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Conventional-Report Nephanalysis

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486 Totten Pond Road
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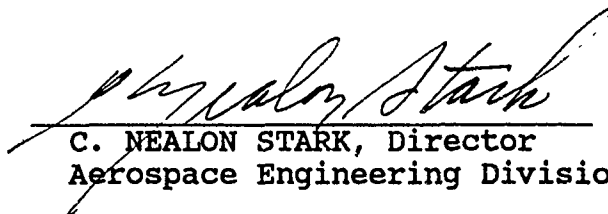


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The Conventional Reports

Cloud layer data from surface observers, aircraft observers, and radiosondes – the so-called *conventional reports* – are collected from stations worldwide for incorporation into AFGWC's nephanalysis algorithms. Conventional reports are valuable because they consist of direct observations of cloud information, whereas satellite fields are derived from infrared or visible-light imagery, and suffer from various sources of confusion ^(1,2).

The conventional reports, particularly those relayed by human observers, are detailed and can be highly accurate. They contain such information as cloud types, cloud amounts (expressed as a per cent of sky coverage), altitudes of cloud bases and tops, the WMO-coded present weather, visibility, and the *total cloud*, a composite value, again expressed in per cent. Appendix A contains examples of conventional reports.

Conventionally-derived reports complement satellite results in the sense that they consist of cloud layer tabulations as observed *from the ground up*, so that the lowest cloud layer is unobscured, with a potential for greater obscuration at successively higher layers. Space-based observations, on the other hand, suffer from the converse problem, with the highest layers having been *least* obscured.

Conventional reports are also inherently *local*, and relatively few in number, and their relatively sparse geographic coverage makes it difficult to obtain large-scale estimates of cloud cover by using them alone. There are a total of 5285 conventional reports over the northern hemisphere in the case study data set for JD 82162 (11 June 1982), and 4511 in the data set for JD 85010 (10 January 1985). The majority of these are derived from the populous and developed regions of the world, particularly Europe (Neph Boxes 29, 30, and 38, with 33% of the total hemispheric reports for JD 82162 and 28% of those for JD 85010), the Far East (Neph Boxes 12, 19, 20, and 21, with 23% of the total reports for JD 82162 and 29% for JD 85010), and the continental United States (Boxes 43, 44, 45, and 52, with 21% of the total reports for JD 82162 and 24% for JD 85010). The highest concentration of reports is in central and eastern Europe, with 14% of the *total hemispheric reports* for each of the case-study data sets occurring in this single neph

box. Even here, however, only one in six of the 4096 grid points in the Neph Box has an observation associated with it.

In order to supplement satellite-derived fields with plausible representations of large-scale cloud cover using the sparse conventional data, the mechanism of conventional-report propagation was introduced. The rationale was as follows: since, under some conditions, a surface observer's visibility is greater than the 25 nautical mile nominal extent of a grid box, it should be valid to propagate a conventional report into neighboring (empty) grid boxes, where actual conditions are likely to be similar to those at the observed point. Furthermore, it is *vital* to do so, if reasonably complete representations of cloud cover are to be generated from the conventional reports alone. Thus, conventional-report propagation has been a part of the AFGWC automated nephanalysis since its inception.

The AFGWC Conventional-Report Processor NEFMRG

The AFGWC conventional-report processor combines cloud layer information from conventional reports with cloud fields estimated from infrared or visible-light satellite sensors. These observations are weighted using various criteria, and are merged into the previously-generated nephanalysis, overwriting it at any points where new information exists. The output analysis thus consists of observations of various ages and sources, intermixed on a gridpoint-by-gridpoint basis.

An additional function of AFGWC's NEFMRG is to perform conventional-report propagation after inserting the conventional reports themselves, but before merging the satellite fields. The rules governing this propagation have not been static over time: more about this later.

NEFMRG is a real-time processor, generating updated nephanalyses many times per day. The program itself, along with the rest of AFGWC's nephanalysis package, has existed in at least two distinct forms. The first, known as the 3DNEPH (3 Dimensional NEPHAnalysis) tabulates cloud cover in up to fifteen fixed-height layers, ranging from the surface to 55000 feet. The 3DNEPH was superseded by the RTNEPH (Real-Time NEPHAnalysis) package on JD 83212. The RTNEPH represents cloud decks with up to four "floating" layers (having variable bases and tops), and maintains separate time history and origin flags for each layer.

