PACIFIC REGION TECHNICAL NOTES

81-012

May 15, 1981

INTERPRETATION OF MARS CLOUD GROUP REPORTS
IN AIRWAYS FORMAT

Brian Hammond, Supervising Meteorologist
Pacific Weather Centre, Vancouver

INTRODUCTION:

Cloud information from Meteorological Automatic Reporting Station (MARS)
sites is now being processed to produce observations in the same format
as the regular manned airways observations. The objective of this note
is to familiarize users in the Pacific Region with some of the deficiencies
arising from the conversion of the MARS cloud information to the airways format.

HEIGHT OF CLOUD LAYERS

It should be noted that the height of only one layer is determined by the
instrument. The height of all other layers are set arbitrarily depending
on the height category into which they fit. The four categories are as follows.

		Cloud Height Set At
Lowest layer	Surface to 500 feet	300 feet
Second layer	501 to 1000 feet	700 feet
Third layer	1001 to 2000 feet	1500 feet
Fourth layer	2001 to 10,000 feet	3500 feet

For example:

An actual report of 5SCT 8SCT C11BKN 500VC would be reported as 3SCT 8SCT
C15BKN 350VC if the second layer at eight hundred feet was the layer which
at this time was measured by the instrument.

SUMMATION OF TOTAL CLOUD AMOUNT

Initially the total summation amount will be set to:

SCT if cloud is observed for less than 50% of the previous hour.
BKN if cloud is observed for more than 50% of the previous hour.
OVC if cloud is observed for more than 90% of the previous hour
   and cloud is presently reported.

DETERMINATION OF EACH LAYER AMOUNT

1) No cloud observed in a particular layer means no cloud observed in
   the last 50 minutes.
2) SCT cloud means no cloud in the past 20 minutes or more OR cloud
   within the last 10 minutes but not at the time of observation.
3) BKN cloud means cloud observed in the past 10 minutes or more.

4) OVC cloud means cloud observed for the past 40 minutes or
    more.

NOTE: There is some discrepancy in the algorithm used to determine
the layer amount. If there is no cloud reported in the last 10
minutes the layer is assigned the value BKN. However if there is
cloud reported in the last 10 minutes but not at the time of
observation then the layer is assigned the value SCT. I have been
unable to resolve the reason for this apparently illogical reasoning.

DETERMINATION OF OBSCURED CONDITIONS

The visibility sensor $V \cdot V_1$ is used to determine an obscured or
partially obscured condition and the vertical visibility into that
obscured layer.

OTHER COMMENTS

It should be kept in mind that there are many situations in which
the automated report will not give a realistic picture of the actual
conditions. The terrain characteristics of British Columbia will play
a significant role of course. A few examples follow:

1) Daytime convection – Convective clouds generally form and are
most frequent along the hills. The instrument could give a biased
observation depending on its location.

2) Fog in a valley may not be observed depending once again on
the instrument location.

3) An incoming deck of cloud could theoretically cover up to
half the sky before being detected by the instrument.

COMPARISONS OF MARS REPORTS WITH PILOT REPORTS

The appendix entitled "PILOT REPORTS/MARS II COMPARISONS – PUNTZI
MOUNTAIN" gives some examples of Puntzi Mountain reports and compares
them with actual pilot reports. Note that some of the pilot reports
are ASL and some are obviously AGL. It is impossible to infer which
height is meant in some of the reports. However, after examining and
comparing each of the reports we can definitely say that reports 2,
7 and 10 show little or no agreement. Agreement in some of the other
reports is quite good.

SUMMARY

The automated reports from the MARS sites (presently Clinton and
Puntzi Mountain) are now being produced in airways format. Although
the report looks the same as any other manned airways observation
report, it should be noted that it is of much lower quality. The
report should not be taken and used with the same level of confidence
as the other manned observations. An attempt has been made here to
make users aware of some of the limitations of the reports regarding
the cloud groups.

For further reference refer to the publication "Guidelines for MARS I and II Monitors". Of particular interest is Paragraph 6.2 on Page 8. A copy of page 8 is appended to this report.

