16	18	20	21	14	17	19	20	13	16	18	20	13	15	20	20	13	17	19	20	13	17	20	20	15	19	21	20		19	21	22	13	16	20	21	51
550	15	18	20	20	13	16	18	20	13	16	18	19	13	15	19	20	13	16	19	19	13	17	19	20	15	18	20	20		19	20	21	13	16	20	20	550
49	15	17	19	20	13	16	18	19	12	16	18	19	12	15	19	19	12	16	18	19	12	16	19	19	14	18	20	19		18	20	21	13	16	20	20	49
48	14	17	19	20	13	16	18	19	12	15	17	18	12	14	18	19	12	16	18	19	12	16	18	19	14	18	19	19		18	19	20	12	15	19	19	48
47	14	17	18	19	12	15	17	19	12	15	17	18	12	14	18	18	12	15	17	18	11	16	18	18	14	17	19	18		17	19	20	12	15	19	19	47
46	13	16	18	19	12	15	17	18	11	15	16	17	12	14	17	18	12	15	17	18	11	15	17	18	14	17	18	18		17	18	19	12	15	19	19	46
45	13	16	17	19	12	15	17	18	11	14	16	17	12	13	17	17	11	15	17	18	11	15	17	17	14	16	18	17		16	18	19	12	15	18	18	45
44	12	16	17	18	11	14	16	18	10	14	16	16	12	13	16	17	11	14	16	17	10	15	16	17	13	16	17	17		16	17	18	12	14	18	18	44
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41	11	15	15	17	10	13	15	17	9	13	15	15	11	12	15	15	10	13	16	17	9	14	15	15	13	14	16	15		15	16	17	11	14	17		41
540	11	14	15	17	10	13	15	16	9	13	14	14	11	12	14	15	10	13	15	16	9	13	14	15	12	14	15	15		14	16	17	11	13	17		540
39	11	14	14	17	10	13	15	16	8	12	14	14	11	11	14	14	10	13	15	16	9	13	14		12	14	15	14		14	15	17	11	13	17		39
38	10	14	14	16	10	12	14	15		12	13	13	11	11	13	14	10	12	15			13	13			13	14			14	15	16	11	13	16		38
37		13	13			12	14	15		12	13	13	11	11	13	13	9	12	14			12	13			13	14				15	16	11	13	16		37
36		13	13			12	14	15		11	13	12	10	10	12	13		12	14			12	12			12	13					16	11	12	15		36
35		13				11	13	14		11	12	12	10	10	12	12		11	13			12	12			12	13							12	15		35
34		12				11	13	14		11	12	12	10	10	12	12		11	13				11			11	12							12	15		34
33		12				11	13	13		10	11	11		9	11	12		11	12								12							12	14		33
32						10	12	13		10	11	11		9	11	11		10	12								12							11	14		32
31							12	13		10	11	11		9	11	11		10	12															11	14		31
530							12	12		10	10	10		8	10	11		10	11															11	13		530
29							11	11		9	10	10		8	10				11															11	13		29
28							11			9	10				10				11															10	13		28
27										9	9				9				11															10	12		27
26										9	9				9																			10	12		26
25										8	9				9																			10	12		25
24										8					8																						24
<523															8																						<523
		S				SW				W				NW				N				NE				E				SE				LV			
983	9	54	39	24	10	58	69	21	11	56	42	30	12	45	36	42	11	24	24	47	8	28	15	44	6	12	13	46	1	12	23	29	14	27	29	12	

diagram 3

MAXIMUMTEMPERATUREN DE BILT VOOR MIDDEN-JUNI

In afhankelijkheid van $\Delta H = h_{500} - h_{1000}$, windrichting aan de grond (LV - < 4 kts) beide van 12 GMT, bovendien opgesplitst naar de zonneschijnklassen 0, 1, 2 en 3 met resp. 0, 1-29, 30-59 en 60% of meer. De parametercombinaties waarvoor geen temperaturen zijn ingevuld zijn tot nu toe nog niet voorgekomen.
Materiaal 1947-1978 met 879 gevallen.