Currently, we do not have the 3DNEPH propagation algorithms. We model them as a parameterized version of the RTNEPH algorithm, inferring the parameters by comparing the propagated conventional reports with the AFGWC-supplied nephanalysis for the same data set.

The AFGL Conventional-Report Processor RDMRG

AFGL's RDMRG (Research and Development MeRGe Processor) simulates the conventional-report propagation of both 3DNEPH-style and RTNEPH-style data. In each case, the reports are merged into a null persistence analysis and propagated. The resulting conventional-report nephanalysis is displayed and written to disk in the appropriate analysis-file format (either fifteen fixed layers in a 3DNeph simulation, or four floating layers with ancillary information in an RTNeph run).

The RDMRG is structured as a set of high-level modules which manage the processing and which actually implement the report propagation, supplemented by two sets of auxiliary, data-type-specific routines which handle the details of data representation. In this way, the propagation algorithm can be modified and then exercised on one or both of the data formats, as long as the appropriate type-specific routines are available.

Like the satellite processor, the RDMRG utilizes terrain-height and geography-type fields. The terrain-height representation is unchanged over the time span encompassing our case-study data sets, whereas for the geography-type field, coastal ice varies seasonally from the summer and winter data. The formats of these files have been invariant, allowing them to be accessed by the high-level modules.



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Conventional-Report Propagation

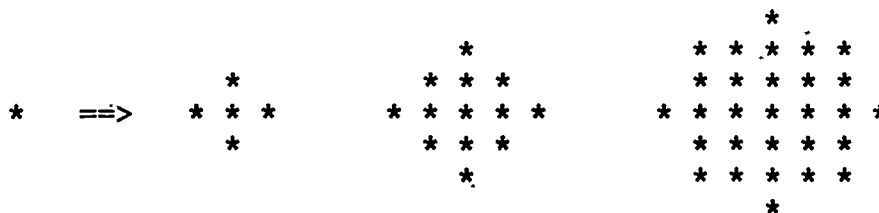
There is little *a priori* justification for the propagation of conventional reports, because the field of view available to a surface observer is dominated by the conditions at his or her own grid box. Geometrical arguments show that the elevation angles of cloud in neighboring grid elements are no more than a few degrees from horizontal. However, weather patterns are often large-scale structures in comparison to an eighth-mesh grid element, and an argument for propagation can be made by examining maps of the conventional reports, isolating adjacent pairs of reports, and comparing the number of pairs having the *same* total cloud versus the number of pairs with *differing* total cloud. As an example, for adjacent-report pairs in Box 45, for both case-study data sets, the ratio of *similar* to *dissimilar* total cloud is approximately 6/4.

The propagation algorithm utilized by NEFMRG and emulated by RDMRG is straightforward. Conventional reports are "spread" — replicated into — empty neighboring grid boxes that lie within a radius of one, two, or three grid boxes from the initializing report. In theory, the actual "spread radius" depends on the altitude of the lowest observed cloud layer, so that reports with low cloud are propagated less than those with high cloud. In practice, the spread radii seem to have been specified to be *independent* of the altitude of the lowest cloud, although for JD 82162, reports with *no* cloud (clear skies) seem to have been propagated more than cloudy reports.

The local geography also plays a part in the spreading process: the propagation of low cloud may be blocked by high-lying terrain in neighboring grid boxes, and propagation is performed only minimally across land/water boundaries.

The spread radii utilized by NEFMRG, in effect during the processing of the case-study data and replicated within RDMRG, are tabulated on the next page (Table 1). The values for JD 82162 are not directly available, so they have been inferred from AFGWC's nephanalysis. In the table, *LCB* is the Lowest Cloud Base.

The patterns that result from spreading an isolated conventional report by a fixed radius are characteristic. For radii of one, two, and three grid boxes, they are:



These and combinations of these can be seen in AFGWC nephanalysis-output fields.

