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The correction of SIRS 1000 to 300mb and 1000 to 500 mb thicknesses by a regression technique. By CAMPBELL,J.S.

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The correction of SIRS 1000 to 300 mb. and 1000 to 500 mb thicknesses by a regression technique

J S CAMPBELL

The correction of SIRS 1000 to 300 mb and 1000 to 500 mb thicknesses by a regression technique.

Introduction

The following note shows some results obtained by extending the method of correcting SIRS thicknesses (to make them compatible with radiosonde measured thicknesses) to the 1000 to 300 mb and the 1000 to 500 mb thickness bands. Branch Memorandum Number 19 gives details of the correction procedure and gives some results for the 1000 to 100 mb thickness band. This note covers the same period as in Branch Memorandum Number 19 ie 1/1/75 to 30/4/75. For further details of the correction method, the above-mentioned note should be consulted.

Results

Tables 1 and 2 show the variation of SIRS-sonde thickness differences with thickness measured for both NOAA3 and NOAA4 for the 1000 to 300 mb thickness and the 1000 to 500 mb thickness respectively.

In all cases, the SIRS-sonde thickness differences increased with thickness measured (as with the 1000 to 100 mb thickness) and again a fairly good straight line fit to the individual plots was obtained.

Tables 3 and 4 show a comparison between the uncorrected mean daily SIRS -sonde thickness differences and those obtained after applying the two different corrections (ie a) a correction period of 10 days and b) a correction period of 10 days plus a lag period of 5 days). The two thickness bands will be discussed separately.

The 1000 to 300 mb thickness band:-

The results obtained for this thickness band were similar to those obtained for the 1000 to 100 mb thickness band. In general, the corrected mean daily SIRS-sonde thickness differences were smaller in absolute value than the uncorrected differences and again some of the variability was removed from the SIRS thicknesses. The improvement was probably slightly more pronounced with NOAA3 where rather more of the variability was removed from the SIRS thicknesses.

Both correction methods produced similar results, with the transition period immediately after the change of instrument being somewhat extended when a lag was included in the correction procedure. However, the transition period was not as pronounced as with the 1000 to 100 mb, and so the extension of this transition period is probably not serious.

The 1000 to 500 mb thickness band:-

In this thickness band, the uncorrected daily mean differences were small in magnitude, especially with NOAA4 instrument 2. A small reduction in the mean daily differece could be detected with NOAA3 instrument 2, but with NOAA3, the uncorrected differences were sufficiently small that no significant change could be detected after the correction was applied.

The corrections did remove some of the variability in the SIRS thicknesses as with the other thickness bands examined, but again this effect was rather small.

Conclusions

The application of the correction to thickness bands other than the 1000 to 100 mb thickness band, produced similar results. It was, however, more useful where the uncorrected mean daily SIRS-sonde differences were relatively large. Where the uncorrected mean daily differences were small the correction certainly did not cause a degradation in the results, but was only of limited usefulness. The procedure is probably most applicable to levels above 300 mb provided enough colocations can be collected for the calculation of the regression parameters. This stipulation will possibly prevent the use of the correction method above say 50 mb since very few radiosonde heights extend above that level.

In this note, the correction period was maintained at 10 days so that the results for the different thickness bands could be compared. It may be that this is not the most suitable correction period and so further work would be required to determine the most useful length of correction period for each thickness band.

TABLE 1

VARIATION OF (SIRS - SONDE) 1000 to 300 MB THICKNESS DIFFERENCE WITH THICKNESS MEASURED (SIRS THICKNESS) FOR NOAA3 INSTRUMENT 2 and NOAA4 INSTRUMENT 2.
(measurements in DMs)

THICKNESS MEASURED (DM)	NOAA3 INSTRUMENT 2		NOAA4 INSTRUMENT 2	
	MEAN DIFFERENCE	STANDARD ERROR OF MEAN	MEAN DIFFERENCE	STANDARD ERROR OF MEAN
825	-6.2	1.7	-	-
835	-3.9	1.0	-	-
845	-0.9	0.7	-3.8	2.7
855	0.5	0.7	-4.4	0.8
865	0.5	0.7	-3.5	0.9
875	1.3	0.5	-3.9	1.1
885	2.2	0.6	-1.4	1.2
895	1.9	0.5	-3.3	1.0
905	2.5	0.5	-1.7	1.0
915	4.0	0.7	-0.9	1.5
925	1.6	0.6	-1.2	0.7
935	2.3	0.6	-1.4	0.7
945	2.9	0.6	-0.2	0.4
955	4.9	0.4	-0.2	0.4
965	3.3	0.5	2.3	1.9

