

CLIDATA FORUM 2013



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Encoding and decoding BUFR messages with
Clidata

Prague, May 2013

Capabilities

- BUFR decoding and encoding
- BUFR is BINARY format → needs to be decoded to readable text format
- Special External Library for working with BUFR files
 - Encode BUFR
 - Decode BUFR
 - Create BUFR template
- Decoding/Encoding – BUFR Synop, BUFR Climat prepared
- Open possibilities

Decoding - BUFR FILE

- Binary file format, complicated to read
- Begins with BUFR end with 7777

```
0001 0203 0405 0607 0809 0A0B 0C0D 0E0F 0123456789ABCDEF
0000 4953 4944 3331 2045 445A 5720 3138 3033 ISID31 EDZW 1803
0010 3030 0D0D 0A42 5546 5200 2B9C 0400 0016 00...BUFR.+s...
0020 0000 4E00 0000 0000 01FF 0E08 07DD 0412 ..N.....'...Ý..
0030 0300 0000 00C3 0000 3F80 0117 0112 C15A .....Ä..?€....ÁZ
0040 04D6 04D7 C159 0419 14EF 14EE 0419 4200 .Ö.×ÁY...ď.í..B.
0050 1F01 01C5 14ED 0419 0802 140B 14C7 0419 ...Í.í.....Ç..
0060 4200 1F01 34D2 14E6 02B1 0DED 0D0D 0419 B...4Ň.é.±.í....
0070 0D0C 0419 0720 0C65 4107 C73F 4100 1F01 .....eA.Ç?A...
0080 14C1 4300 1F00 14C2 14C3 14D8 4100 1F00 .ÁC....Â.Ā.ŘA...
0090 14CE 0419 0E1F 4300 1F00 0419 0419 0E1F .î....C.....
00A0 0419 02AF 0D0B 1A14 14CB 0419 0D0B 14CB ...ž.....Ě.....Ě
00B0 4500 1F00 0419 0419 02AF 0D0B 14CB 4300 E.....ž...ĚC.
00C0 1F00 0DCB 14CC 14CD 4800 1F00 0419 0419 ...Ě.Ě.ÍH.....
00D0 0CCA 0C15 0C16 0720 0C70 0CC3 C22A 0419 .Ě.....p.ĀĀ*..
00E0 0B2A 0BCA 0419 0B2B 0B29 4400 1F00 0419 .*Ě...+.)D....
00F0 0419 0B29 0B2A 002A B700 007F FFFF FFFF ...)*.*. *...Ā'...'
0100 8A75 D319 5A5C 1E9A 59CB 521B DB1E 9A18 Šuó.z\šyĚR.Ů.š.
0110 5D5C D95B 8808 07DD 4486 035E 86E1 25A6 ]\Ů[ ..ÝD+.^+á&!
0120 CE0A 8205 413F FCD1 FFFF FFFB E211 8DC3 î...A?uŇ'...'úá.řĀ
0130 E71C 0000 847E F27C 417C F5C0 0000 F000 ě...~ň|A|óŘ..ď.
0140 2FFF FFF8 0000 056F D100 15BD 1400 A6F9 /'ř...oŇ..~...!ů
0150 5005 1BEF 4032 6EEB 0191 B5E7 FFFF FFFF P..d@2ně.'uĉ'...'
0160 FFFF FFC0 07C4 0010 F869 8FFE F884 0008 '...'Ř.Ā...řizťř"...
0170 00F6 98FF FFFF E1FF FFA1 F0D3 1FFF .ó'...'á'...'dó..
0180 FFFF FFFF E000 BFFF FFFF FC09 FD96 8047 '...'ř.z'...'ú.y-EG
0190 F7F6 FF82 4BE2 7FC1 25F1 0090 069F 8968 ÷ó',KĀĀ Á&ń. .žšh
01A0 0930 F869 8FFF FFF0 07FF FFFF FFF8 A781 .Ořiz'...'d.'...'ŸS
01B0 3DCD 8DA1 85D1 E880 8080 8080 8080 8080 =íř'...'Ňčeeeeeeeeee
01C0 8080 8080 7DD4 4860 35E6 8E12 6A39 E0AB eeee}ŌH`5óž.j9ř<
01D0 E055 FFFF CD1F FFFF FFBE 210A 2836 1F40 řU'...'í.'...'I!..(6.@
01E0 0008 476D C7C4 17CD 6400 000F 0002 FFFF ..GmĉĀ.íd.....'
01F0 FF80 0000 56F6 3001 5BB5 C00A 6F45 0051 'e..Vø0.[µŘ.øE.Q
0200 BF1C 0326 F3B0 191B 79FF FFFF FFFF FFFF ž...&ó°..y'...'
0210 FC00 7C40 010F 8698 FFEF 8840 0080 0F69 ù.|ø..+ 'd'@.e.i
0220 8FFF FFFF FFFE 1FFF FA1F 0D31 FFFF FFFF ž'...'ť.'...'ú..1'...'
00000000 (1:1) I 073 HEX editor Přepisován
```