TABLE 1 Spread Radii, in eighth-mesh grid points, for the Summer and Winter case-study days

Action	82162	85010
Spread coast to land	1	1
Spread sea to land	1	1
$LCB < h_1$	2	3
$h_1 < LCB \leq h_2$	2	3
$h_2 < LCB$	2	3
Spread <i>Clear</i> Report	3	3
Spread w/ <i>Missing LCB</i>	1	3
h_1 (low/mid cloud delimiter)	2000	2000
h_2 (mid/high cloud delimiter)	5000	5000

Case Study Data Set Propagation

For both case study days, the conventional reports for Box 45 were propagated using AFGL's RDMRG, and the results were compared with the appropriate AFGWC nephanalysis output. This process demonstrates the kind of results to be expected from conventional-report nephanalysis and highlights some of the differences in the way the conventional reports and satellite fields had been merged by AFGWC's 3DNEPH and RTNEPH.

Figure (1a) depicts the geography field for Box 45, which includes the north-eastern United States and Canada. For the two case-study days, this field varies only slightly, in the distribution of offshore ice at high latitudes.

The next figure (1b) displays the conventional reports' total cloud field for the summer case-study data set. There are 267 surface observations and four aircraft-pilot reports. Note that the reports cluster in the populous coastal regions.

The effects of the spreading process, using the spread parameters from Table 1, are shown in (1c). While isolated reports are spread into characteristic star-like patterns, a virtually complete nephanalysis results for the well-reported coastal regions. For comparison, AFGWC's composite nephanalysis, generated by the (missing) 3DNEPH merge algorithm, and including cloud fields derived from satellite data as well as conventional reports, is shown in (1d). A comparison of (1c) and (1d), looking for evidence of conventional-report spreading in AFGWC's nephanalysis, shows that for this case, spreading occurred more over water than over land. Note the characteristic star-like artifacts in the southern and eastern areas, whereas in the west, which is predominantly land, the conventional reports themselves are frequently overwritten, presumably by satellite fields. Overall, the influence of the conventional reports on this analysis field seems to have been minimal.

A far more complete picture of the conventional-report assimilation process emerges from the winter case-study day, because there exist point-by-point time history and data-origin flags in the RTNEPH output analysis. First, (2a) shows the 218 conventional reports for case-study day 85010. The distribution is similar to that for 82162.

The results of the RTNEPH spreading process, using the parameters from Table 1, are shown in (2b). Although there are fewer reports than in the summer-day case, the larger spread radius results in more extensive coverage. The next figure (2c) shows a subset of AFGWC's nephanalysis. The displayed grid points are those with either the *conventional-report* or *spread-to* flag set in the data origin-words associated with each RTNEPH grid point. (Note that these points may have been *influenced* by satellite-derived information: the flags referred to simply indicate the influence of conventionally-obtained data as well.) Although some of the points in this field have been retained from the previous nephanalysis (as can be seen by examining the time-history words), the resemblance between this field and (2b) is striking. This suggests a far greater reliance on the conventional reports by the RTNEPH merge algorithm than by the 3DNEPH: compare again (1c) and (1d).

Figure (2d) is the complement of (2c), in that all displayed grid points are derived from satellite data only. Note that the texture of this field can be finer than conventional-report fields, as in the southeastern corner, because of the high visual resolution of satellite imagery and because conventional report fields are heavily dependent upon spreading. RTNEPH's complete nephanalysis is shown in (2e).

