W.A.I.T. TASMAN SEA STUDY

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1. Introduction

In December, 1982 a data set comprising of four TOVS orbits taken over the Tasman Sea were distributed by the Cooperative Institute for Meteorological Satellite Studies (CIMSS) Madison. These data sets have been processed at WAIT, Perth. We report the temperature soundings derived from these four Tasman sea passes. Both Smith and Chahine iterative schemes have been employed in generating soundings which used statistical initial guess temperature profiles.

2. Temperature Retrievals

The analysis of satellite data reported here utilized the ORBIT or preprocessed data rather than the INGEST set. Atmospheric sounding from the NOAA satellites has begun only recently at WAIT and the full retrieval packages are still being implemented and evaluated. At this time it was not possible to generate retrievals with confidence over cloudy areas, although this option will be available shortly. We limit our data presentation to a set of clear areas identified from the 11 micron brightness temperature fields.

Atmospheric soundings have been produced using both the Smith retrieval scheme and a modified Chahine technique. Data are reported at five selected standard levels (vis. 850, 700, 500, 300, 200 mb) although they are available at 40 levels. For this paper we typically used a 3x3 or 3x4 sounding grid for each satellite pass.

(i) Pass 1 at 0249Z on October 28, 1982

Figure 1 shows the clear area in which these 850 mb temperature soundings were taken on the 0249Z pass. The row and column numbers of the sounding grid points (counted from upper left corner of the image) are provided in Table 1(a). Table 1(b) provides the temperature soundings at these grid points for the 850, 700, 500, 300 and 200 mb levels of the 0249Z satellite pass. The two temperature soundings given at each grid point correspond to the Smith and modified Chahine retrieval schemes respectively. The temperatures given in square brackets in Figure 1 and Table 1(b) for grid point (6,4) are derived from the Auckland (Station 93119) 0000Z sonde of October 28. Table 1(c) presents thickness fields derived from the temperature profiles.

(ii) Pass 2 at 0431Z on October 28, 1982

Figure 2 contains the 850 mb temperature soundings for pass 2 (at 0431Z) at the grid points listed in Table 2(a). Table 2(b) tabulates temperature soundings on this grid at the 850, 700, 500, 300 and 200 mb levels. The temperatures shown in square brackets are from the Lord Howe Island (Station 94995) 0000Z sonde of October 28. Table 2(c) presents the associated thickness fields derived from the temperature profiles.

(iii) Pass 3 at 1418Z on October 28, 1982

Figure 3 shows the 850 mb temperature soundings for satellite pass 3 (at 1418Z) at the image grid points given in Table 3(a). Table 3(b) provides the temperature retrievals at selected standard levels. For comparison, the Auckland (Station 93119) 1200Z radiosonde temperatures at the tabulated levels are provided in square brackets. (Note in Table 3(b) that an analysis of the 700 mb field by the Bureau of Meteorology for 1200Z data suggests that a temperature of 273K may be nearer to the correct value than the 276.1 K value listed.) Table 3(c) lists the thickness fields derived from the temperature profiles.

(iv) Pass 4 on 1600Z on October 28,1982

Figure 4 details the temperature soundings obtained from the cloud free regions of the 1600Z satellite pass. Table 4(a) lists the row and column indices at which soundings were taken. Table 4(b) lists temperature retrievals for selected standard levels. The Hobart Station (no. 94975) 1200Z radiosonde report for October 28 is given in square brackets at the (22,16) grid point in Figure 4(a) and Table 4(b). Table 4(c) lists the thickness fields derived from the temperature profiles.

3. Conclusion

In that the soundings were restricted to relatively cloud free regions, the sounding locations and some stations were separated typically by significant distances (750 km). This, together with a knowledge of the temperature gradients which existed on the day, would imply that a close agreement between our satellite soundings and the sonde temperatures wouldn't be expected. With these qualifications we report a 2.9°K standard deviation between the satellite and sonde temperatures for all four passes at the five standard levels specified.

