AVHRR Level 2 Polar Winds Product Format Specification

Doc.No. : EUM/OPS-EPS/SPE/08/0338
Issue : V3A
Date : 6 August 2013
WBS/DBS :

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Document Change Record

Issue / Revision	*Date*	*DCN. No*	*Changed Pages / Paragraphs*
v1	10/11/2008		Initial release.
v1A	06/08/2009		Modifications in SPHR and MDR details (see Annex). General editorial updates.
v1B	17/09/2009		Section 5: record format version control table completed. Annex only: Modified field names in SPHR.
v1C	28/09/2009		Correction of several tables (entry insertion or deletion) in Sections 3.4.1, 3.4.2, 3.4.4 & 3.4.8.
v1D	07/10/2009		Insertion of Sections 3.1.1 & 3.4.1 to specify subclass ID values for SPHR & MDR.
v1E	10/11/2009		Annex only: Several field updates for MDR and SPHR records (see Annex for full details).
v1F	13/11/2009		Section 3.3.1 Table 2: GEADR-CONFIG subclass ID changed from 1 to 20. Also typo in table title: GIADR → GEADR.
v1G	27/04/2010	ODT_DCR_155	Added record subclass info.
v2	26/03/2012		Full rewriting of the format A format version 2 is created for the SPHR and the MDR. Details of changes are presented in the annex document. Section 2.5 details the BUFR code/flags tables used. New section 4 details the BUFR format used for AMV and lists the cross-references between the native and BUFR parameters.
V2	26/06/2013		Bits numbering and array dimensions order was revised to be compliant with the EPS Generic Product Format Specification document.
V3 - V3A	06/08/2013		Updates to comply with TSS Document Management Plan.

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1 INTRODUCTION

1.1 Purpose and Scope

This document is the AVHRR Level 2 Polar Winds Product Format Specification.
The generic product format specification used by this document is defined in the EPS Generic Product Format Specification [AD 1].

1.2 Document Structure

The document is organised into the following sections, including the introduction:

- Section 1 describes the scope of the document;
- Section 0 details the native format for the AVHR_AMV level 2 product;
- Section 0 presents considerations about the orbit reconstruction (DIF service);
- Section 0 details the BUFR format for the AVHRR winds product.

1.3 Applicable Documents

Ref	*Title*	*Document ID/Ref*
AD 1	EPS Generic Product Format Specification	EPS.GGS.SPE.96167
AD 2	AVHRR Level 2 Polar Winds Product Generation Specification	EUM/OPS-EPS/SPE/08/0346

2 AVHR_AMV NATIVE PRODUCT FORMAT

2.1 Overview

This AVHRR Level 2 product provides information about polar winds. These are more commonly referred to as atmospheric motion vectors (AMVs) in the Polar Regions. The product format is based on the generic product format as described in [AD 1]. This section details the instrument and level-specific additions required for AVHR_AMV products.

2.2 Main Product Record Header

The MPHR is a generic record. It is detailed in [AD 2].

2.3 Secondary Product Header Record

Description	*Record Class*	*Inst. group*	*Subclass*	*Version*
Quality flags and general product-specific information	SPHR	AVHR	2	2

Table 1: SPHR record identification

The SPHR is detailed in Table 13 of this document.

2.4 Global External Auxiliary Data Record

The global external auxiliary datasets that are used by the Level 2 PGF (described in [AD 2] but not written into the product are referenced by GEADRs, as specified in [AD 1]. There is only one GEADR defined for the AMV product referring to the name of the algorithm configuration file.

Description	*Record Class*	*Instrument group*	*Subclass*	*Version*
Processor configuration data	GEADR	AVHR	20	1

Table 2: GEADR record identification

The GEADR is detailed in [AD 1].

2.5 Measurement Data Record

Description	*Record Class*	*Instrument Group*	*Subclass*	*Version*
AMV data	MDR	AVHR	4	2

Table 3: MDR record identification

The MDRs contain the AMV data and are organised in such a way that one record represents exactly one AMV. The MDR is detailed in the appendix to this document. See Table 14 The number of vectors in the product is variable and could even be zero if no vectors are generated. The following sub-sections describe the contents of the various flags in the MDRs. Most of the tables rely on standard BUFR tables.