TABLE 2

VARIATION OF (SIRS - SONDE) 1000 to 500 MB THICKNESS DIFFERENCE WITH THICKNESS MEASURED (SIRS THICKNESS) FOR NOAA 3 INSTRUMENT 2 AND NOAA 4 INSTRUMENT 2.
(measurements in DMs)

THICKNESS MEASURED (DM)	NOAA3 INSTRUMENT 2		NOAA4 INSTRUMENT 2	
	MEAN DIFFERENCE	STANDARD ERROR OF MEAN	MEAN DIFFERENCE	STANDARD ERROR OF MEAN
485	-4.3	1.0	-	-
495	-4.8	0.7	-	-
505	-2.1	0.4	-1.3	1.5
515	0.0	0.4	-3.3	0.5
525	0.7	0.3	-2.2	0.5
535	2.0	0.3	-2.1	0.5
545	2.4	0.3	-1.3	0.6
555	2.9	0.3	-0.8	0.6
565	3.2	0.3	0.3	0.5
575	4.7	0.2	1.0	0.3
585	4.7	0.3	2.8	0.4

TABLE 3

COMPARISON OF (SIRS-SONDE) 1000 TO 300 MB MEAN DAILY THICKNESS DIFFERENCES i) UNCORRECTED ii) CORRECTED WITH A CORRECTION PERIOD OF 10 DAYS iii) CORRECTED WITH A CORRECTION PERIOD OF 10 DAYS AND A LAG PERIOD OF 5 DAYS
(measurements in DMs)

Month	Day	i) UNCORRECTED				ii) CORRECTED - NO LAG				iii) CORRECTED - WITH LAG			
		MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.
January	1	7.9	1.3	2.8	5	-	-	-	-	-	-	-	-
	2	3.5	1.2	4.0	12	-4.5	1.2	4.2	12	-	-	-	-
	3	4.4	1.2	5.1	18	-0.9	1.1	4.6	18	-	-	-	-
	4	6.0	1.3	5.9	19	1.2	1.3	5.6	19	-	-	-	-
	5	4.2	1.0	4.5	20	-0.9	0.7	3.3	20	-	-	-	-
	6	6.2	1.6	5.2	11	1.7	1.4	4.6	11	-0.4	1.6	5.2	11
	7	6.4	0.9	3.7	17	0.6	0.8	3.2	17	-1.5	0.9	3.9	17
	8	4.3	2.2	5.8	7	-0.1	1.9	5.1	7	-0.2	1.9	5.1	7
	9	4.0	2.1	7.0	11	-1.5	1.9	6.3	11	-1.0	1.9	6.3	11
	10	2.1	1.4	6.1	18	-3.5	1.5	6.2	18	-3.5	1.4	6.1	18
	11	2.8	1.0	4.2	18	-2.9	0.9	4.0	18	-3.2	0.9	4.0	18
	12	0.4	1.6	5.5	12	-4.5	1.5	5.4	12	-5.6	1.6	5.4	12
	13	1.7	2.0	7.1	13	-2.4	1.8	6.5	13	-3.8	1.8	6.4	13
	14	3.3	1.2	4.9	17	-0.8	1.1	4.6	17	-2.5	1.1	4.6	17
	15	3.2	0.8	3.5	21	-0.5	0.7	3.3	21	-2.4	0.7	3.4	21
	16	0.5	0.8	3.8	21	-1.9	0.8	3.6	21	-3.4	0.8	3.6	21
	17	4.0	1.2	4.3	13	1.7	1.2	4.5	13	0.0	1.2	4.5	13
	18	4.7	0.9	3.8	20	1.9	0.9	4.1	20	0.3	0.9	4.1	20
	19	3.6	1.4	5.0	13	1.7	1.3	4.6	13	0.6	1.3	4.6	13
	20	4.1	0.7	2.7	13	1.9	0.8	2.9	13	1.2	0.9	3.1	13
	21	3.6	1.2	4.2	13	0.5	1.0	3.5	13	0.0	0.9	3.4	13
	22	3.0	1.5	5.0	11	-0.1	1.4	4.8	11	0.1	1.4	4.8	11
	23	2.8	2.2	7.5	12	-0.4	2.2	7.7	12	0.4	2.2	7.7	12
	24	1.3	0.8	3.5	19	-2.3	0.7	3.2	19	-1.7	0.7	3.2	19
	25	5.5	1.8	7.4	17	2.2	1.9	7.7	17	2.5	1.9	7.8	17
	26	2.6	0.9	4.2	21	-0.4	0.9	4.2	21	0.1	1.0	4.4	21
	27	4.9	1.6	5.8	14	1.4	1.6	6.0	14	1.9	1.7	6.3	14
	28	2.7	1.0	5.2	27	-0.7	1.0	5.1	27	0.3	1.0	5.1	27
	29	1.7	0.9	3.5	16	-1.7	0.9	3.4	16	-1.7	0.9	3.4	16
	30	1.1	1.2	5.0	18	-1.9	1.2	5.1	18	-1.7	1.2	5.2	18
	31	1.5	1.6	5.8	13	-1.3	1.6	5.6	13	-1.6	1.5	5.6	13