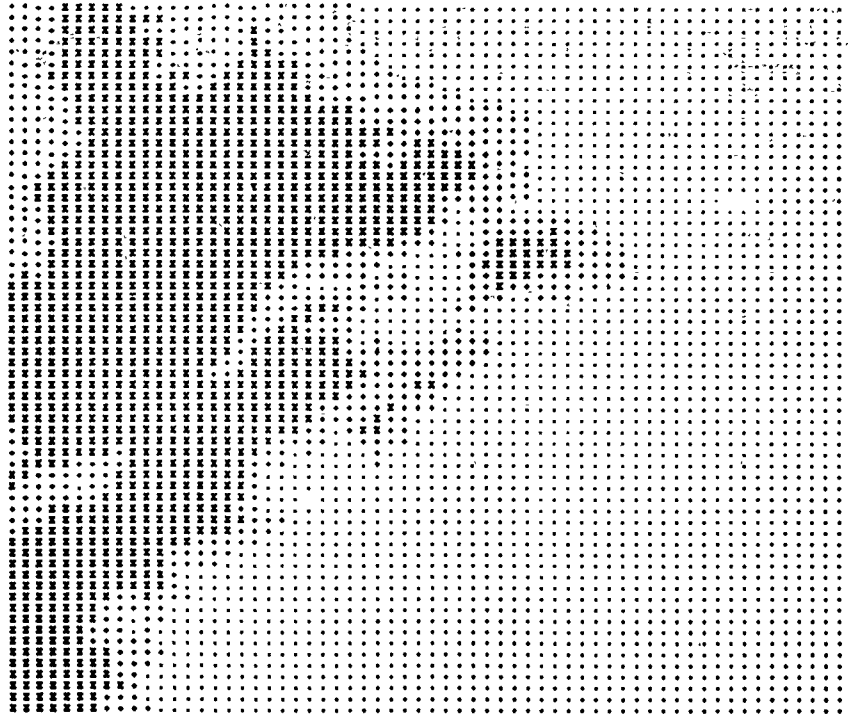


Figure 1a. The geography field for Box 45 on the summer case-study day 82162. Small and large dots represent water and ice, respectively, + indicates coast, and X is land. The figure extends from the mid-Atlantic states through New England into Canada. Cape Cod, Nova Scotia, New Brunswick, the St. Lawrence Seaway, Lake Ontario and the eastern edge of Hudson Bay are all visible.

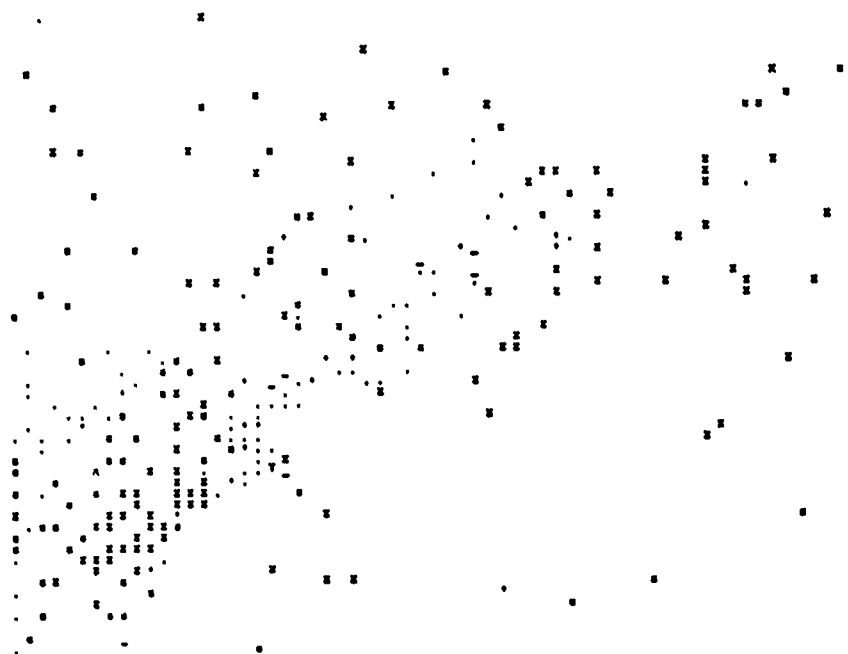


Figure 1b. The conventional reports. Total cloud is represented in fourths, with _ ==> 0/4, . ==> 1/4, ° ==> 2/4, x ==> 3/4, and X ==> 4/4. Reports originating over water are from ships.



Figure 1c. The propagated conventional reports.



Figure 1d. For comparison, AFGWC's composite nephanalysis for 82162, including satellite-derived fields as well as conventional data. Here, clear gridpoints are represented using blanks.



Figure 2a. The conventional reports for the winter case-study day 85010.