The corresponding BUFR element descriptor number and the size of the parameter are indicated in the tables' captions. All code figures are indicated for completeness even if they are not all used in the product.

2.5.1 Surface type

The SURFACE_TYPE field contains a code indicating the type of surface underneath the tracer.

Code figure	*Meaning*
0	Land
1	Sea
2	Coastal
3/255	*[Missing value]*

Table 4: Land/sea qualifier (C 0008012 – 2 bits)

2.5.2 Channel identifier

The CHANNEL_ID field contains the flags indicating the channels used to derive the AMV.

Bit No.	*Meaning*
7	AVHRR 1
6	AVHRR 2
5	AVHRR 3a
4	AVHRR 3b
3	AVHRR 4
2	AVHRR 5
1	*[Missing value]*
0	*[Missing value]*
All bits	*[Missing value]*

Table 5: AVHRR channel combination (F 025051 – 7 bits)

2.5.3 Wind method

The WIND_METHOD field contains a flag indicating the type of wind derivation.

Code figure	*Meaning*
0	*[Reserved]*
1	Wind derived from cloud motion observed in the infrared channel
2	Wind derived from cloud motion observed in the visible channel
3	Wind derived from cloud motion observed in the water vapour channel
4	Wind derived from motion observed in a combination of spectral channels
5	Wind derived from motion observed in the water vapour channel in clear air
6	Wind derived from motion observed in the ozone channel
7	Wind derived from motion observed in the water vapour channel (cloud or clear air not specified)
8 – 12	*[Reserved]*
13	Root mean square
14	*[Reserved]*
15/255	*[Missing value]*

Table 6: Satellite derived wind computation method (C 002023 – 4 bits)

2.5.4 Matching method

The MATCHING_METHOD field contains a flag that indicates which kind of target matching was applied. The former "*Euclidean method*" used as primary method in the algorithm until the version 1.5 corresponds to the *"Norms least square minimum"* and encoded as 0.

Code figure	*Meaning*
0	Norms least square minimum
1	Euclidean norm with radiance correlation
2	Cross-correlation method
3-6	*[Reserved]*
7/255	*[Missing value]*

Table 7: Tracer correlation method (C 002164 – 3 bits)

2.5.5 Algorithm flags

This parameter, introduced in the version 2 of the format, collocates the different algorithm flags of the previous version.

Bit No.	*Meaning*
7	IASI co-located data used for height assignment
6	Inversion height assignment correction applied
5	Cloud base assignment correction applied
4	Image enhancement applied
3	Triplet mode
2	*[Reserved]*
1	*[Reserved]*
0	*[Missing value]*
All bits	*[Missing value]*

Table 8: Algorithm flags (8 bits). First bit position corresponds to the higher bit order.

2.5.6 Height assignment method

The AMV_HA_METHOD field refers to the method that has been chosen for best representation of the height assignment. The HA_METHODS field refers to the height assignment methods implemented and used to derive the AMV.

Code figure	*Meaning*
0	Auto editor
1	IRW height assignment
2	WV height assignment
3	H2O intercept height assignment
4	CO2 slicing height assignment
5	Low pixel max gradient
6	Higher pixel max gradient
7	Primary height assignment
8	Layer thickness assignment
9	Cumulative contribution function -10 percent height
10	Cumulative contribution function -50 percent height
11	Cumulative contribution function -90 percent height
12	Cumulative contribution function - height of maximum gradient
13	IR / two WV channel ratioing method
14	Composite height assignment
15/255	*[missing value]*

Table 9: Height assignment method (C 002163 – 4 bits)

2.5.7 Quality values

The QUALITY_VALUES array lists all the errors, overall quality and individual quality elements, or consistencies, for each derived wind. Some elements could be missing if not estimated. The organisation of the array is shown in Table 10. The first element has index 1:

Array index	*Meaning*	*SF*	*Units*
1	Overall quality		%
2	Overall quality excl. forecast		%
3	Estimated error	1	m/s
4 – 6	*[reserved]*		
7	Forecast consistency		%
8	Spatial vector consistency		%
9	Spatial height consistency		%
10	Temporal height consistency		%
11	Tracking vector consistency		%
12	Tracking speed consistency		%
13	Tracking direction consistency		%
14	U-component consistency		%
15	V-component consistency		%
16 – 18	*[Reserved]*		

Table 10: Quality types present in the QUALITY_VALUES array

2.6 Occurrence information

Record	*Occurrence*
MPHR	Once per product
SPHR	Once per product
IPR	One pointing to the GEADR One pointing to the first MDR
GEADR	Once per product
MDR	Once per AMV

Table 11: Record occurrence overview

2.7 Record format version control history

This section provides version numbers for the records defined within this document.