4. Acknowledgements

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279.2, 279.1	276.5, 276.4	275.8, 275.7	275.8, 275.9
278.4, 278.4 [279.3]	275.4, 275.4	273.4, 273.3	273.5, 273.4

FIGURE 1. Temperature retrievals (K) for selected image grid locations at 850mb level in the clear region of the 0294Z pass. The notation used is (Smith, Chahine) at each grid point and [ ] for the 0000Z sonde, Auckland, October 28th, 1982.

2,4	2,12	2,20	2,28
6,4	6,12	6,20	6,28

Table 1(a). Image grid points (row,col.) in the 0249Z pass at which the temperature soundings in FIGURE 1. were determined.

PRESSURE LEVEL	TEMPERATURE SOUNDINGS			
850 mb	279.2, 279.1	276.5, 276.4	275.8, 275.7	275.8, 275.9
	278.4, 278.4 [279.3]	275.4, 275.4	273.4, 273.3	273.5, 273.4
700 mb	272.5, 272.5	268.8, 268.8	268.1, 268.2	268.2, 268.5
	271.4, 271.4 [271.6]	267.4, 267.5	265.7, 265.9	265.6, 265.7
500 mb	257.0, 257.2	254.6, 254.8	254.1 254.4	254.9, 255.2
	255.8, 256.0 [255.6]	253.0, 253.3	252.3, 252.7	252.1, 252.5
300 mb	232.5, 232.6	234.3, 234.3	234.7, 234.7	236.4, 236.3
	231.8, 231.9 [227.6]	233.4, 233.3	234.3, 234.1	234.8, 234.8
200 mb	220.5, 220.4	225.4, 225.1	226.6, 226.4	227.9, 227.5
	220.4, 220.3 [216.8]	225.4, 225.0	227.6, 227.3	228.4, 228.1

Table 1(b). Temperature retrievals (K) at the 850, 700, 500, 300, and 200 mb levels for the 0249Z pass at the image grid points listed in Table 1(a).

(553,705)	(546,714)	(545,716)	(546,719)
(551,704)	(544,715)	(541,720)	(541,721)

Table 1(c). The (1000-500, 300-100)mb thickness fields (Dm) derived using the Smith iterative scheme for the 0249Z pass image grid points listed in Table 1(a).