TABLE 3

COMPARISON OF (SIRS-SONDE) 1000 to 300 MB MEAN DAILY THICKNESS DIFFERENCES i) UNCORRECTED ii)CORRECTED WITH A CORRECTION PERIOD OF 10 DAYS iii) CORRECTED WITH A CORRECTION PERIOD OF 10 DAYS AND A LAG PERIOD OF 5 DAYS

(measurments in DMs)

Month	Day	i) UNCORRECTED				ii) CORRECTED - NO LAG				iii) CORRECTED - WITH LAG			
		MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.
February	1	0.9	1.4	4.4	10	-1.8	1.4	4.4	10	-2.6	1.4	4.4	10
	2	3.4	0.9	3.4	16	0.6	0.8	3.3	16	-0.4	0.8	3.3	16
	3	2.2	2.9	9.6	11	-0.3	2.9	9.6	11	-1.0	2.9	9.6	11
	4	4.6	1.5	4.2	8	1.8	1.4	4.0	8	1.4	1.4	4.0	8
	5	2.2	0.7	3.4	22	-0.4	0.7	3.2	22	-0.7	0.7	3.4	22
	6	1.2	1.0	4.5	21	-1.4	0.9	4.3	21	-1.5	1.0	4.4	21
	7	1.5	1.1	4.4	15	-0.6	1.2	4.5	15	-1.1	1.1	4.4	15
	8	2.5	1.1	5.9	30	0.7	1.0	5.7	30	-0.1	1.1	5.8	30
	9	3.4	1.3	6.8	29	1.6	1.3	6.8	29	0.8	1.3	6.8	29
	10	1.9	1.4	4.7	11	-1.0	1.4	4.7	11	-0.9	1.4	4.6	11
	11	0.3	1.6	6.7	17	-1.5	1.6	6.5	17	-1.8	1.6	6.6	17
	12	2.8	1.4	5.6	16	0.6	1.3	5.3	16	0.7	1.4	5.4	16
	13	0.7	1.5	5.3	12	-1.1	1.4	4.9	12	-0.9	1.4	5.0	12
	14	0.4	1.0	4.1	15	-1.6	0.9	3.6	15	-1.4	0.9	3.7	15
	15	-0.6	1.9	7.3	14	-2.8	1.9	7.0	14	-3.1	1.9	7.0	14
	16	1.5	0.8	3.8	22	-0.5	0.8	3.7	22	-1.0	0.8	3.7	22
	17	-1.8	1.4	4.5	10	-3.1	1.4	4.4	10	-3.7	1.4	4.4	10
	18	-2.5	1.0	5.1	24	-4.1	0.9	4.4	24	-4.7	0.9	4.4	24
	19	0.3	1.2	5.3	21	-0.2	1.1	5.2	21	-1.5	1.1	5.3	21
	20	0.8	1.1	5.9	30	0.2	1.0	5.5	30	-1.4	1.0	5.5	30
	21	2.0	1.4	5.3	14	1.2	1.3	5.0	14	-0.2	1.3	4.9	14
	22	0.5	1.7	7.3	19	-0.1	1.5	6.6	19	-1.4	1.5	6.6	19
	23	1.4	1.7	6.4	14	1.4	1.5	5.6	14	-0.1	1.5	5.6	14
	24	2.1	1.0	4.6	20	0.8	1.0	4.3	20	0.2	1.0	4.3	20
	25	2.2	2.4	6.4	7	1.9	2.1	5.5	7	1.8	2.1	5.6	7
	26	-1.0	1.3	6.2	22	-1.9	1.3	5.9	22	-1.8	1.3	5.9	22
	27	0.2	1.1	4.1	14	0.6	1.0	3.6	14	0.1	1.0	3.7	14
	28	0.2	1.3	5.9	22	-0.4	1.0	4.5	22	-0.3	1.0	4.7	22
March	1	-2.8	1.7	4.4	7	-2.2	1.4	3.7	7	-2.2	1.4	3.8	7
	2	-0.3	1.1	5.0	20	-0.6	0.9	3.8	20	-0.6	0.9	4.0	20
	3	1.2	1.0	3.8	15	0.0	1.1	4.1	15	0.1	1.0	3.8	15
	4	-0.3	1.0	4.6	21	0.3	0.9	3.9	21	0.1	0.9	3.9	21