Figure 2b. The propagated conventional reports.



Figure 2c.

The conventional-report-influenced component of AFGWC's composite nephanalysis for 85010. The displayed points have either the conventional-report or spread-to flag set in the data origin word associated with each grid point. Note that there are points displayed here which do not appear in (2b). These result from conventional reports which were processed in a previous nephanalysis cycle, and which are not yet old enough to be discontinued. (This can be verified from the time flag returned in the analysis - see Appendix B).



Figure 2d.

The satellite-data component of AFGWC's output nephanalysis for 85010. This figure is the complement of the previous figure.



Figure 2c. AFGWC's composite naphanalysis for 85010.

Conclusion

The complementary nature of surface and satellite observations suggests two areas for further study involving the conventional reports. First, a statistical analysis of layer frequencies could be performed, as has been done for satellite-derived fields⁽³⁾. Second, at grid points where the conventional reports and the satellite results differ, a detailed analysis of the satellite processor's cloud-field extraction algorithm should be made, possibly with emphasis on the cloud/background thresholding algorithm.

Possibly there ought to be more interplay between the conventional reports and the SGDB within the satellite-data algorithm. At grid points where conventional reports show non-overcast conditions (total cloud $\leq 75\%$) it might be worthwhile to compute a local cloud/no cloud threshold value from the data in the SGDB, and utilize this threshold when generating the RGS maps. For example, when there is a *clear* total cloud report, the typical SGDB pixel value should define the appropriate local threshold value, whereas for 50% total cloud, the warmest 50% of the SGDB pixels can be used to set the threshold. An overcast report is not helpful for this type of analysis, since most or all of the associated pixels should be at a similar non-background temperature.¹

It may, additionally, be worthwhile to propagate these thresholds in a manner similar to that currently performed for the conventional reports themselves, if the underlying skin temperatures show less point-by-point variation than do typical cloud fields.

¹A very cursory comparison between the SGDB and corresponding conventional reports shows that for this approach to be valuable, the surface and satellite observations must be closely correlated in time. Also, the total cloud field of the conventional reports is not always consistent with the reports' own layer information. In such cases it will be necessary to make some kind of judgement as to which information is more valid.

Appendix A – The Conventional-Report Data

The following pages contain the conventional-report data for Box 45 for both case-study days.

Appendix B – The Nephanalysis Output

The following pages contain a portion of the conventional-report nephanalysis data for Box 45 for each of the case-study days, along with listings of the layer source bytes and status/diagnostic word for the RTNeph output for 85010. In these listings, the *RTNeph Embedded SpreadTo Points* are the points shown in Figure (2c). The mnemonics for the 'layer source' bytes correspond to the following conditions:

LoP	Low cloud was persisted
BEs	Cloud base was estimated
TEs	Cloud top was estimated
BRR	Best report from RAOB (radiosonde) was used
BRP	Best report from PIREP (aircraft pilot report) was used
BRS	Best report from surface-observer data was used
VSa	Visual satellite data was used
ISa	Infrared satellite data was used

For more information, consult the *AFGWC Data Format Handbook*⁽⁴⁾.