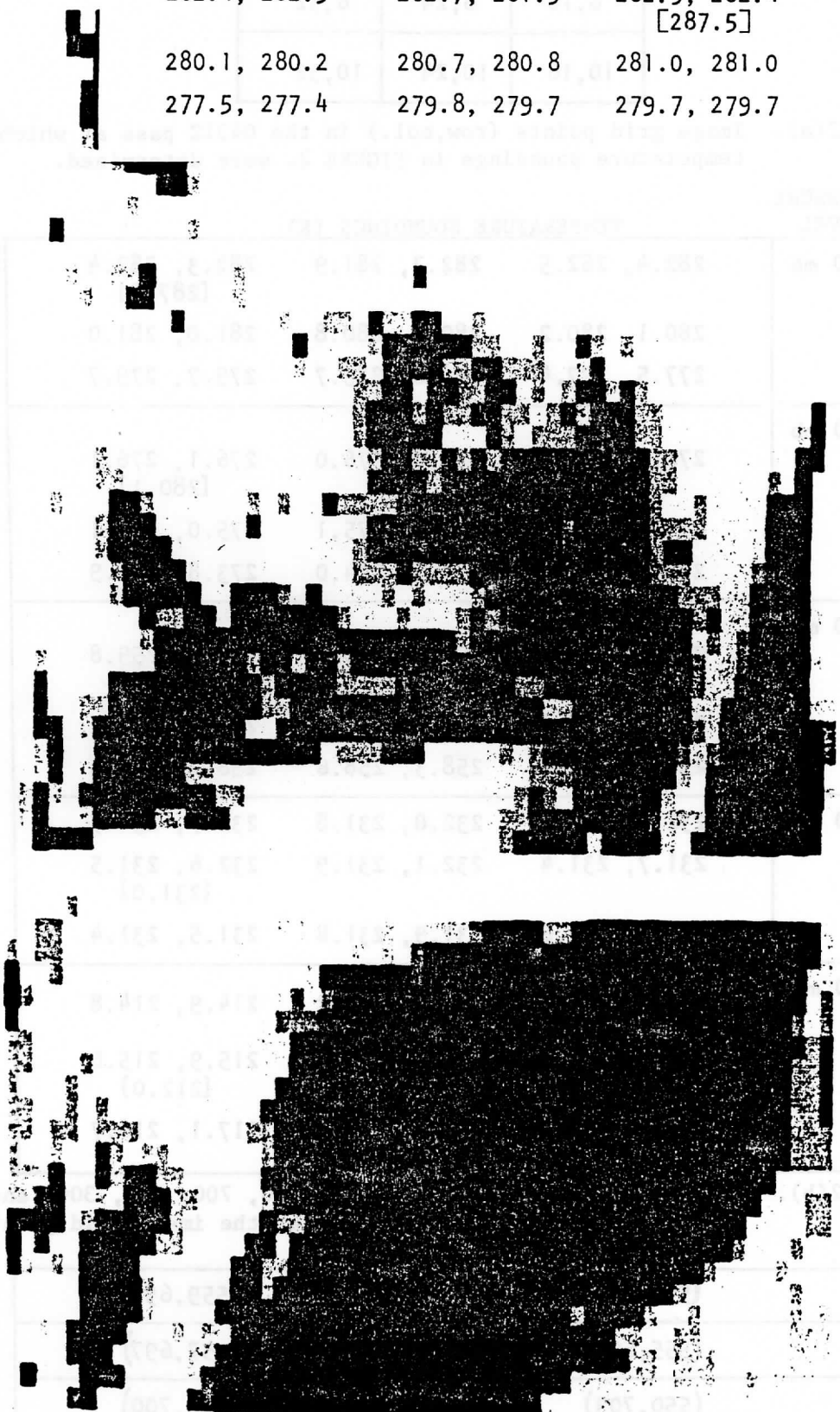

FIGURE 2. Temperature retrievals (K) for selected image grid locations at the 850mb level in the clear region of the 04317Z pass. The notation used is (Smith, Chahine) at each grid point and [ ] for the Lord Howe Island 0000Z sonde, October 28th, 1982.

2,16	2,24	2,32
6,16	6,24	6,32
10,16	10,24	10,32

Table 2(a). Image grid points (row,col.) in the 0431Z pass at which temperature soundings in FIGURE 2. were determined.

PRESSURE LEVEL	TEMPERATURE SOUNDINGS (K)		
850 mb	282.4, 282.5	282.7, 281.9	282.3, 282.4 [287.5]
	280.1, 280.2	280.7, 280.8	281.0, 281.0
	277.5, 277.4	279.8, 279.7	279.7, 279.7
700 mb	276.4, 276.4	275.8, 276.0	276.1, 276.1 [280.1]
	274.4, 274.5	274.9, 275.1	275.0, 275.1
	271.4, 271.4	273.9, 274.0	273.8, 273.9
500 mb	260.0, 260.1	259.8, 260.0	259.8, 259.8 [260.8]
	258.8, 258.9	259.3, 259.4	259.1, 259.2
	256.3 256.6	258.3, 258.6	258.2, 258.4
300 mb	232.1, 231.9	232.0, 231.8	232.7, 231.7
	231.7, 231.4	232.1, 231.9	232.6, 231.5 [231.0]
	231.8, 231.6	231.9, 231.8	231.5, 231.4
200 mb	215.8, 215.6	215.7, 215.2	214.9, 214.8
	216.4, 216.0	216.5, 216.0	215.9, 215.6 [212.0]
	218.6, 218.1	217.3, 216.9	217.1, 216.7

Table 2(b). Temperature retrievals(K) at the 850, 700, 500, 300, and 200 mb levels for the 0431Z pass at the image grid points listed in Table 2(a).

(559,696)	(558,696)	(559,693)
(555,697)	(556,698)	(557,697)
(550,703)	(554,700)	(554,700)

Table 2(c). The (1000-500, 300-100) mb thickness fields (Dm) derived using the Smith iterative scheme for the 0431Z pass image grid points listed in Table 2(a).