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(measurements in DMs)

Month	Day	i) UNCORRECTED				ii) CORRECTED – NO LAG				iii) CORRECTED – WITH LAG			
		MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.
March	5	-0.6	1.4	5.8	18	-0.9	1.0	4.2	18	-1.0	1.1	4.5	18
	6	-1.9	1.4	6.1	19	-0.2	1.2	5.1	19	-1.1	1.2	5.2	19
	7	3.6	1.1	5.7	27	3.7	1.2	6.0	27	3.2	1.1	5.9	27
	8	3.5	1.3	4.8	13	3.1	1.2	4.5	13	3.1	1.2	4.5	13
	9	-0.9	1.6	6.8	18	-2.3	1.3	5.7	18	-1.7	1.3	5.7	18
	10	2.3	1.0	3.3	10	2.5	0.8	2.6	10	2.7	0.8	2.6	10
	11	0.6	1.9	6.3	11	0.4	1.7	5.5	11	1.2	1.7	5.5	11
	12	-1.2	2.4	7.7	10	-1.2	2.1	6.7	10	-0.2	2.1	6.7	10
	13	-0.6	1.3	5.4	17	-2.5	1.2	4.8	17	-1.9	1.2	4.8	17
	14	-2.5	2.1	7.8	14	-2.4	1.9	7.1	14	-2.4	1.9	7.1	14
	15	0.8	1.9	5.9	10	1.1	1.9	5.9	10	1.1	1.9	5.9	10
	16	0.4	2.7	7.5	8	0.6	3.2	9.2	8	0.7	3.3	9.3	8
	17	0.4	1.1	5.1	20	-0.3	1.1	4.9	20	-0.2	1.1	5.0	20
	18	0.0	1.7	7.0	17	0.2	1.8	7.5	17	-0.2	1.9	7.6	17
	19	-0.2	1.4	5.4	16	-0.3	1.4	5.6	16	-1.1	1.5	5.9	16
	20	-2.6	2.0	4.9	6	-3.2	2.1	5.0	6	-4.2	2.3	5.6	6
	21	-1.2	2.2	6.3	8	-1.4	2.0	5.6	8	-2.9	1.8	5.2	8
	22	-3.6	1.5	5.7	15	-3.7	1.5	6.0	15	-5.4	1.6	6.2	15
	23	0.5	1.3	4.7	13	1.0	1.3	4.8	13	-0.9	1.4	5.2	13
	24	-5.0	3.9	10.9	8	-4.3	3.8	10.9	8	-5.1	3.8	10.8	8
	25	-1.4	1.5	5.5	13	-0.6	1.5	5.6	13	-1.3	1.7	6.2	13
	26	1.3	3.0	10.3	12	2.4	3.0	10.4	12	1.1	2.9	10.0	12
	27	0.0	1.8	7.0	15	0.9	1.8	7.0	15	0.3	1.8	6.9	15
	28	-2.0	2.1	7.6	13	-0.8	2.1	7.7	13	-0.9	2.1	7.8	13
	29	-1.2	1.2	5.1	18	0.1	1.2	4.9	18	-0.4	1.2	5.0	18
	30	-2.3	1.4	4.6	10	-0.9	1.3	4.2	10	-1.5	1.4	4.5	10
	31	-3.6	3.2	7.3	5	-2.1	3.1	6.9	5	-2.6	3.3	7.3	5

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(measurements in DMs)