Template description usually like:

BC30-CLIMAT.pdf - Adobe Reader

Soubor Úpravy Zobrazení Ořezání Nápověda

1 / 18 117%

Nástroje Poznámka

B/C30 - CLIMAT

B/C30 – Regulations for reporting CLIMAT data in TDCF

Amendment: 7 Nov. 2012

TM 307073 - BUFR template for reports of monthly values from a land station suitable for CLIMAT data

3 07 073		Sequence for representation of monthly values suitable for CLIMAT data
	3 07 071	Monthly values from a land station
	3 07 072	Monthly normals for a land station

Monthly values from a land station (data of CLIMAT Sections 0, 1, 3 and 4)
Sequence BUFR descriptor <3 07 071> expands as shown in the leftmost column below.

3 01 090			Fixed surface station identification, time, horizontal and vertical coordinates	Unit, scale
	3 01 004		Surface station identification	
		0 01 001	WMO block number	Numeric, 0
		0 01 002	WMO station number	Numeric, 0
		0 01 015	Station or site name	CCITT IA5, 0
		0 02 001	Type of station	Code table, 0
	3 01 011	0 04 001	Year ⁽¹⁾	Year, 0
		0 04 002	Month ⁽¹⁾	Month, 0
		0 04 003	Day (= 1) ⁽¹⁾	Day, 0
	3 01 012	0 04 004	Hour (= 0) ⁽¹⁾	Hour, 0
		0 04 005	Minute (= 0) ⁽¹⁾	Minute, 0
	3 01 021	0 05 001	Latitude (high accuracy)	Degree, 5