Record Subclass	*Format Version Number*	*Issue Defined*
SPHR	1	1D
	2	2
GEADR	1	1D
MDR	1	1D
	2	2

Table 12: Record format version numbers

2.8 AVHR_AMV product records

The detailed format specifications for the specific AVHR_AMV records are also included in a workbook available from the EUMETSAT help desk. Ask for EUM/OPS-EPS/SPE/08/0601.

2.8.1 Detailed Description of the SPHR

Field	*Description*	*SF*	*Units*	*Equivalent Type*	*Encode Chars*	*Field Size*	*Offset*
RECORD_HEADER	Generic Record Header - ***Note***: This is binary!			REC_HEAD	20	20	0
Product data quality							
AMV_TOTAL_NUMBER	Total number of AMV in the product	0	1	*U-INTEGER*	8	41	20
TOTAL_OVERALL_QUALITY	Total overall quality of product (including lower quality winds)	0	%	*U-INTEGER*	8	41	61
AMV_NUMBER_DISSEMINATED	Number of AMV which quality pass the dissemination threshold	0	1	*U-INTEGER*	8	41	102
OVERALL_QUALITY	Overall quality of product	0	%	*U-INTEGER*	8	41	143
FORECAST_CONSISTENCY	Averaged forecast consistency	0	%	*U-INTEGER*	8	41	184
SPATIAL_VECTOR_CONSISTENCY	Averaged spatial vector consistency	0	%	*U-INTEGER*	8	41	225
SPATIAL_HEIGHT_CONSISTENCY	Averaged spatial height consistency	0	%	*U-INTEGER*	8	41	266
TEMPORAL_HEIGHT_CONSISTENCY	Averaged temporal height consistency	0	%	*U-INTEGER*	8	41	307
TRACKING_CONSISTENCY	Averaged tracking consistency	0	%	*U-INTEGER*	8	41	348
Algorithm settings							
DISSEMINATION_THRESHOLD	Quality threshold for AMV dissemination	0	%	*U-INTEGER*	8	41	389
SAMPLING_GRID_RESOLUTION	AMV distance sampling	0	m	*U-INTEGER*	8	41	430
TARGET_SIZE	Size of the target area	0	m	*U-INTEGER*	8	41	471
SEARCH_DISTANCE	Maximal search distance	0	m	*U-INTEGER*	8	41	512
Size of the Record							553

Table 13: Detailed description of the SPHR

2.8.2 Detailed description of the MDR

Field	*Description*	*Sf*	*Units*	*Dim1*	*Dim2*	*Type*	*Type Size*	*Field Size*	*Offset*
RECORD_HEADER	Generic Record Header			1	1	REC_HD	20	20	0
General quality indicators									
DEGRADED_INST_MDR	Degraded quality due to an instrument degradation	NA	flag	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Degraded quality due to a processing degradation	NA	flag	1	1	boolean	1	1	21
AMV characterization									
AMV_VALIDITY_TIME	Reference time associated to the AMV	NA	NA	1	1	short cds time	6	6	22
LATITUDE	Latitude of the AMV location	4	deg	1	1	integer4	4	4	28
LONGITUDE	Longitude of the AMV location	4	deg	1	1	integer4	4	4	32
SURFACE_TYPE	Surface type (land, sea, or coast)	NA	code	1	1	enum	1	1	36
CHANNEL_ID	Spectral channel identifier	NA	code	1	1	enum	1	1	37
WIND_METHOD	Wind derivation method	NA	code	1	1	enum	1	1	38
MATCHING_METHOD	Target matching method	NA	code	1	1	enum	1	1	39
AMV_DIRECTION	AMV direction	1	deg	1	1	u-integer2	2	2	40
AMV_SPEED	AMV speed	1	m/s	1	1	u-integer2	2	2	42
AMV_PRESSURE	AMV pressure	-1	Pa	1	1	u-integer2	2	2	44
AMV_TEMPERATURE	AMV temperature	1	K	1	1	u-integer2	2	2	46
Method and quality									
ALGORITHM_FLAGS	Algorithm control flags	NA	flags	1	1	enum	1	1	48
AMV_HA_METHOD	Final height assignment method	NA	code	1	1	enum	1	1	49
AMV_PRESSURE_SD	Standard deviation of pressure	-1	Pa	1	1	u-integer2	2	2	50
AMV_TEMPERATURE_SD	Standard deviation of temperature	1	K	1	1	u-integer2	2	2	52
QUALITY_VALUES	Errors and quality values	*See table*		18	1	u-byte	1	18	54