Month	Day	i) UNCORRECTED				ii) CORRECTED - NO LAG				iii) CORRECTED - WITH LAG			
		MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS
April	1	-1.8	2.5	9.2	14	-0.6	2.4	8.9	14	-1.1	2.4	9.0	14
	2	-0.5	2.1	8.1	15	0.6	2.1	8.0	15	0.5	2.1	8.0	15
	3	-2.6	1.4	6.4	20	-1.4	1.4	6.3	20	-1.4	1.4	6.3	20
	4	1.2	2.6	10.5	16	2.5	2.6	10.4	16	2.6	2.6	10.4	16
	5	-4.0	1.3	5.3	17	-2.9	1.1	4.5	17	-2.6	1.2	4.8	17
	6	-3.6	1.6	3.7	5	-1.5	1.5	3.3	5	-1.8	1.5	3.4	5
	7	-2.4	3.0	11.4	14	-1.2	2.9	10.9	14	-1.5	2.9	11.0	14
	8	-1.5	5.3	14.0	7	0.3	5.4	14.2	7	-0.3	5.3	14.1	7
	9	-2.6	1.3	4.7	13	-0.4	1.4	4.9	13	-1.3	1.3	4.7	13
	10	0.9	2.1	4.2	4	2.9	3.4	6.9	4	1.8	3.2	6.5	4
	11	-4.3	2.6	6.5	6	-3.2	2.0	4.9	6	-3.6	2.0	5.0	6
	12	-4.6	3.1	7.6	6	-2.8	2.8	6.8	6	-3.1	2.8	6.8	6
	13	-2.1	2.2	7.1	10	0.7	1.9	6.1	10	0.2	1.9	6.0	10
	14	-4.0	1.6	5.2	10	-1.1	1.2	3.9	10	-1.3	1.2	3.8	10
	15	-3.5	1.7	6.3	14	-1.4	1.5	5.5	14	-2.2	1.5	5.5	14
	16	-1.9	0.9	3.1	11	0.4	1.1	3.6	11	-0.6	1.0	3.3	11
	17	-5.7	1.6	7.0	18	-2.6	1.8	7.7	18	-3.6	1.8	7.4	18
	18	-3.0	1.5	6.2	18	0.1	1.5	6.3	18	-1.0	1.5	6.4	18
	19	-2.4	2.4	7.1	9	1.2	2.1	6.4	9	0.1	2.1	6.2	9
	20	-4.9	1.2	6.1	24	-1.2	1.2	6.0	24	-1.7	1.3	6.2	24
	21	-5.0	1.3	6.1	24	-1.1	1.2	5.7	24	-1.9	1.2	5.7	24
	22	-1.7	1.1	5.8	28	2.1	1.1	5.8	28	0.9	1.1	5.9	28
	23	-2.6	2.2	7.2	11	1.2	2.1	7.1	11	1.0	2.1	7.1	11
	24	-2.9	1.8	6.9	15	0.7	1.7	6.7	15	0.5	1.7	6.7	15
	25	-3.2	2.2	5.4	6	-0.1	2.1	5.2	6	-0.2	2.1	5.1	6
	26	-0.3	1.2	5.7	21	2.7	1.2	5.7	21	2.8	1.3	5.8	21
	27	-3.1	1.4	5.5	15	0.3	1.4	5.3	15	1.1	1.4	5.3	15
	28	-4.3	2.0	8.2	16	-0.6	2.0	8.1	16	-0.1	2.0	8.1	16
	29	0.3	2.4	4.9	4	2.2	1.9	3.8	4	2.9	2.0	3.9	4
	30	0.0	1.7	5.2	10	3.1	1.6	5.1	10	3.6	1.6	5.1	10

TABLE 4

COMPARISON OF (SIRS-SONDE) 1000 TO 500 MB MEAN DAILY THICKNESS DIFFERENCES i) UNCORRECTED ii) CORRECTED WITH A CORRECTION PERIOD OF 10 DAYS iii) CORRECTED WITH A CORRECTION PERIOD OF 10 DAYS AND A LAG PERIOD OF 5 DAYS

(measurements in DMs)