Decoding - decoding method SYNOP

- Bufr decoding method

Decode params

Method: BUFR Mask: *.bin

Input Directory: /clidata/bufr-test

Output Directory: /clidata/bufr-test

Archive Directory: /clidata/bufr-test/ARCHIVE

Log Directory: /clidata/bufr-test/LOG

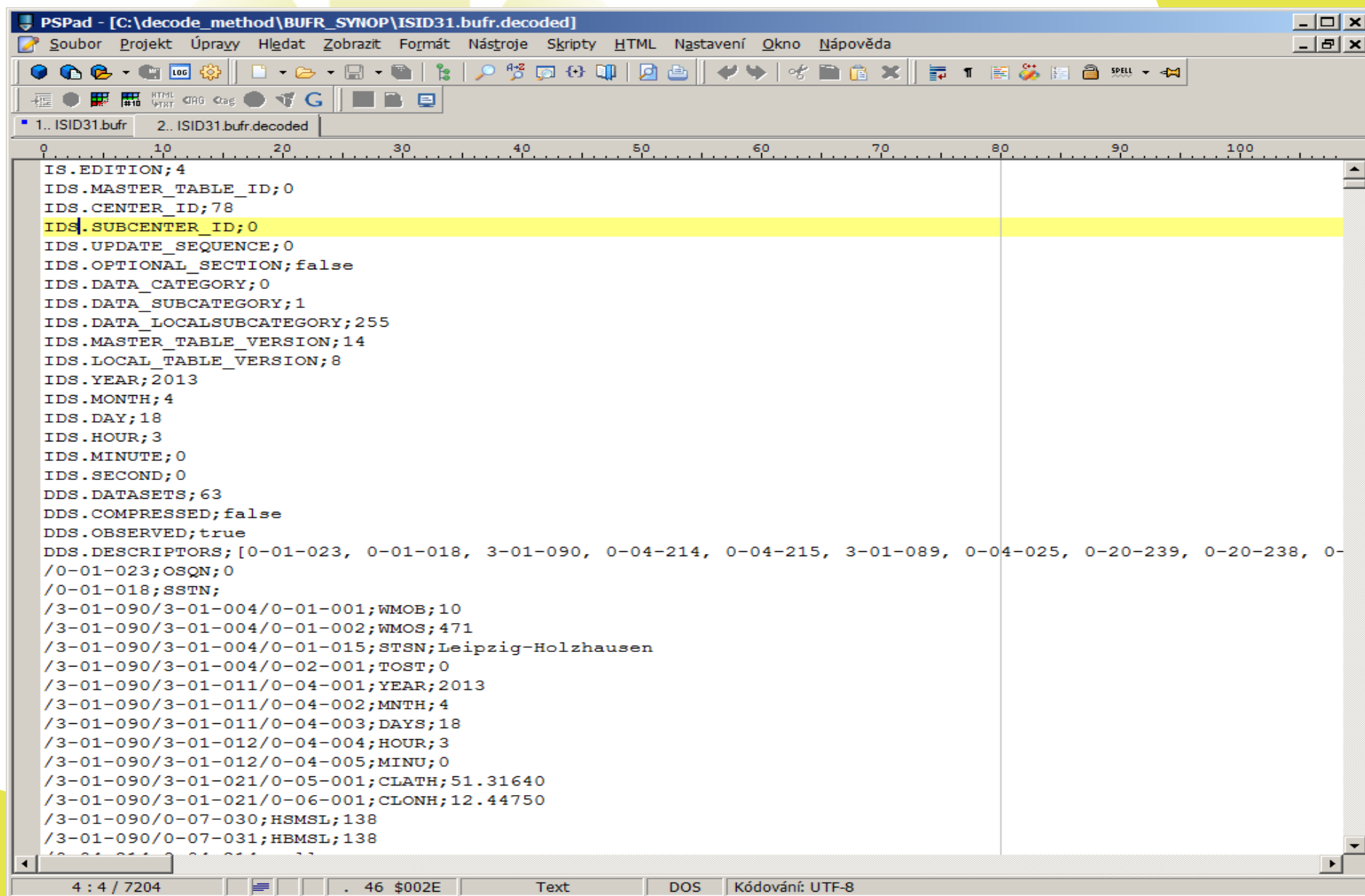
Additional Param: NOT USED

Interval: 10/1440

Ok Cancel

- Decode all BUFRs for which “BUFR tables exists”
- Reference WMO tables
- Local table Problem

Decoding - Decoded file



The image shows a screenshot of the PSPad text editor. The title bar reads "PSPad - [C:\decode_method\BUFR_SYNOP\ISID31.bufr.decoded]". The menu bar includes "Soubor", "Projekt", "Úpravy", "Hledat", "Zobrazit", "Formát", "Nástroje", "Skripty", "HTML", "Nastavení", "Okno", and "Nápověda". The toolbar contains various icons for file operations and editing. The main text area displays a list of metadata fields for a BUFR file, with the line "IDS.SUBCENTER_ID;0" highlighted in yellow. The status bar at the bottom shows "4 : 4 / 7204", ". 46 \$002E", "Text", "DOS", and "Kódování: UTF-8".

```
IS. EDITION; 4
IDS. MASTER_TABLE_ID; 0
IDS. CENTER_ID; 78
IDS. SUBCENTER_ID; 0
IDS. UPDATE_SEQUENCE; 0
IDS. OPTIONAL_SECTION; false
IDS. DATA_CATEGORY; 0
IDS. DATA_SUBCATEGORY; 1
IDS. DATA_LOCALSUBCATEGORY; 255
IDS. MASTER_TABLE_VERSION; 14
IDS. LOCAL_TABLE_VERSION; 8
IDS. YEAR; 2013
IDS. MONTH; 4
IDS. DAY; 18
IDS. HOUR; 3
IDS. MINUTE; 0
IDS. SECOND; 0
DDS. DATASETS; 63
DDS. COMPRESSED; false
DDS. OBSERVED; true
DDS. DESCRIPTORS; [0-01-023, 0-01-018, 3-01-090, 0-04-214, 0-04-215, 3-01-089, 0-04-025, 0-20-239, 0-20-238, 0-
/0-01-023; OSQN; 0
/0-01-018; SSTN;
/3-01-090/3-01-004/0-01-001; WMOB; 10
/3-01-090/3-01-004/0-01-002; WMOS; 471
/3-01-090/3-01-004/0-01-015; STSN; Leipzig-Holzhausen
/3-01-090/3-01-004/0-02-001; TOST; 0
/3-01-090/3-01-011/0-04-001; YEAR; 2013
/3-01-090/3-01-011/0-04-002; MNTH; 4
/3-01-090/3-01-011/0-04-003; DAYS; 18
/3-01-090/3-01-012/0-04-004; HOUR; 3
/3-01-090/3-01-012/0-04-005; MINU; 0
/3-01-090/3-01-021/0-05-001; CLATH; 51.31640
/3-01-090/3-01-021/0-06-001; CLONH; 12.44750
/3-01-090/0-07-030; HSMSL; 138
/3-01-090/0-07-031; HBMSL; 138
```