ΔH	S 0	S 1	S 2	S 3	SW 0	SW 1	SW 2	SW 3	W 0	W 1	W 2	W 3	NW 0	NW 1	NW 2	NW 3	N 0	N 1	N 2	N 3
>578																				
77																				
76																				
75																				
74								28												
73								28												
72				32				27												
71			28	31				27												
570			28	31				26		24										
69			27	30				26		23		26								
68		23	27	30				26		23		26								
67		23	26	29				25		23		26				23				
66		23	26	29			25	25		22		25				23				
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64		22	25	28		23	24	24	18	22		24	17			23			23	25
63	20	22	25	27		23	24	24	18	21		24	16		22	22		20	22	25
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61	20	21	24	26	21	22	23	23	18	21		23	16		22	22		20	22	24
560	19	21	24	26	21	22	22	23	17	20	23	23	16	21	21	22		19	21	23
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56	18	19	22	24	19	20	21	22	16	19	21	22	15	19	20	21		18	19	21
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54	17	19	21	23	18	20	20	21	16	18	20	21	15	19	19	20	15	17	19	20
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47	14	16	19		16	18	18	19	14	16	18	18	13	16	17	19	14	16	16	18
46	14	16	18		15	17	17	19	14	16	17	18	13	16	17	18	13	15	16	18
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44	13	15	18		15	17	17	18	13	15	17	18	13	15	16	18	13	15	15	
43	12	15	17		14	17	17	18	13	15	16		13	15	16	18	13	15		
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41	11	14				16	16	17	13	14	16			14	15	17	12			
540	11	14				16	16	17	12	14	15			14	15	17	12			
39	10	14				16				14	15			13	15					
38	10	13				15				14	15			13	14					
37	9	13				15					14									
36	9										14									
35																				
34																				
33																				
32																				
31																				
<530																				
879	11	48	31	25	13	60	44	24	11	40	51	37	11	39	35	38	4	27	23	46

ΔH	NE 0	NE 1	NE 2	NE 3	E 0	E 1	E 2	E 3	SE 0	SE 1	SE 2	SE 3	LV 0	LV 1	LV 2	LV 3	ΔH
>578												36					>578
77												35					77
76												35					76
75												34					75
74								32				34					74
73								32				33				32	73
72								31				33				31	72
71				30				31				32				31	71
570				29				30				32				30	570
69				29				30				31			28	30	69
68				28				29				31			28	29	68
67				28				29			25	30			27	29	67
66			27	27				28			25	30			27	28	66
65			26	27				28		24	25	29			26	28	65
64			26	26			26	27		23	25	29			26	27	64
63		21	25	26			25	27		23	24	28		21	25	27	63
62	16	21	25	25		24	25	26		23	24	28		21	25	26	62
61	16	21	24	25		25	25	26		22	24	27		21	25	26	61
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59	16	20	23	24		23	24	25		22	23	26	18	20	24	25	59
58	16	20	23	23		22	24	25		21	23	26	17	20	23	24	58
57	16	19	22	23		22	23	24		21	23	25	17	19	23	24	57
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51	15	17	20	30		19	21	22		19	21	22	16	17	20	21	51
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49	14	17	19	19		18	21	21		19			15	17	19		49
48	14	16	16	19		17	20			19			15	16	19		48
47	14	16	18	18		17	20		13	18			15	16	18		47
46	14	16	17	18		16	19			18			14	16	18		46
45	14	15	17				19			18				16	17		45
44	13	15	16				19							15	17		44
43		15	16				18							15	16		43
42		14	15				18							15	16		42
41			15				18							15			41
540			14				17							14			540
39														14			39
38														14			38
37																	37
36																	36
35																	35
34																	34
33																	33
32																	32
31																	31
<530																	<530
879	7	13	13	46	-	7	6	31	1	6	6	23	5	39	31	27	

diagram 4

MAXIMUMTEMPERATUREN DE BILT VOOR JULI

In afhankelijkheid van $\Delta H = h_{500} - h_{1000}$, windrichting aan de grond (LV < 4kts) beide van 12 GMT, bovendien opgesplitst naar de zonneschijnklassen 0, 1, 2 en 3 met resp. 0, 1-29, 30-59 en 60% of meer. De parameterklassen waarvoor geen temperaturen zijn ingevuld zijn tot nu toe nog niet voorgekomen. Materiaal 1947-1978 met 910 gevallen. De onderstreepte temperaturen geven de kolomgemiddelden aan.