278.3, 278.4	276.0, 276.0	273.3, 273.1
276.7, 276.6 [280.9]	276.0, 278.5	272.9, 272.8
275.0, -	275.2, -	272.6, -

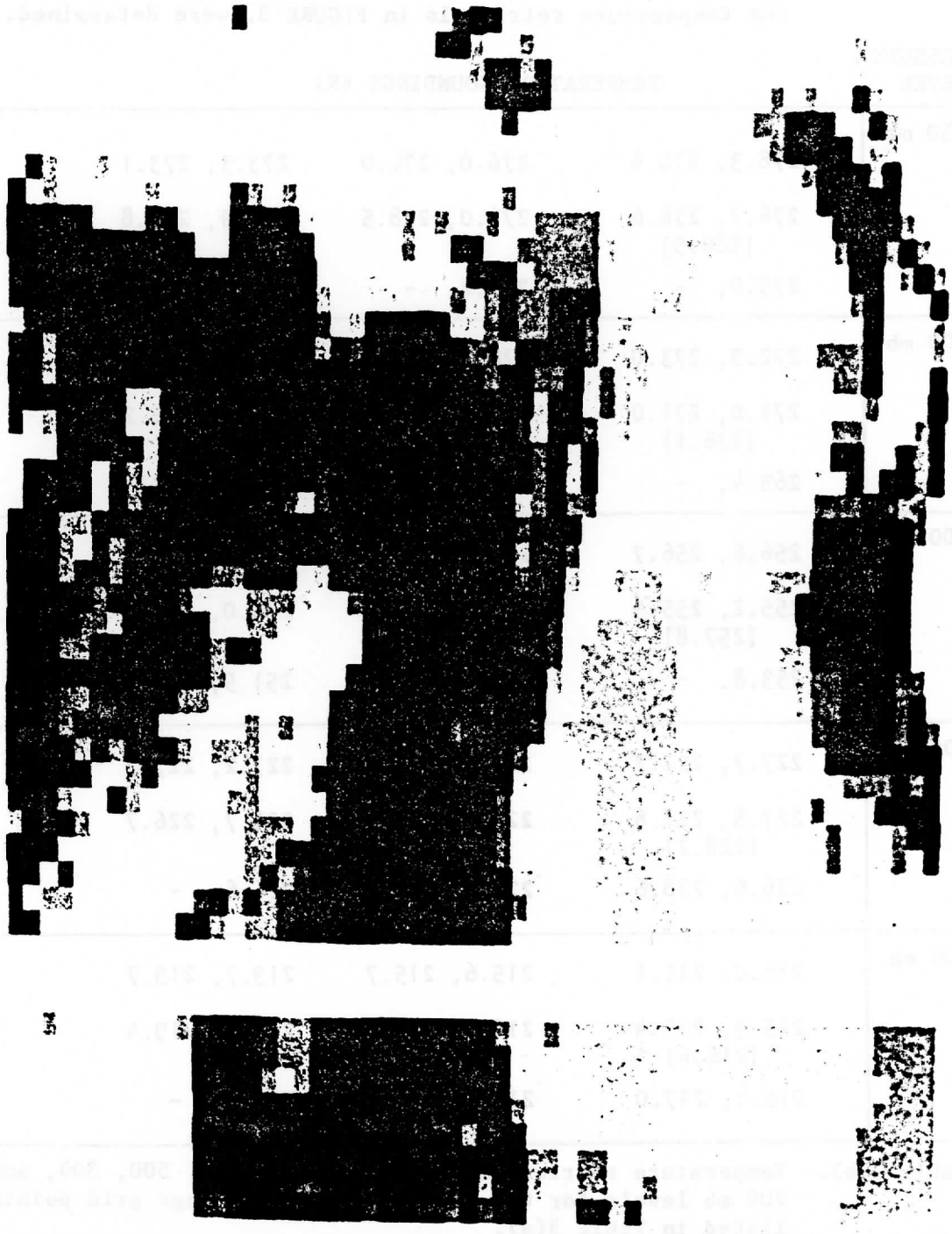

FIGURE 3. Temperature retrievals (K) for selected image grid locations at the 850mb level in the clear region of the 1418Z pass. The notation used is (Smith, Chahine) at each grid point and [ ] for the Auckland 1200Z sonde, October 28, 1982.