Field	*Description*	*Sf*	*Units*	*Dim1*	*Dim2*	*Type*	*Type Size*	*Field Size*	*Offset*
FC_BASETIME	Base time of the used forecast data			1	1	short cds time	6	6	72
FC_STEP	Step times of forecast data	0	h	2	1	u-byte	1	2	78
HA_METHODS	Individual height assignment methods	NA	code	4	1	enum	1	4	80
Individual cluster data									
SENSING_TIME	Sensing time of the individual data			3	1	short cds time	6	18	84
FC_DIRECTION	Forecast wind direction	1	deg	3	1	u-integer2	2	6	102
FC_SPEED	Forecast wind speed	1	m/s	3	1	u-integer2	2	6	108
SAT_ZENITH_ANGLE	Satellite zenith angle	2	deg	3	1	u-integer2	2	6	114
CLUSTER_SIZE	Number of pixels in the cluster	0	NA	3	1	u-integer2	2	6	120
HA_PRESSURE	Individual pressure retrieved	-1	Pa	4	3	u-integer2	2	24	126
HA_PRESSURE_SD	Standard deviation on pressure	-1	Pa	4	3	u-integer2	2	24	150
HA_TEMPERATURE	Individual temperature retrieved	1	K	4	3	u-integer2	2	24	174
HA_TEMPERATURE_SD	Standard deviation on temperature	1	K	4	3	u-integer2	2	24	198
Intermediate components									
INTER_DIRECTION	AMV direction for the component	1	deg	2	1	u-integer2	2	4	222
INTER_SPEED	AMV speed for the component	1	m/s	2	1	u-integer2	2	4	226
MATCHING_VALUE	Peak value of correlation method			2	1	u-integer2	2	4	230
HA_FC_CONSISTENCY	Particular forecast consistency	0	%	4	2	u-byte	1	8	234
SIZE OF THE RECORD									**242**

Table 14: Detailed description of the MDR

2.9 Product naming convention

The AVHRR AMV level 2 products follow the product naming convention as detailed in [AD 1].

INSTRUMENT_ID:	AVHR
PRODUCT_TYPE:	AMV
PROCESSING_LEVEL:	depends on the process mode

02 for legacy products (product format v1);
2A for AMV products derived from a single AVHRR sensor
2D for AMV products derived from AVHRR sensors on two satellites;
2T for AMV products derived from AVHRR sensors on two satellites with Triplet mode activated.

The SPACECRAFT_ID refers to the satellite platform of the AVHRR data used. For 2D and 2T modes, it refers to the most recent data.

3 FULL PRODUCT / PDU CONSIDERATIONS

The orbit reconstruction follows the general rules described in the [AD-1]. The *product quality* section of the SPHR shall be computed as follows.

Element	*Description*
AMV_TOTAL_NUMBER	
AMV_NUMBER_DISSEMINATED	*NUMBER = SUM[i=1..noPDUs] number(i)* For quality values, a weighted average is performed to compute the parameter at orbit level: *QUALITY = SUM[i = 1..noPDUs] number(i)*quality(i) / NUMBER*
	For quality values, a weighted average is performed to compute the parameter at orbit level: *QUALITY = SUM[i= 1..noPDUs] number(i)*quality(i) / NUMBER*
TOTAL_OVERALL_QUALITY	*number* is the AMV_TOTAL_NUMBER parameter
OVERALL_QUALITY	
FORECAST_CONSISTENCY	
SPATIAL_VECTOR_CONSISTENCY	
SPATIAL_HEIGHT_CONSISTENCY	
TEMPORAL_HEIGHT_CONSISTENCY	
TRACKING_CONSISTENCY	*number* is the AMV_NUMBER_DISSEMINATED parameter.