	S				SW				W				NW				N				NE				E				SE				LV				
ΔH	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	ΔH
>580																												35									>580
79																												35									79
78																												34									78
77																												34									77
76				33																								33				31				32	76
75			30	33								28												32				39				31				32	75
74			29	32				28				27								28			30	31				32				31				31	74
73			29	32				28				27								28			29	31				32				30				31	73
72			28	31				27				27								28			29	30			31	31				30				30.	72
71			28	31				27				26								27			28	30			30	31				30				30	71
570			27	30				27				26			27					27			28	29			30	30				29			28	29	570
69			27	30				26			26	26			27					27			27	29			29	30			28	29			27	29	69
68			26	29	22	24	25	26			26	26			27					26			27	28			29	30			27	29		26	27	28	68
67			26	29	21	24	25	26		23	25	25			26	26				26	22	23	26	28			28	29			27	28		25	26	28	67
66			25	28	21	23	25	25		23	25	25		23	26	26	17	24	24	25	22	23	26	27			28	29			26	28		25	26	27	66
65			25	28	21	23	24	25		22	25	25		22	25	25	17	24	24	25	22	23	25	27		24	27	28			26	27		24	25	27	65
64		22	24	27	20	23	24	25		22	24	24		22	25	25	17	24	24	25	21	22	25	26		24	27	28			25	27	20	24	25	26	64
63		22	24	27	20	22	24	24		22	24	24		22	24	24	17	23	23	24	21	22	24	26		23	26	27		26	25	26	19	24	25	26	63
62	18	22	24	26	20	22	24	24		21	24	24		21	24	24	16	23	23	24	20	22	24	25		23	26	27		25	24	26	19	23	24	25	62
61	17	21	23	26	19	22	23	24		21	23	23	18	21	23	23	16	22	23	24	20	22	24	25		23	25	26		25	24	25	19	23	24	25	61
560	17	21	23	25	19	21	23	23	17	21	23	23	18	21	23	23	16	22	23	23	20	21	23	24		22	25	26	20	24	24	25	19	22	23	24	560
59	17	21	22	25	19	21	23	23	17	21	23	23	18	20	22	22	16	21	21	23	19	21	23	24		22	24	25		24	24	24	19	22	23	24	59
58	17	21	22	24	18	21	22	23	17	20	22	22	17	20	22	22	16	21	21	23	19	21	23	23		22	24	25		23	23	24	18	22	23	23	58
57	17	20	22	24	18	20	22	22	17	20	22	22	17	20	22	22	15	20	21	22	19	20	22	23		22	24	24		23	23	23	18	21	22	23	57
56	16	20	21	24	18	20	22	22	17	20	22	22	17	19	21	21	15	20	21	22	18	20	22	22		21	23	24		22	22	23	18	21	22	22	56
55	16	20	21		17	20	21	21	16	19	21	22	17	19	21	21	15	20	20	22	18	20	22	22		21	23	23		22	22	22	18	21	22	22	55
54	16	20	20		17	19	21	21	16	19	21	21	16	19	21	21	15	19	20	21	18	19		21	20	21	23	23		21	21	22	17	20	21	21	54
53	16	19	20		17	19	21	21	16	19	20	21	16	18	20	21	15	19	20	21	17	19		21			22	22		21	21	21	17	20	21	21	53
52	15	19	20		17	19	20	21	16	18	20	21	16	18	20	20		19	20	21		19								20	20	21	17	20	21	21	52
51	15	19	19		16	18	20	20	16	18	20	20	16	18	19	20		18	19	20		18									20	21	17	19	20	20	51
550	15	19	19		16		20	20	16	18	19	20	15	18	19	20		18	19	20		18									19	20	17	19	20	20	550
49	14	19	19				20	20	16	17	19	20	15	17	18	20		18	19	20		18									19	20	17	18	19	20	49
48	14	18	18				19	19	16	17	19	19	15	17	18	19		17	19	19		17									18	20		18	19		48
47	14	18	18				19	19	16	17	18	19	15	17	17	19		17		19		17									18			18	19		47
46	14	18					19			16	18	19	14	16	17	19		16		19											18			17	18		46
45		18					19			16	17	18	14	16	17	18				18											17			17	18		45
44		18					18			16	17	18	14	16	16	18				18											17			17	18		44
43		17					18			15	17	18	14	15	16	18															17			16	17		43
42		17					18			15	16			15																	16			16			42
41		17								15	16			15																				15			41
540		17									16			14																							540
39		17																																			39
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910	4	43	22	19	17	88	61	30	10	78	68	38	12	49	41	26	7	17	23	31	4	10	10	35	1	8	7	20	1	5	8	16	8	40	28	25	910