Month	Day	i) UNCORRECTED				ii) CORRECTED - NO LAG				iii) CORRECTED - WITH LAG			
		MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.
January	1	3.8	1.4	3.2	5	-	-	-	-	-	-	-	-
	2	0.9	1.1	3.9	12	-2.3	1.0	3.5	12	-	-	-	-
	3	1.7	1.0	4.2	18	-0.4	0.9	3.8	18	-	-	-	-
	4	2.2	1.1	4.8	19	0.3	1.0	4.5	19	-	-	-	-
	5	1.3	0.8	3.5	20	-0.6	0.5	2.3	20	-	-	-	-
	6	3.1	0.8	3.1	15	1.0	0.8	3.0	15	0.3	0.8	3.1	15
	7	3.9	0.5	2.3	18	1.1	0.5	2.3	18	0.1	0.5	2.1	18
	8	2.3	1.8	4.7	7	0.8	1.4	3.7	7	0.9	1.4	3.7	7
	9	0.9	1.4	4.8	11	-1.5	1.3	4.3	11	-1.1	1.3	4.3	11
	10	1.6	1.0	4.3	18	-0.9	1.0	4.4	18	-0.8	1.0	4.4	18
	11	3.4	0.8	3.4	18	0.4	0.8	3.5	18	0.4	0.8	3.6	18
	12	1.5	1.3	4.4	12	-1.3	1.1	4.0	12	-1.4	1.1	4.0	12
	13	2.6	1.5	5.3	13	0.4	1.3	4.7	13	0.1	1.3	4.7	13
	14	3.4	0.9	3.7	17	0.7	0.8	3.1	17	0.4	0.7	3.1	17
	15	2.9	0.5	2.4	22	0.3	0.4	1.9	22	0.2	0.4	1.9	22
	16	1.1	0.6	2.7	23	-0.7	0.5	2.3	23	-0.4	0.5	2.3	23
	17	3.2	0.9	3.4	13	1.3	0.8	3.0	13	1.3	0.8	3.0	13
	18	4.1	0.5	2.5	21	1.4	0.5	2.4	21	1.5	0.5	2.3	21
	19	3.7	1.2	4.4	13	2.0	1.1	3.8	13	2.2	1.0	3.8	13
	20	3.5	0.8	2.9	13	1.2	0.7	2.7	13	1.6	0.7	2.7	13
	21	3.4	1.0	3.7	13	0.2	0.6	2.3	13	0.6	0.6	2.3	13
	22	3.1	1.2	4.2	12	0.1	0.9	3.1	12	0.8	0.9	3.2	12
	23	3.2	1.8	6.2	12	0.1	1.8	6.3	12	0.9	1.8	6.2	12
	24	2.4	0.9	3.7	19	-1.4	0.6	2.8	19	-0.6	0.7	2.8	19
	25	5.0	1.4	5.9	18	1.5	1.5	6.3	18	1.9	1.5	6.2	18
	26	2.6	0.7	3.6	24	-0.3	0.5	2.7	24	0.0	0.5	2.7	24
	27	4.8	1.0	3.8	15	1.1	1.1	4.3	15	1.5	1.1	4.4	15
	28	2.2	0.8	4.4	28	-0.6	0.7	3.9	28	0.1	0.7	3.8	28
	29	2.8	0.7	2.6	16	-0.9	0.6	2.5	16	-0.7	0.6	2.6	16
	30	1.3	0.8	3.4	18	-1.6	0.7	2.9	18	-1.3	0.7	2.9	18
	31	1.4	1.2	4.4	14	-1.3	0.9	3.4	14	-1.5	0.9	3.4	14

TABLE 4

COMPARISON OF (SIRS–SONDE)1000 TO 500 MB MEAN DAILY THICKNESS DIFFERENCES i) UNCORRECTED ii) CORRECTED WITH A CORRECTION PERIOD OF 10 DAYS iii) CORRECTED WITH A CORRECTION PERIOD OF 10 DAYS AND A LAG PERIOD OF 5 DAYS
(measurements in DMs)

Month	Day	i) UNCORRECTED				ii) CORRECTED – NO LAG				iii) CORRECTED – WITH LAG			
		MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.
February	1	1.9	1.0	3.3	10	-0.9	0.9	3.0	10	-1.4	0.9	3.0	10
	2	3.6	0.9	3.6	16	0.0	0.7	2.7	16	-0.6	0.7	2.7	16
	3	1.5	2.0	7.2	13	-1.3	1.9	6.8	13	-1.9	1.9	6.8	13
	4	3.7	1.1	3.2	8	0.6	1.0	2.8	8	0.2	1.0	2.8	8
	5	2.1	0.6	2.7	22	-0.4	0.4	2.1	22	-0.7	0.4	2.1	22
	6	2.4	0.8	3.8	21	-0.5	0.7	3.3	21	-0.8	0.7	3.3	21
	7	2.7	0.8	3.0	15	0.2	0.9	3.3	15	-0.3	0.8	3.2	15
	8	3.4	0.9	5.3	31	1.2	0.8	4.4	31	0.5	0.8	4.5	31
	9	3.5	0.9	4.8	29	1.6	0.8	4.5	29	1.0	0.8	4.5	29
	10	2.8	1.2	4.0	11	-0.8	1.1	3.7	11	-0.5	1.1	3.6	11
	11	1.3	0.9	3.9	17	-0.3	0.9	3.6	17	-0.4	0.9	3.5	17
	12	2.4	1.2	4.7	16	-0.1	1.0	4.2	16	0.2	1.1	4.2	16
	13	0.6	1.4	5.0	13	-1.4	0.9	3.3	13	-0.9	0.9	3.4	13
	14	1.8	0.8	3.3	16	-0.3	0.5	2.2	16	0.1	0.5	2.2	16
	15	0.7	1.4	5.2	14	-2.0	1.1	4.2	14	-2.0	1.1	4.2	14
	16	2.8	0.5	2.5	23	0.2	0.5	2.3	23	0.1	0.5	2.2	23
	17	1.0	1.1	4.1	13	-0.6	1.0	3.7	13	-0.7	1.0	3.7	13
	18	-0.5	0.7	3.8	26	-2.9	0.5	2.4	26	-3.0	0.5	2.5	26
	19	1.3	0.9	4.2	21	-0.2	0.8	3.7	21	-0.8	0.8	3.7	21
	20	1.4	0.8	4.1	30	-0.5	0.6	3.0	30	-1.4	0.5	3.0	30
	21	2.6	0.9	3.6	15	0.4	0.7	2.7	15	-0.7	0.7	2.7	15
	22	1.3	1.2	5.3	19	-0.2	1.0	4.5	19	-1.3	1.0	4.5	19
	23	1.5	1.0	3.8	15	0.1	0.7	2.7	15	-1.0	0.7	2.6	15
	24	3.1	0.7	3.1	20	0.4	0.6	2.7	20	-0.1	0.6	2.7	20
	25	1.9	1.5	4.3	8	0.6	1.1	3.1	8	0.4	1.1	3.1	8
	26	0.4	0.8	3.8	22	-1.4	0.7	3.5	22	-1.5	0.7	3.4	22
	27	1.4	0.7	2.5	14	0.6	0.6	2.1	14	0.3	0.6	2.1	14
	28	2.0	1.0	4.9	23	0.4	0.7	3.4	23	0.2	0.7	3.5	23