REFERENCES:

(1) Guidelines for MARS I and II Monitors - A.E.S.

(2) MARS II and I Algorithm for Conversion of Cloud Groups.
     A.E.S.

PILOT REPORTS/MARS II COMPARISONS
PUNTZI MOUNTAIN

DATE/TIME	AIRCRAFT/TYPE	REPORT	MARS II
JANUARY 81			
231635	GQIS C206	ABM YPU WBND 85BKN 120BKN	WPU 231600 E56 BKN
240016	GHIL C210	Approaching YPU WBND 85BKN	WPU 240000 E37BKN
272313	GMIH C172	By YPU EBND. OVR YPU 250 SCT	WPU 272300 CLR BLO 100
282130	FCXM C180	15 N YPU. CIG 50 ASL	WPU 272100 E16 OVC
FEBRUARY 81			
050010	FCXM C180	By YPU EBND EST CIG 10 OVC VIS 15	WPU 050000 E60VC 9+
072142	GNLM PA31	By YPU 10T NO CLDS BLO 10T YPU AREA	WPU 072100 CLR BLO 100
151920	GMIH C172	Landing YPU. CIG ABT 7500ASL	WPU 151900 CLR BLO 100
231649	GBAR C182	By YPU EST CIG 50 OVC	WPU 231600 16 SCT E35 OVC
242352	FCXM C180	At YPU. 18 SCT 26 BKN	WPU 250000 20 SCT E35 OVC
MARCH 81			
022100	FCDN C180	By YPU. EST CIG 55 - 60 BKN	WPU 022100 CLR BLO 100

Some examples of how the automatic station at Puntzi Mountain compares
with some aircraft observations.

6.   SKY CONDITION   (conversion table #3 and 4)

6.1   <u>Missing Data</u> a brief power failure will cause input data to be spaces.
SA output will be shown as missing. This problem corrects itself after 1
hour of history is again built up.

6.1.1 invalid data in <u>both</u> input cloud groups will cause the SA output to
be shown as missing. This may be caused by hits on the line, (communications)
or faulty operation of MARS equipment.

6.1.2 sensor failure (RBC or processor), will result in input data being
spaces (both groups), with the result that the SA output is shown as missing.

6.1.3 during maintenance of a MARS II station, if the EL technician installs
an override card, input data will be spaces and the SA output will be shown
as missing. During maintenance at a MARS I station, the EL technician may
cause the cloud (history) group to input MMMM.

6.1.4 if the input data for <u>both</u> cloud groups is constant (e.g. <u>no</u> change
in any of the 8 digits) over the past 6 consecutive hours, and this input
does not convert to "CLR BLO 100" the SA output for sky condition will be
shown as missing.

6.1.5 missing sky condition data in the SA is reported by the use of 5 M's
(MMMM).

6.2   <u>Non Representative Data</u> the RBC looks at a limited portion of the
sky. A history of what is seen over the <u>past hour</u> by the RBC is built up
in the MARS cloud processor. This history is reduced to the 2 cloud
groups you see in the MARS input message by the processor. These two
groups are manipulated by a lengthy program in the SSC Mini-Computer to
output what looks like any other hourly sky condition report. Because
this sky condition report is based on an entire hour of sky condition
history, and because this history may or may not be truly representative
of actual conditions over the past hour (since the RBC only looks at a
very limited portion of the sky and has other inherent weaknesses), it
<u>cannot and should not be considered as a report of current sky conditions</u>.
Only under stable conditions such as a persistant (several hours) solid
overcast or several hours of totally clear conditions below 10,000 feet,
might a comparison of this sky history report and a manual observation of
current sky conditions be expected to be in close agreement.

6.2.1 Haze or thin fog conditions can cause broken and/or overcast
conditions to be reported for 1,2,3 or 4 levels; zero ceiling, or even
10/10 obscured may be reported under these conditions. A manned report
might show little or no cloud and/or obscured sky.