diagram 5

MAXIMUMTEMPERATUREN DE BILT VOOR AUGUSTUS

in afhankelijkheid van $\Delta H = h_{500} - h_{1000}$, windrichting aan de grond (LV < 4kts) beiden van 12 GMT, bovendien opgesplitst naar de zonneschijnklassen 0, 1, 2 en 3 met resp. 0, 1-29, 30-59 en 60% of meer. De parametercombinaties waarvoor geen temperaturen zijn ingevuld zijn tot nu toe nog niet voorgekomen. De onderstreepte temperaturen stellen kolomgemiddelden voor. Materiaal 1947-1978 met 911 gevallen.

	S				SW				W				NW				N				NE				E				SE				LV				
ΔH	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	
>575				30																																	>575
74				30																																	74
73				29																			25					31									73
72				29							26												25					31			31			25			72
71			27	29							25												25	27				30			30	30		25			71
570			27	28			26				25			24									25	27				30			30	30		25		29	570
69			26	28			25	27			25			23						26			24	26			27	29			29	29		24	28	28	69
68		24	26	28			25	27			24			23		26				26			24	26			27	29			29	29		24	28	28	68
67		23	25	27		23	24	26			24	25		23	24	25			25	26		23	24	26			26	28			28	28		24	27	27	67
66		23	25	27	20	23	24	26			24	25		23	24	25			25	25		23	24	25			26	28			28	28		23	27	27	66
65		23	25	26	20	23	24	26			23	24		22	24	25			24	25		23	23	25			26	27		25	27	27		23	26	26	65
64	20	22	24	26	20	22	23	25		22	23	24		22	23	24			24	25		23	23	25			25	27		25	27	27		23	26	26	64
63	20	22	24	25	19	22	23	25		21	23	23		22	23	24			24	24		22	23	24			25	26		24	26	26	21	22	25	25	63
62	19	22	24	25	19	22	23	25	18	21	23	23		21	23	24		22	23	24		22	23	24		23	25	26		24	26	26	21	22	25	25	62
61	19	21	23	25	19	21	22	24	18	21	22	23		21	23	23		22	23	24		22	22	24		23	24	25		23	25	25	20	22	24	24	61
560	18	21	23	24	18	21	22	24	18	20	22	22		21	22	23		21	23	23		22	22	23	19	22	24	25		23	25	25	20	21	24	24	560
59	18	21	23	24	18	21	22	24	18	20	22	22		21	22	23	18	21	22	23	18	21	22	23	19	22	24	24		22	24	24	19	21	23	24	59
58	18	20	22	24	18	20	22	23	18	20	21	22	19	20	22	22	18	20	22	23	18	21	22	23	19	22	23	24		22	24	24	19	21	23	23	58
57	17	20	22	23	17	20	21	23	18	20	21	21	18	20	21	22	18	20	22	22	17	21	21	22	19	21	23	24		21	24	23	18	20	22	23	57
56	17	20	22	23	17	20	21	23	18	19	21	21	18	20	21	22	18	20	21	22	17	21	21	22		21	23	23		21	23	23	18	20	22	23	56
55	17	19	21	23	17	19	21	22	18	19	20	21	17	20	21	21	18	19	21	22	17	20	21	22		20	22	23		20	23		17	20	21	22	55
54	16	19	21	22	16	19	20	22	18	19	20	20	17	19	21	21	18	19	21	21	16	20	21	21		20	22	23		20	23		17	19	21	22	54
53	16	19	21	22	16	19	20	22	18	19	20	20		19	20	21	18	19	20	21	16	20	20	21		20	22	22		19	22		16	19	21	22	53
52		18	20	22		18	20	21	18	18	19	20		19	20	20	18	18	20	21	16	19	20	21		19	21	22		19	22		16	19	20	21	52
51		18	20	21		18	20	21		18	19	19		19	20	20		18	20	20		19	20	20		19	21	22			22			18	20	21	51
550		18	20	21		18	19	21		18	19	19		18	19	20		18	19	20		19	20	20		18					21			18	19		550
49		17	19	21		17	19	20		18	19	19		18	19	19			19	20			19	20		18					21			18	19		49
48		17	19	20		17	19	20		17	18	18		18	19	19			19	19			19	20		18								17	19		48
47		17	19	20		17	18	20		17	18	18		18	19	19			18	19			19											17	18		47
46		16	18	20		16	18	19		17	17	18		17	18	18			18	19			19											17	18		46
45		16	18	19		16	18	19		17	17	17		17	18	18			18	18			18												18		45
44		16	18	19		16	17	19		16	17	17		17	18	18			17	18			18														44
43			17	19		15	17	18		16	17				17	18			17				18														43
42				18		15	17	18		16	17				17	17			17				18														42
41				18				18		16					17	17			17																		41
540				18				18		15					16																						540
<539				18				17		15																											<539
911	12	26	34	27	16	103	63	16	4	51	59	34	3	27	33	30	4	15	28	29	4	11	14	57	3	13	11	44	-	10	23	22	6	33	25	21	911

