METEOROLOGICAL WARNINGS STUDY GROUP (METWSG)

FOURTH MEETING

Montréal, 15 to 18 May 2012

Agenda Item 5: SIGMET/AIRMET
5.2: SIGMET/AIRMET requirements

SPATIAL DESCRIPTORS IN WARNINGS

(Presented by Bill Maynard)

SUMMARY

The current terminology used to describe the forecasted spatial density of weather phenomena in warnings is reviewed. It is suggested that the status quo be revalidated and alternatives be considered.

1. INTRODUCTION

1.1 The current terminology and definitions used for the description of the spatial density of specified weather phenomena may be both limited and ambiguous and may be inconsistent with anticipated future developments in meteorological forecast products. This study note presents a brief overview of this assertion and proposes alternatives for further consideration.

2. DISCUSSION

2.1 At present, Annex 3 — *Meteorological Service for International Air Navigation* contains the following terminology for the description of the spatial density of weather phenomena: ISOL for less than 50 per cent coverage, OCNL for 50 per cent to 75 per cent coverage and FRQ for more than 75 per cent coverage. These are further explained in Appendix 6, Section 4.2.1 as shown in the appendix to this study note. The ongoing use of temporal terminology to provide information on spatial density should also be noted.

2.2 It can be argued that ISOL is too large of a range and that it may be inconsistent with anticipated future forecast products that will include greater detail on both spatial density and probability. Furthermore, many users may default to the worst case scenario (i.e. ISOL = 50 per cent, OCNL =

75 per cent and FRQ = 100 per cent) which will leave limited flexibility to forecast reduced risk or even generally favourable weather conditions. There is a possibility that this may, in some cases, contribute to the introduction of systematic bias such that spatial probabilities in the 25 per cent range (as an example) are either ignored or amplified solely to meet the needs of these definitions. Moreover, such bias may not be consistently applied between different forecasters or States.

2.3 The current descriptors may have been developed with their application for cumulonimbus being the primary consideration. In fact, the text related to these terms in Annex 3 is specifically linked to this singular phenomena as shown in Appendix 1 (model SN) to Annex 3 that states it is to be used for "CB only" which includes the following related text (percentages added):

Cloud except CB	CB only
FEW = few (1/8 to 2/8)	ISOL = individual CBs (isolated) <50 per cent
SCT – scattered (3/8 to 4/8)	OCNL = well separated CBs (occasional) 50-75 per cent
BKN = broken (5/8 to 7/8)	FRQ = CBs with little or no separation (frequent) >75 per cent
OVC = overcast (8/8)	

2.4 It is also apparent that the undefined descriptor "LOC" is utilized in Appendix 1 (Model SWL), it is assumed that this refers to "local" but does not have an associated spatial distribution. It should also be noted that the correct abbreviation for 'local", in accordance with the *Procedures for Air Navigation Services — ICAO Abbreviations and Codes* (PANS-ABC, Doc 8400) – is "LCA".

2.5 Some States utilize additional terminology to provide enhanced guidance for phenomena that cover less than 50 per cent of a defined area. In Canada "LCL" (for "local") is used to describe hazardous phenomena that have less than 25 per cent coverage. It should be noted, to illustrate the deviation in practice, that Canada uses LCL or ISOLD for 25 per cent or less; PTCHY ("patchy") or SCT for 26 to 50 per cent and XTNSV ("extensive") or NMRS ("numerous") for greater than 50 per cent. In Canada LCL, PTCHY and XTNSV are used for non-convective phenomena.

2.6 Some **other** definitions that are known to be in use by various States include:

— LCA (or LCL or LOC): "local", not consistently defined but used to mean "risk" by at least one State and less than 25 per cent by another

— OCNL: Occasional >50 per cent chance for <1/2 of the forecast period

— ISOL: Isolated Single cells

— WDLY SCT: Widely scattered <25 per cent of the area affected

— SCT: Scattered Areas of 25 per cent to <50 per cent or 50 per cent or 54 per cent (the latter 3 depending upon the State) of the area affected

— NMRS: Numerous , one of ≥50 per cent or >50 per cent or >55 per cent of the area affected depending upon the State

— WDSPRD: Widespread ≥50 per cent or >50 per cent or >55 per cent of the area affected

2.7 Many forecasters are of the view that it is both achievable and desirable to provide additional details related to phenomena that warrant a warning but have a spatial density of less than 50 per cent. Clearly, this perspective needs to be validated by end users; however, it may be reasonable to assume that a phenomenon with a spatial density of 10 per cent may be treated differently from one with a spatial density of 49 per cent. This broad range leaves open a large degree of uncertainty for both the forecaster and end user regarding the expected weather conditions and may lead to a high false alarm rate in taking cautionary action. In a worse case, a user may disregard a forecast as a result of a perception of repeated over forecasting (i.e. the current definitions may unintentionally encourage an "all or nothing" approach to forecasting). It is also interesting to note that the there is more flexibility to provide detail related to generally non-significant cloud than there is for thunderstorms.

2.8 One alternative is to propose that at least one new spatial descriptor be added to those already listed in Annex 3. For example, it could be proposed that "LCA" be added for phenomena with less than 25 per cent spatial distribution and that ISOL then be adjusted to be 25 per cent to 49 per cent.

2.9 Another alternative would be to retain the current Annex 3 terminology but to adjust the associated spatial/temporal percentages to provide additional details in the lower percentage range, subject to the concurrence of end users. In essence, it is assumed that most users will consider any spatial/temporal probability greater than 50 per cent to be an near certainty (such that additional information above that level does not add much value in planning) whereas there may be value in providing greater details for lower percentages of coverage (i.e. a coverage of less than 25 per cent may be materially different from one of 50 per cent). In other words, there may be value in providing further information regarding areas where hazardous conditions may be occurring but which are relatively more favourable than adjacent areas.

2.10 Alternatively, the well understood definitions associated with FEW, SCT, BKN and OVC could be used whenever practicable.

2.11 A further long term option would be to introduce a new code form that will allow for spatial density to be forecasted in percentages. This would provide a better long-term option that would be more consistent with anticipated future forecast products. However, such a solution is likely to require a period of years to be suitably developed and implemented.

3. ACTION BY THE GROUP

3.1 The group is invited to comment on this paper and the desirability of the options described in paragraphs 2.7 to 2.10.

3.2 The World Meteorological Organization (WMO) should be invited to consider updating Appendix 1 to Annex 3 to address the apparent terminology inconsistency described in paragraph 2.2.

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APPENDIX

(Excerpt from Annex 3)

From Appendix 6

4.2.1 **Recommendation.—** *An area of thunderstorms and cumulonimbus clouds should be considered:*
a) obscured (OBSC) if it is obscured by haze or smoke or cannot be readily seen due to darkness;
b) embedded (EMBD) if it is embedded within cloud layers and cannot be readily recognized;
c) isolated (ISOL) if it consists of individual features which affect, or are forecast to affect, an area with a maximum spatial coverage less than 50 per cent of the area concerned (at a fixed time or during the period of validity); and
d) occasional (OCNL) if it consists of well-separated features which affect, or are forecast to affect, an area with a maximum spatial coverage between 50 and 75 per cent of the area concerned (at a fixed time or during the period of validity).

4.2.2 **Recommendation.—** *An area of thunderstorms should be considered frequent (FRQ) if within that area there is little or no separation between adjacent thunderstorms with a maximum spatial coverage greater than 75 per cent of the area affected, or forecast to be affected, by the phenomenon (at a fixed time or during the period of validity).*

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