If a PDU product is empty and contains a dummy MDR, this (dummy) data record is not copied into the reconstructed orbit product.

4 AVHRR-WINDS BUFR PRODUCT FORMAT

The AVHR_AMV BUFR product format is common to the MSG-SEVIRI-derived wind BUFR product format. It uses the BUFR standard 3 10 014 Satellite derived wind sequence. It is completed by quality information sequences. Table 15 below shows the cross-reference between the BUFR descriptors and the parameters of the native output product.

Pos.	*BUFR Descriptor*			*Description*	*Corresponding parameter within the native product*
3 10 014 Satellite derived wind sequence					
1	3 01 072	3 01 071	0 01 007	Satellite identifier	Derived from MPHR: SATELLITE_ID
2			0 01 031	Generating centre	= *EUMETSAT*
3			0 02 020	Satellite classification	= *EPS*
4			0 02 028	Segment size at nadir in X direction	SPHR: SAMPLING_GRID_RESOLUTION
5			0 02 029	Segment size at nadir in Y direction	
6		3 01 011	0 04 001	Year	AMV_VALIDITY_TIME
7			0 04 002	Month	
8			0 04 003	Day	
9		3 01 013	0 04 005	Hour	
10			0 04 006	Minute	
11			0 04 007	Seconds	
12		3 01 021	0 05 001	Latitude	LATITUDE

Pos.	*BUFR Descriptor*			*Description*	*Corresponding parameter within the native product*
13			0 05 002	Longitude	LONGITUDE
14	3 03 041		0 02 152	Geostationary satellite instrument used	= *Polar orbiter*
15			0 02 023	Cloud motion computational method	WIND_METHOD
16			0 07 004	Pressure	AMV_PRESSURE
17			0 11 001	Wind direction	AMV_DIRECTION
18			0 11 002	Wind speed	AMV_SPEED
19			0 02 153	Satellite channel centre frequency	Set based on CHANNEL_ID
20			0 02 154	Satellite channel band width	
21			0 12 071	Coldest cluster temperature	AMV_TEMPERATURE
22	3 04 011		0 02 163	Height assignment method	AMV_HA_METHOD
23			0 02 164	Tracer correlation method	MATCHING_METHOD
24			0 08 012	Land/Sea qualifier	SURFACE_TYPE
25			0 07 024	Satellite zenith angle	SAT_ZENITH_ANGLE[1]
26			0 02 057	Origin of first guess information	= *MRF model*
27			0 08 021	Time significance	= *First Guess*
28			0 04 001	Year	FC_BASE_TIME

Pos.	*BUFR Descriptor*			*Description*	*Corresponding parameter within the native product*
29			0 04 002	Month	
30			0 04 003	Day	
31			0 04 004	Hour	
32			0 08 021	Time significance	= *Nominal reporting time*
33			0 08 024	Time period or displacement	FC_STEP[1]
Intermediate components c = 1..2 (in triplet mode) (3 to 4 -> [missing])					
34		4 times	0 08 021	Time significance	= *Start time*
35			0 04 004	Hour	SENSING_TIME[c]
36			0 04 005	Minute	
37			0 04 006	Seconds	
38			0 08 021	Time significance	= *End time*
39			0 04 004	Hour	SENSING_TIME[c+1]
40			0 04 005	Minute	
41			0 04 006	Seconds	
42			0 11 001	Wind direction	INTER_DIRECTION[c]
43	➔73		0 11 002	Wind speed	INTER_SPEED[c]