diagram 6

MAXIMUMTEMPERATUREN DE BILT VOOR SEPTEMBER

in afhankelijkheid van $\Delta H = h_{500} - h_{1000}$, windrichting aan de grond (LV < 4kts) beide kan 12 GMT, bovendien opgesplitst naar de zonneschijnklassen 0, 1, 2 en 3 met resp. 0, 1-29, 30-59 en 60% of meer. De parameterklassen waarvoor geen temperaturen zijn ingevuld zijn tot nu toe nog niet voorgekomen.
Materiaal 1947-1978 met 947 gevallen. De onderstreepte temperaturen geven de kolomgemiddelden aan.

	S				SW				W				NW				N				NE				E				SE				LV				
ΔH	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	
>580																																32					>580
79																																31					79
78																																31					78
77																																30					77
76																																30					76
75				28																						28						29					75
74				28																						28						29					74
73				27																						27						28					73
72				27																						27						28					72
71			26	26			24					25														26				26	26	27					71
570			26	26			24					25											22	23		26		26		26	26	27					570
69			25	25			24					25			24								22	23		25		26		25	25	27					69
68			25	25		20	23					24			24								21	23		25		25		25	25	26				24	68
67	20	22	25	25	19	20	23					24			24				23				21	23		24		25		24	24	26			24	24	67
66	19	22	24	24	18	20	23		18	20	21	24			23				23				21	22		24	24	24		24	24	25			24	24	66
65	19	21	24	24	18	19	22		18	20	21	24			23				23	23		20	21	22		23	24	24		23	23	25			23	23	65
64	19	21	24	24	18	19	22		18	20	21	23	16		23			20	22	22		20	20	22		23	23	24		23	23	24		21	23	23	64
63	18	21	23	23	18	19	22	22	18	20	21	23	16		22			20	22	22		19	20	22	18	22	23	23		23	23	24		21	23	23	63
62	18	20	23	23	17	19	21	21	18	19	20	23	16		22	22		19	22	22		19	20	21	17	22	22	23		22	22	23	18	21	22	22	62
61	18	20	22	22	17	19	21	21	17	19	20	22	16	18	22	22	19	19	21	21		19	20	21	17	22	22	23	19	22	22	23	17	20	22	22	61
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diagram 7

MAXIMUMTEMPERATUREN DE BILT VOOR OKTOBER

in afhankelijkheid van $\Delta H = h_{500} - h_{1000}$, windrichting aan de grond (LV < 4 kts), beide van 12 GMT en bovendien opgesplitst naar de zonneschijnklassen 0, 1, 2 en 3 met resp. 0, 1-29, 30-59 en 60% of meer. De parametercombinaties waarvoor geen temperaturen zijn ingevuld zijn tot nu toe nog niet voorgekomen. Materiaal 1947-1978 met 910 gevallen. De onderstreepte temperaturen stellen de kolomgemiddelden voor.

	S				SW				W				NW				N				NE				E				SE				LV				
ΔH	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	0	1	2	3	
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66																												20		20	20	21			20		66
65		20	20		16																							20		19	19	21			20	23	65
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