RTNeph Analysis for Box 45

PW	Via	Tf	TC	Layer 1				Layer 2				Layer 3				Layer 4			
				Ant	Typ	Bas	Top	Ant	Typ	Bas	Top	Ant	Typ	Bas	Top	Ant	Typ	Bas	Top
1	0	0	8	100	4	34	101	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	8	100	4	80	130	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	8	100	25	7	84	100	4	37	104	0	0	0	0	0	0	0	0
4	0	0	8	100	40	7	112	100	4	35	123	0	0	0	0	0	0	0	0
5	0	0	10	100	100	3	25	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	10	100	100	3	44	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	10	100	100	3	25	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	10	100	100	3	35	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	10	100	100	3	15	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	10	100	100	4	31	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	10	100	80	7	80	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	10	100	42	13	104	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	10	100	88	7	98	100	4	61	198	0	0	0	0	0	0	0	0
14	0	0	10	100	80	7	70	100	4	58	118	0	0	0	0	0	0	0	0
15	0	0	10	100	80	7	114	100	4	31	118	0	0	0	0	0	0	0	0
16	0	0	10	100	80	7	88	100	3	87	87	0	0	0	0	0	0	0	0
17	0	0	10	100	100	4	8	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	10	100	100	4	8	0	0	0	0	0	0	0	0	0	0	0	0
19	0	0	10	100	100	4	4	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	10	100	100	3	0	0	0	0	0	0	0	0	0	0	0	0	0
21	0	0	10	100	100	3	0	0	0	0	0	0	0	0	0	0	0	0	0
22	0	0	10	100	100	3	18	0	0	0	0	0	0	0	0	0	0	0	0
23	0	0	10	100	100	3	18	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	10	25	25	3	8	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	0	0	11	100	100	8	7	0	0	0	0	0	0	0	0	0	0	0	0
29	0	0	10	34	34	4	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	11	100	100	8	7	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	10	31	31	4	0	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	10	81	81	4	0	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	10	100	60	7	100	100	4	41	108	0	0	0	0	0	0	0	0
34	0	0	10	100	75	7	118	100	4	41	138	0	0	0	0	0	0	0	0
35	0	0	10	100	100	1	83	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	10	100	100	7	88	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	11	100	100	7	78	0	0	0	0	0	0	0	0	0	0	0	0
38	0	0	11	100	95	7	118	100	4	53	120	0	0	0	0	0	0	0	0
39	0	0	11	100	33	4	85	100	4	0	48	0	0	0	0	0	0	0	0
40	0	0	11	100	60	7	110	100	4	85	138	0	0	0	0	0	0	0	0
41	0	0	11	100	13	7	84	100	4	0	108	0	0	0	0	0	0	0	0
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46	0	0	11	100	100	7	83	0	0	0	0	0	0	0	0	0	0	0	0
47	0	0	11	100	80	7	103	100	4	0	188	0	0	0	0	0	0	0	0
48	0	0	11	100	88	7	103	100	4	8	108	0	0	0	0	0	0	0	0
49	0	0	11	100	48	7	80	0	0	0	0	0	0	0	0	0	0	0	0
50	0	0	11	80	48	7	80	90	4	0	108	0	0	0	0	0	0	0	0
51	0	0	11	80	60	4	0	0	0	0	0	0	0	0	0	0	0	0	0
52	0	0	11	100	100	4	8	0	0	0	0	0	0	0	0	0	0	0	0
53	0	0	11	100	100	4	0	0	0	0	0	0	0	0	0	0	0	0	0
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55	0	0	11	100	100	7	70	0	0	0	0	0	0	0	0	0	0	0	0
56	0	0	11	100	100	7	80	0	0	0	0	0	0	0	0	0	0	0	0
57	0	0	11	98	83	9	180	98	7	113	801	0	0	0	0	0	0	0	0
58	0	0	11	100	100	1	23	0	0	0	0	0	0	0	0	0	0	0	0
59	0	0	11	98	100	1	23	0	0	0	0	0	0	0	0	0	0	0	0
60	0	0	11	98	98	1	23	0	0	0	0	0	0	0	0	0	0	0	0

RTNeph Embedded SpreadTo Pts for Box 45 JRN 140800

J	PW	Via	Tf	TC	Layer 1				Layer 2				Layer 3				Layer 4			
					Ant	Typ	Bas	Top	Ant	Typ	Bas	Top	Ant	Typ	Bas	Top	Ant	Typ	Bas	Top
1	3	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	8	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	7	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	8	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	9	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	10	38	4	8	100	100	8	9	0	0	0	0	0	0	0	0	0	0	0	
1	11	38	4	8	100	100	8	9	0	0	0	0	0	0	0	0	0	0	0	
1	12	0	81	8	100	100	10	200	808	30	7	88	143	30	3	88	81	0	0	
1	13	0	81	8	100	100	10	200	808	30	7	88	143	30	3	88	81	0	0	
1	14	0	81	8	100	100	10	200	808	30	7	88	143	30	3	88	81	0	0	
1	15	78	48	0	100	100	3	18	78	0	0	0	0	0	0	0	0	0	0	
1	16	78	48	0	100	100	3	18	78	0	0	0	0	0	0	0	0	0	0	
1	20	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	31	0	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	32	8	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	33	8	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	34	8	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	35	8	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	36	8	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	37	8	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	38	8	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	39	8	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	40	8	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	41	8	74	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	42	0	64	0	87	80	8	808	818	80	8	127	160	80	8	31	41	0	0	
1	44	8	74	0	18	10	7	181	188	0	0	0	0	0	0	0	0	0	0	
1	48	8	74	0	18	10	7	181	188	0	0	0	0	0	0	0	0	0	0	
1	48	88	80	331	87	80	8	808	818	80	8	128	188	80	8	23	33	0	0	
1	47	88	80	331	87	80	8	808	818	80	8	128	188	80	8	23	33	0		