Pos.	*BUFR Descriptor*			*Description*	*Corresponding parameter within the native product*
Individual height estimation m=1..4 (5 to 10 -> [missing])					
74		10 times	0 02 163	Height Assignment method	HA_METHODS[m]
75			0 07 004	Pressure	HA_PRESSURE[1][m]
76	➔103		0 12 001	Temperature	HA_TEMPERATURE[1][m]
End of standard wind sequence					
Quality information					
104			2 22 000	Quality information on fields # 16, 17, 18, 21	
105			0 01 031	Generating centre	= *EUMETSAT*
106			0 01 032	Generating application	=*1*
107	➔110	4 times	0 33 007	Per cent confidence	QUALITY_VALUES[1] (repeated x4)
111			0 01 031	Generating centre	= *EUMETSAT*
112			0 01 032	Generating application	=*1*
113	➔116	4 times	0 33 035	Manual/Auto quality control	= *[Missing]*
117			0 01 031	Generating centre	= *EUMETSAT*
118			0 01 032	Generating application	=*1*
119	➔122	4 times	0 33 007	Nominal confidence threshold	= *[Missing]*
123			0 01 031	Generating centre	= *EUMETSAT*

Pos.	*BUFR Descriptor*			*Description*	*Corresponding parameter within the native product*
124			0 01 032	Generating application	*=2*
125	➔128	4 times	0 33 007	Per cent confidence	QUALITY_VALUES[2] (repeated x4)
129			0 01 031	Generating centre	= *EUMETSAT*
130			0 01 032	Generating application	*=2*
131	➔116	4 times	0 33 035	Manual/Auto quality control	= *[Missing]*
135			0 01 031	Generating centre	= *EUMETSAT*
136			0 01 032	Generating application	*=2*
137	➔140	4 times	0 33 007	Nominal confidence threshold	= *[Missing]*
141			0 01 031	Generating centre	= *EUMETSAT*
142			0 01 032	Generating application	*=3*
143	➔146	4 times	0 33 007	Per cent confidence	= *[Missing]*
147			0 01 031	Generating centre	= *EUMETSAT*
148			0 01 032	Generating application	*=3*
149	➔152	4 times	0 33 035	Manual/Auto quality control	= *[Missing]*
153			0 01 031	Generating centre	= *EUMETSAT*
154			0 01 032	Generating application	*=3*

Pos.	*BUFR Descriptor*			*Description*	*Corresponding parameter within the native product*
155	➔158	4 times	0 33 007	Nominal confidence threshold	= *[Missing]*

Table 15: Data section description of the AVHR_AMV BUFR messages

Doc Ref: EUM/OPS-EPS/SPE/08/0601
AVHRR Level 2 Polar Winds Product Format Specification - Annex
Worksheet: VERSION

This Document	
Title	AVHRR LEVEL 2 POLAR WINDS PRODUCT FORMAT SPECIFICATION TABLES
Reference Number	EUM/OPS-EPS/SPE/08/0601

Revision History	
Version 1 10/11/08	First release.
Version 1A 06/08/09	Modifications in SPHR and MDR details.
Version 1B 17/09/09	Amend field 14, 17 & 18 names in SPHR.
Version 1C 28/09/09	No changes to annex.
Version 1D 07/10/09	No changes to annex.
Version 1E 10/11/09	MDR.MATCHING_VALUE: Description now includes description of variable scale factor values.
	MDR. For the 12 fields START_TIME_1 through FIRST_GUESS_DIRECTION_2: Descriptions corrected ('forward' and 'backward' swapped).
	MDR.IMAGE_TRIPLET_FLAG & FIRST_GUESS_FLAG: Type changed from byte to boolean.
	MDR. For flag fields MATCHING_METHOD, WIND_METHOD, IMAGE_ENHANCEMENT, SURFACE_TYPE, TARGET_TYPE, CORRECTION_METHOD, HEIGHT_ASSIGNMENT_METHOD, BUFR_HEIGHT_METHOD & HA_BUFR_HEIGHT_METHOD, Type changed from byte to enumerated.
	SPHR.SEARCH_START_FRWARD_TRACK: Field name corrected to SEARCH_START_TIME_FRWARD_TRACK.
Version 1F 13/11/09	No changes to annex.
Version 1G 27/04/10	No changes to annex.
Version 2 26/03/12	SPHR changes: No more information about start and end search time, since the data set at the PDU is totally lost in the orbit reconstruction. Settings in km instead of pixels since it is foreseen to work later on a map grid instead of the scan grid of the reference image. Only a dimension is given (assuming always same in both direction). Dissemination threshold is introduced in the record (today the threshold is 0 !) AMV_TOTAL_NUMBER is introduced (even if it is redundant with MPHR:TOTAL_MDR)
	MDR is totally refactored: All parameters (but latitude/longitude) are encoded as unsigned integer (missing coding values are 0xFF or 0xFFFF) All short and long integer are aligned on word boundaries Triplet mode is fully implemented in the format Parameters into 4 groups (AMV, Quality, Cluster, Wind Components) Algorithm control flags gathered into a single parameter