2,16	2,28	2,40
6,16	6,28	6,40
10,16	10,28	10,40

Table 3(a). Image grid points (row,col.) in the 1418Z pass at which the temperature retrievals in FIGURE 3. were determined.

PRESSURE LEVEL	TEMPERATURE SOUNDINGS (K)		
850 mb	278.3, 278.4	276.0, 276.0	273.3, 273.1
	276.7, 276.6 [280.9]	276.0, 278.5	272.9, 272.8
	275.0, -	275.2, -	272.6, -
700 mb	272.9, 273.0	270.8, 270.8	267.3, 267.3
	271.0, 271.0 [276.1]	270.1, 272.1	267.1, 267.2
	269.4, -	269.2, -	266.6, -
500 mb	256.6, 256.7	254.8, 254.9	252.2, 252.4
	255.2, 255.3 [257.8]	254.3, 255.5	252.0, 252.2
	253.8, -	253.4, -	251.5, -
300 mb	227.7, 227.7	226.5, 226.7	227.2, 227.3
	227.5, 227.6 [228.2]	227.2, 228.3	226.7, 226.7
	226.6, 228.6	226.7, -	226.6, -
200 mb	215.0, 215.1	215.6, 215.7	219.7, 219.7
	215.3, 215.4 [216.6]	216.8, 218.0	219.4, 219.4
	215.2, 217.0	217.7, -	219.9, -

Table 3(b). Temperature retrievals (K) at the 850, 700, 500, 300, and 200 mb levels for the 1418Z pass at the image grid points listed in Table 3(a).

552,696	549,698	542,708
549,696	547,701	542,707
546,696	545,703	541,709

Table 3 (c). The (1000-500, 300-100) mb thickness fields (Dm) derived using the Smith iterative scheme for the 1418Z pass image grid points listed in Table 3(a).