Appendix C – Running RDMRG

Two distinct versions of RDMRG exist on the AIMS network. Version 1.0, in [NEF_ROOT.OLDMRG], accesses files of conventional reports, the terrain/geography file, and a file of processing parameters from [NEF_ROOT.BRDAT]. After the conventional-report nephanalysis is performed, the program writes the full nephanalysis file and an abstracted total-cloud field to the same directory. This version of RDMRG presents its results as 'printer-plotter' representations, as in Figures (1a-d) and (2a-e).

Version 2.0, in [NEF_ROOT.RDMRG], performs all data access through the Nephanalysis Data Base (NDB). Three new NDB 'types' were instituted for this purpose: 'CRep', code 12, is an eighth-mesh *gridded* representation of the conventional reports, 'CNef', code 1004, is the conventional-report nephanalysis, and 'CRTc', code 1005, is the total cloud field for the conventional-report nephanalysis, abstracted for compactness. When operating version 2.0, a representation of the conventional-report total cloud superimposed over the terrain/geography field is displayed on the Adage image processor, the conventional-report propagation occurs, the conventional-report nephanalysis is displayed on the Adage, and the user is asked to decide whether to retain either the nephanalysis or its abstracted total-cloud field. Nothing is written to the NDB without specific approval.

Both versions of the program are executed in similar fashion.

1) Set the appropriate default directory – [NEF_ROOT.OLDMRG] for Version 1.0, or [NEF_ROOT.RDMRG] for Version 2.0.

2) Invoke

@RDMRG 3D

for 3DNeph-style processing (pre-83212), or

@RDMRG RT

for RTNeph-style processing (post-83212). The procedure will prompt for the parameter if it is omitted.

- 3) Both versions prompt for the appropriate case-study day: currently defined possibilities are 82162 and 85010.
- 4) The RTNeph 'flavor' of Version 1.0 will prompt for the Julian Reference Time: supply the value '149280'.
- 5) For both versions, the 3DNeph 'flavor' may print a number of messages of the following form to the terminal:

DISSAM -- Spread conflict incompletely resolved.
Spreading from [i1], [j1] to [i2], [j2]

These occur when two or more conventional reports could be propagated to the same 'empty' grid point, and the 'timeliness' and 'total cloud' criteria are insufficient to decide between them. The default behavior is to propagate the first -- lowest-indexed -- candidate encountered. This ambiguity does not arise when processing RTNeph-style data. Here, in cases of equal timeliness and total cloud, the report with the greatest visibility is used.

References

1. *The AFGWC Automated Real-Time Cloud Analysis Model*, Kiess & Cox, AFGWC TN-87/002 (September 1987), Air Force Global Weather Central, Offutt AFB, NE 68113;
2. *The AFGWC Automated Cloud Analysis Model*, Falko K. Fye, AFGWC TM 78-002 (June 1978), Air Force Global Weather Central, Offutt AFB, NE 68113;
3. *Comparison Between the RTNEPH and AFGL Cloud Layer Analysis Algorithms*, d'Entremont et. al., Hanscom AFB, MA 01731-5000, GL TR 89-0175 (15 July 1989), ADA216637;
4. *The Data Format Handbook*, AFGWC (May 1987), Air Force Global Weather Central, Offutt AFB, NE 68113.