	Date/Time parameters are simplified (acquisition time and not start/end) Quality indices coded as a u-byte instead of a integer2 Some parameters renamed to make all the parameters names consistent SAT_ZENITH_ANGLE given for individual cluster data CLUSTER_SIZE is given for the (up to) three images CHANNEL_ID uses a predefined BUFR table to encode the AVHRR channel used TRACKING_DEVIATION is removed (the information is already considered in a quality index) SPEED_/DIRECTION_OPPOSITE are removed BEST_MATCH_ROW/_COLUMN are removed HEIGHT_ASSIGNMENT_FLAG is removed (was redundant with HA_BUFR_HEIGHT_METHOD) FIRST_GUESS_SPEED_1/2 are replaced by FC_SPEED/DIRECTION. Previous HEIGHT_ASSIGNMENT_METHOD is removed since it was equivalent to BUFR_HEIGHT_METHOD and renamed into AMV_HA_METHOD. All errors and quality values are collocated in an array. The dimension size of HA_METHODS is reduced from 6 to 4 (only 2 implemented today) MATCHING_VALUE is given for each component (triplet mode) MDR size is reduced from 364 to 242.
Version 2A 04/06/12	Fixes the dimensions order (Fortran convention) and the types of two parameters (bitfield instead of enumerated)

FIELD	DESCRIPTION	SF	UNITS	EQUIVALENT TYPE	ENCODE CHARS	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header - NOTE: This is binary!			REC_HEAD	20	20	0
	Product data quality						
AMV_TOTAL_NUMBER	Total number of AMV in the product	0	1	*U-INTEGER*	8	41	20
TOTAL_OVERALL_QUALITY	Total overall quality of product (including low quality winds)	0	%	*U-INTEGER*	8	41	61
AMV_NUMBER_DISS	Number of AMV which quality pass the dissemination threshold	0	1	*U-INTEGER*	8	41	102
OVERALL_QUALITY	Overall quality of product	0	%	*U-INTEGER*	8	41	143
FORECAST_CONSISTENCY	Averaged forecast consistency	0	%	*U-INTEGER*	8	41	184
SPATIAL_VECTOR_CONSISTENCY	Averaged spatial vector consistency	0	%	*U-INTEGER*	8	41	225
SPATIAL_HEIGHT_CONSISTENCY	Averaged spatial height consistency	0	%	*U-INTEGER*	8	41	266
TEMPORAL_HEIGHT_CONSISTENCY	Averaged temporal height consistency	0	%	*U-INTEGER*	8	41	307
TRACKING_CONSISTENCY	Averaged tracking consistency	0	%	*U-INTEGER*	8	41	348
	Algorithm settings						
DISSEMINATION_THRESHOLD	Quality threshold for AMV dissemination	0	%	*U-INTEGER*	8	41	389
SAMPLING_GRID_RESOLUTION	AMV distance sampling	0	m	*U-INTEGER*	8	41	430
TARGET_SIZE	Size of the target area	0	m	*U-INTEGER*	8	41	471
SEARCH_DISTANCE	Maximal search distance	0	m	*U-INTEGER*	8	41	512
Size of the Record							553

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AVHRR Level 2 Polar Winds Product Format Specification - Annex
Worksheet: MDR