TABLE 4

COMPARISON OF (SIRS–SONDE) 1000 TO 500 MB MEAN DAILY THICKNESS DIFFERENCES i) UNCORRECTED ii) CORRECTED WITH A CORRECTION PERIOD OF 10 DAYS iii) CORRECTED WITH A CORRECTION PERIOD OF 10 DAYS AND A LAG PERIOD OF 5 DAYS
(measurements in DMs)

Month	Day	i) UNCORRECTED				ii) CORRECTED – NO LAG				iii) CORRECTED – WITH LAG			
		MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.
March	1	-1.2	1.4	3.8	7	-1.7	1.4	3.6	7	-1.8	1.4	3.6	7
	2	1.3	0.8	3.4	20	0.0	0.5	2.2	20	-0.1	0.5	2.3	20
	3	2.4	0.7	3.0	17	-0.2	0.6	2.5	17	-0.2	0.6	2.4	17
	4	0.6	0.9	4.0	21	-0.2	0.6	2.8	21	-0.2	0.6	2.9	21
	5	0.5	1.1	4.5	18	-0.8	0.6	2.4	18	-0.7	0.6	2.6	18
	6	-0.3	1.1	5.0	19	-0.1	0.9	3.9	19	-0.6	0.9	4.0	19
	7	2.9	0.8	4.4	27	1.6	0.8	4.0	27	1.4	0.8	4.0	27
	8	3.0	0.7	2.4	13	1.5	0.6	2.3	13	1.4	0.6	2.2	13
	9	0.6	1.1	4.6	18	-1.7	0.7	2.8	18	-1.4	0.7	3.0	18
	10	2.6	0.9	2.9	10	1.5	0.8	2.5	10	1.5	0.8	2.5	10
	11	1.0	1.5	5.1	12	-0.1	1.1	3.7	12	0.1	1.1	3.7	12
	12	-1.0	1.7	5.8	11	-2.0	1.4	4.6	11	-1.6	1.4	4.6	11
	13	0.8	0.8	3.4	17	-1.5	0.7	2.7	17	-1.5	0.7	2.7	17
	14	-0.5	1.4	5.3	15	-0.9	1.1	4.3	15	-1.2	1.1	4.3	15
	15	0.6	1.0	3.2	10	0.3	1.0	3.1	10	0.2	1.0	3.2	10
	16	-0.9	1.5	4.1	8	-0.8	1.8	5.2	8	-0.9	1.9	5.3	8
	17	-0.1	0.8	3.8	20	-0.9	0.6	2.9	20	-1.2	0.6	2.9	20
	18	-0.4	1.0	4.2	17	-0.4	1.1	4.6	17	-0.9	1.1	4.7	17
	19	0.3	0.9	3.7	16	-0.3	1.0	3.9	16	-1.0	1.0	4.1	16
	20	-1.1	0.9	2.2	6	-2.2	0.8	2.0	6	-3.2	1.0	2.5	6
	21	-0.8	1.2	3.3	8	-1.5	0.8	2.2	8	-2.9	0.8	2.3	8
	22	-0.2	1.6	6.7	17	-0.7	1.6	6.7	17	-2.1	1.6	6.8	17
	23	0.4	1.0	3.6	13	-0.2	1.0	3.5	13	-1.4	1.1	3.8	13
	24	-3.6	2.4	6.8	8	-3.4	2.4	6.7	8	-4.0	2.4	6.8	8
	25	-0.5	1.0	3.9	14	0.1	1.1	4.2	14	-0.6	1.3	4.7	14
	26	0.3	1.9	6.6	12	0.4	1.8	6.3	12	-0.6	1.8	6.1	12
	27	0.3	1.5	5.7	15	0.6	1.4	5.4	15	0.1	1.4	5.3	15
	28	-0.1	1.4	5.2	13	0.7	1.5	5.3	13	0.5	1.5	5.4	13
	29	-0.4	0.9	4.1	19	0.0	0.9	3.8	19	-0.3	0.9	3.8	19
	30	-1.3	1.1	3.5	11	-0.9	0.9	3.0	11	-1.1	0.9	3.0	11
	31	-1.3	1.8	4.1	5	-0.7	1.5	3.3	5	-0.8	1.6	3.5	5