Decoding - DATA in datasets

```
/3-01-090/3-01-004/0-01-001;WMOB;10
/3-01-090/3-01-004/0-01-002;WMOB;471
/3-01-090/3-01-004/0-01-015;STATION;Leipzig-Holzhausen
/3-01-090/3-01-004/0-02-001;TEMP;0
/3-01-090/3-01-011/0-04-001;YEAR;1990
/3-01-090/3-01-011/0-04-002;MNTH;4
/3-01-090/3-01-011/0-04-003;DAYS;18
/3-01-090/3-01-012/0-04-004;HOUR;12
/3-01-090/3-01-012/0-04-005;MINU;12
/3-01-090/3-01-021/0-05-001;CLATH;0.31640
/3-01-090/3-01-021/0-06-001;CLONH;750
```

The diagram illustrates the structure of a dataset descriptor. It shows a list of descriptors, each consisting of a path (e.g., /3-01-090/3-01-004/0-01-001) followed by a descriptor name and a value. Three blue arrows point to specific parts of the descriptors: one points to the path (labeled 'DESCRIPTOR'), one points to the descriptor name (labeled 'ELEMENT'), and one points to the value (labeled 'VALUE').

- User must know how to interpret descriptors
- The unit for value is connected with descriptor
- Defined in WMO Tables

Decoding - Bufr Table B - specification of descriptors

#	F-XX-YYY	SCALE	REFERENCE VALUE	BIT WIDTH	UNIT	MNEMONIC	DESC ; CODE ;	ELEMENT NAME
	0-00-001	0	0	24	CCITT IA5	TABLAE	; ;	Table A: entry
	0-00-002	0	0	256	CCITT IA5	TABLAD1	; ;	Table A: data ca
	0-00-003	0	0	256	CCITT IA5	TABLAD2	; ;	Table A: data ca
	0-00-004	0	0	16	CCITT IA5	MTABL	; ;	BUFR/CREX Master
	0-00-005	0	0	24	CCITT IA5	BUFREDN	; ;	BUFR Edition num
	0-00-006	0	0	16	CCITT IA5	BMTVN	; ;	BUFR Master tabl
	0-00-007	0	0	16	CCITT IA5	CMTVN	; ;	CREX Master tabl
	0-00-008	0	0	16	CCITT IA5	BLTVN	; ;	BUFR Local table
	0-00-010	0	0	8	CCITT IA5	FDESC	; ;	F descriptor to
	0-00-011	0	0	16	CCITT IA5	XDESC	; ;	X descriptor to
	0-00-012	0	0	24	CCITT IA5	YDESC	; ;	Y Descriptor to
	0-00-013	0	0	256	CCITT IA5	ELEMNA1	; ;	Element name, 13
	0-00-014	0	0	256	CCITT IA5	ELEMNA2	; ;	Element name, 13
	0-00-015	0	0	192	CCITT IA5	UNITSNA	; ;	Units name
	0-00-016	0	0	8	CCITT IA5	SCALESG	; ;	Units scale sign
	0-00-017	0	0	24	CCITT IA5	SCALEU	; ;	Units scale
	0-00-018	0	0	8	CCITT IA5	REFERSG	; ;	Units reference
	0-00-019	0	0	80	CCITT IA5	REFERVA	; ;	Units reference
	0-00-020	0	0	24	CCITT IA5	ELEMDWD	; ;	Element data wid
	0-00-030	0	0	48	CCITT IA5	DDSEQ	; ;	Descriptor defir
	0-01-001	0	0	7	Numeric	WMOB	; ;	WMO block number