FIELD	DESCRIPTION	SF	UNITS	DIM1	DIM2	TYPE	TYPE SIZE	FIELD SIZE	OFFSET
RECORD_HEADER	Generic Record Header			1	1	REC_HD	20	20	0
General quality indicators									
DEGRADED_INST_MDR	Degraded quality due to an instrument degradation	NA	flag	1	1	boolean	1	1	20
DEGRADED_PROC_MDR	Degraded quality due to a processing degradation	NA	flag	1	1	boolean	1	1	21
AMV characterization									
AMV_VALIDITY_TIME	Reference time associated to the AMV	NA	NA	1	1	short cds time	6	6	22
LATITUDE	Latitude of the AMV location	4	deg	1	1	integer4	4	4	28
LONGITUDE	Longitude of the AMV location	4	deg	1	1	integer4	4	4	32
SURFACE_TYPE	Surface type (land, sea, or coast)	NA	code	1	1	enum	1	1	36
CHANNEL_ID	Spectral channel identifier	NA	code	1	1	bitst(8)	1	1	37
WIND_METHOD	Wind derivation method	NA	code	1	1	enum	1	1	38
MATCHING_METHOD	Target matching method	NA	code	1	1	enum	1	1	39
AMV_DIRECTION	AMV direction	1	deg	1	1	u-integer2	2	2	40
AMV_SPEED	AMV speed	1	m/s	1	1	u-integer2	2	2	42
AMV_PRESSURE	AMV pressure	-1	Pa	1	1	u-integer2	2	2	44
AMV_TEMPERATURE	AMV temperature	1	K	1	1	u-integer2	2	2	46
Method and quality									
ALGORITHM_FLAGS	Algorithm control flags	NA	flags	1	1	bitst(8)	1	1	48
AMV_HA_METHOD	Final height assignment method	NA	code	1	1	enum	1	1	49
AMV_PRESSURE_SD	Standard deviation of pressure	-1	Pa	1	1	u-integer2	2	2	50
AMV_TEMPERATURE_SD	Standard deviation of temperature	1	K	1	1	u-integer2	2	2	52
QUALITY_VALUES	Errors and quality values			18	1	u-byte	1	18	54
FC_BASETIME	Base time of the used forecast data	0	NA	1	1	short cds time	6	6	72
FC_STEP	Step times of forecast data	0	h	2	1	u-byte	1	2	78
HA_METHODS	Individual height assignment methods	NA	code	4	1	enum	1	4	80
Individual cluster data									
SENSING_TIME	Sensing time of the individual data	0	NA	1	3	short cds time	6	18	84
FC_DIRECTION	Forecast wind direction	1	deg	1	3	u-integer2	2	6	102
FC_SPEED	Forecast wind speed	1	m/s	1	3	u-integer2	2	6	108
SAT_ZENITH_ANGLE	Satellite zenith angle	2	deg	1	3	u-integer2	2	6	114
CLUSTER_SIZE	Number of pixels in the cluster	0	NA	1	3	u-integer2	2	6	120
HA_PRESSURE	Individual pressure retrieved	-1	Pa	4	3	u-integer2	2	24	126
HA_PRESSURE_SD	Standard deviation on pressure	-1	Pa	4	3	u-integer2	2	24	150
HA_TEMPERATURE	Individual temperature retrieved	1	K	4	3	u-integer2	2	24	174
HA_TEMPERATURE_SD	Standard deviation on temperature	1	K	4	3	u-integer2	2	24	198
Intermediate components									

INTER_DIRECTION	AMV direction for the component	1	deg	1	2	u-integer2	2	4	222
INTER_SPEED	AMV speed for the component	1	m/s	1	2	u-integer2	2	4	226
MATCHING_VALUE	Peak value of correlation method		NA	1	2	u-integer2	2	4	230
HA_FC_CONSISTENCY	Particular forecast consistency	0	%	4	2	u-byte	1	8	234
SIZE OF THE RECORD									**242**

Field Type	Size in Bytes
bitst(16)	2
bitst(24)	3
bitst(32)	4
bitst(48)	6
bitst(64)	8
bitst(8)	1
boolean	1
byte	1
char(1)	1
char(100)	100
char(2)	2
char(3)	3
char(4)	4
char(40)	40
char(88)	88
e-char(1)	1
e-char(2)	2
e-char(3)	3
enumerated	1
general time	15
integer2	2
integer4	4
integer8	8
long cds time	8
REC_HEAD	20
short cds time	6
u-byte	1
u-integer2	2
u-integer4	4
u-integer8	8

Parameter	Value	Description
1	1	Numbers make Excel formulae easier!
2	2	
3	3	
4	4	
NI	3	Number of images (orbits) processed
NQ	18	Number of quality checks
NH	4	Number of height assignment methods