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(measurements in DMs)

Month	Day	i) UNCORRECTED				ii) CORRECTED - NO LAG				iii) CORRECTED - WITH LAG			
		MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.	MEAN DIFFERENCE	STANDARD ERROR	STANDARD DEVIATION	NO. OF OBS.
April	1	-0.6	1.3	4.9	15	-0.3	1.1	4.3	15	-0.4	1.1	4.3	15
	2	1.1	1.4	5.6	16	1.6	1.3	5.4	16	1.4	1.4	5.4	16
	3	-1.4	1.0	4.5	21	-1.2	0.9	4.0	21	-1.1	0.9	4.1	21
	4	1.7	1.8	7.3	16	1.9	1.8	7.0	16	2.1	1.8	7.1	16
	5	-1.3	1.1	4.4	17	-1.2	0.8	3.2	17	-0.9	0.9	3.5	17
	6	-3.0	1.8	3.9	5	-2.2	1.4	3.2	5	-2.2	1.5	3.4	5
	7	-1.2	2.1	8.2	15	-1.5	1.9	7.5	15	-1.2	2.0	7.6	15
	8	-0.2	3.0	8.5	8	0.6	2.8	7.9	8	0.2	2.8	8.0	8
	9	-1.2	1.2	4.2	13	-0.5	1.0	3.6	13	-0.9	1.0	3.7	13
	10	4.0	1.6	3.7	5	4.3	2.7	6.1	5	3.8	2.4	5.4	5
	11	-1.5	1.9	4.8	6	-2.1	1.0	2.5	6	-2.2	1.1	2.8	6
	12	-2.4	1.7	4.4	7	-1.8	1.3	3.5	7	-2.0	1.3	3.5	7
	13	0.4	1.3	4.5	12	1.4	0.9	3.2	12	1.1	0.9	3.3	12
	14	-1.0	1.5	4.6	10	0.1	1.1	3.6	10	0.2	1.1	3.6	10
	15	-0.8	1.2	4.3	14	-0.9	0.9	3.2	14	-1.1	0.9	3.3	14
	16	-1.3	0.6	2.0	13	-1.3	0.7	2.6	13	-1.7	0.7	2.4	13
	17	-2.8	0.9	3.9	19	-1.4	1.0	4.6	19	-2.0	1.0	4.5	19
	18	-1.3	0.9	3.7	18	-0.5	0.9	3.9	18	-0.9	1.0	4.1	18
	19	-1.8	1.6	4.9	9	-0.4	1.4	4.1	9	-1.1	1.3	3.9	9
	20	-2.9	0.7	3.6	25	-1.5	0.7	3.5	25	-1.8	0.8	3.8	25
	21	-2.8	0.7	3.6	24	-0.9	0.7	3.3	24	-1.7	0.7	3.5	24
	22	-0.8	0.7	3.5	28	1.0	0.6	3.4	28	0.0	0.7	3.5	28
	23	-1.3	1.3	4.4	12	0.8	1.2	4.2	12	0.2	1.2	4.2	12
	24	-0.9	0.7	3.0	17	0.8	0.7	3.0	17	0.2	0.7	3.0	17
	25	-1.8	1.6	4.0	6	-0.4	1.4	3.4	6	-1.0	1.3	3.3	6
	26	0.2	0.8	3.8	21	1.6	0.8	3.6	21	1.3	0.8	3.6	21
	27	-2.3	0.9	3.4	15	-0.5	0.9	3.4	15	-0.3	0.9	3.4	15
	28	-3.6	1.3	5.4	16	-1.4	1.3	5.1	16	-1.3	1.3	5.1	16
	29	-1.9	1.3	3.0	5	-0.3	0.7	1.6	5	-0.2	0.8	1.7	5
	30	0.1	0.8	2.5	10	1.9	0.9	2.7	10	1.9	0.8	2.6	10