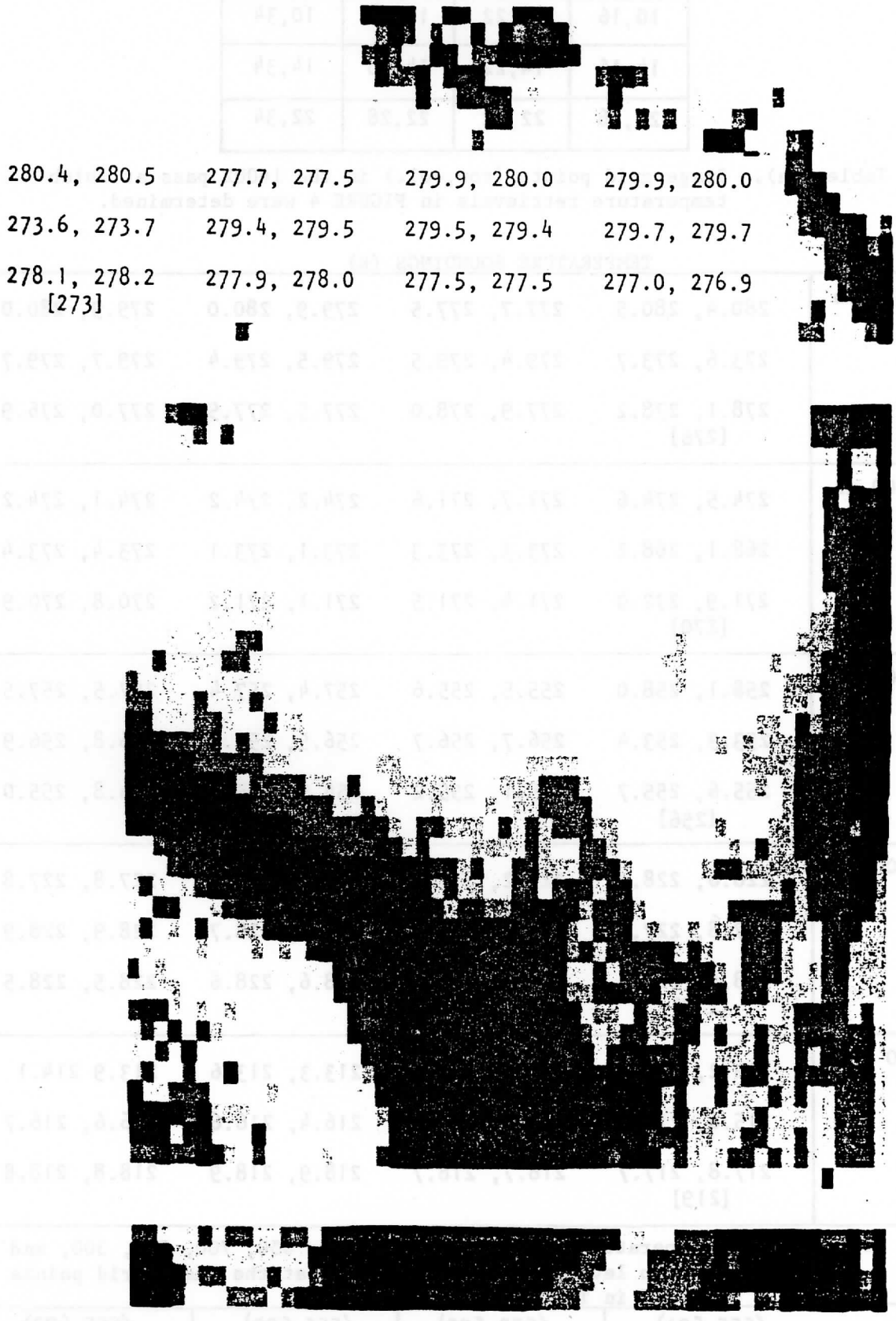

FIGURE 4. Temperature retrievals (K) for selected image grid locations at the 850mb level in the clear region of the 1600Z pass. The notation is (Smith, Chahine) at each grid point and [ ] for the Hobart 1200Z sonde, October 28th, 1982.

10,16	10,22	10,28	10,34
14,16	14,22	14,28	14,34
22,16	22,22	22,28	22,34

Table 4(a). Image grid points (row,col.) in the 1600Z pass at which temperature retrievals in FIGURE 4 were determined.

TEMPERATURE SOUNDINGS (K)

850 mb	280.4, 280.5	277.7, 277.5	279.9, 280.0	279.9, 280.0
	273.6, 273.7	279.4, 279.5	279.5, 279.4	279.7, 279.7
	278.1, 278.2 [276]	277.9, 278.0	277.5, 277.5	277.0, 276.9
700 mb	274.5, 274.6	271.7, 271.6	274.2, 274.2	274.1, 274.2
	268.1, 268.2	273.3, 273.3	273.1, 273.1	273.4, 273.4
	271.9, 272.0 [270]	271.4, 271.5	271.1, 271.2	270.8, 270.9
500 mb	258.1, 258.0	255.5, 255.6	257.4, 257.4	257.5, 257.5
	253.3, 253.4	256.7, 256.7	256.5, 256.5	256.8, 256.9
	255.6, 255.7 [256]	255.1, 255.2	254.9, 255.0	254.8, 255.0
300 mb	228.6, 228.7	227.2, 227.4	227.5, 227.6	227.8, 227.8
	227.8, 227.5	228.4, 228.5	228.6, 228.7	228.9, 228.9
	228.4, 228.4 [228]	228.6, 228.6	228.6, 228.6	228.5, 228.5
200 mb	214.2, 214.6	213.8, 214.1	213.3, 213.6	213.9 214.1
	215.6, 215.2	215.8, 216.0	216.4, 216.6	216.6, 216.7
	217.8, 217.7 [219]	218.7, 218.7	218.9, 218.9	218.8, 218.8

Table 4(b). Temperature retrievals (K) at the 850, 700, 500, 300, and 200 mb levels for the 1600Z pass at the image grid points listed in Table 4(a).

(555,691)	(550,690)	(555,690)	(555,692)
(543,696)	(553,696)	(553,698)	(554,699)
(551,702)	(550,705)	(549,705)	(549,705)

Table 4(c). The (1000-5000, 300-100) mb thickness fields (Dm) derived using the Smith iterative scheme for the 1600Z pass image grid points listed in Table 4(a).

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