Decoding - Bufr Table D - descriptor groups

```
#####  
# F-XX-YYY | MNEMONIC ;DCOD ; NAME <-- sequence definition  
# | F-XX-YYY > | NAME <-- element definition (fir  
# | F-XX-YYY | NAME <-- element definition (las  
#####  
  
3-00-002 | TABLACAT ; ; Table A category definition  
| 0-00-002 > | Table A category, line 1  
| 0-00-003 | Table A category, line 2  
  
3-00-003 | FXYDESCR ; ; FXY descriptor  
| 0-00-010 > | F, part descriptor  
| 0-00-011 > | X, part descriptor  
| 0-00-012 | Y, part descriptor  
  
3-00-004 | ELUNSCRW ; ; Table B element definition  
| 3-00-003 > | Table B descriptor to be defined  
| 0-00-013 > | Element name, line 1  
| 0-00-014 > | Element name, line 2  
| 0-00-015 > | Units name  
| 0-00-016 > | Units scale sign  
| 0-00-017 > | Units scale sign
```

Import method - BUFR SYNOP

Form Table Parameters

Method: Target Table:

End of Record Type: Missing Value Type: Decimal Character: Save

Value Separator: Load

Description:

Ord Nr.	Item	Required	Required part	Datetime mask	Convert	Length	Action
9000	<&IGNORE>	<input type="checkbox"/>	/3-07-08_/3-01-090/3-01-012/0-04-...				
10000	<&IGNORE>	<input type="checkbox"/>	/3-07-08_/3-01-090/3-01-021/0-05-...				
11000	<&IGNORE>	<input type="checkbox"/>	/3-07-08_/3-01-090/3-01-021/0-06-...				
12000	<&IGNORE>	<input type="checkbox"/>	/3-07-08_/3-01-090/0-07-030%				
13000	<&IGNORE>	<input type="checkbox"/>	/3-07-08_/3-01-090/0-07-031%				
14000	<42&IGNORE><\$B-PP>	<input type="checkbox"/>	/3-07-08_/3-02-031/3-02-001/0-10-...				VALUE*.01
15000	<42&IGNORE><\$B-P>	<input type="checkbox"/>	/3-07-08_/3-02-031/3-02-001/0-10-...				VALUE*.01
16000	<42&IGNORE><\$B-PPP>	<input type="checkbox"/>	/3-07-08_/3-02-031/3-02-001/0-10-...				VALUE*.01
17000	<42&IGNORE><&FLAG_PREV>	<input type="checkbox"/>	/3-07-08_/3-02-031/3-02-001/0-10-...				DECODE('VALUE','15',...
18000	<33&IGNORE><\$B-P24>	<input type="checkbox"/>	/3-07-08_/3-02-031/0-10-062%				
19000	<33&IGNORE><&CONDITION>	<input type="checkbox"/>	/3-07-08_/3-02-031/0-07-004%				
20000	<34&IGNORE><&VALUE>	<input type="checkbox"/>	/3-07-08_/3-02-031/0-10-009%				
21000	<43&IGNORE><&IGNORE>	<input type="checkbox"/>	/3-07-08_/3-02-035/3-02-032/0-07-...				
22000	<42&IGNORE><\$B-T>	<input type="checkbox"/>	/3-07-08_/3-02-035/3-02-032/0-12-...				kw_bufr_fnc.Kelvin_to...
23000	<42&IGNORE><\$B-Td>	<input type="checkbox"/>	/3-07-08_/3-02-035/3-02-032/0-12-...				kw_bufr_fnc.Kelvin_to...
24000	<42&IGNORE><\$B-U>	<input type="checkbox"/>	/3-07-08_/3-02-035/3-02-032/0-13-...				
25000	<42&IGNORE><&IGNORE>	<input type="checkbox"/>	/3-07-08_/3-02-035/3-02-032/0-07-...				

Ord Nr.	Condition Type	Sign	Value	Action	Element	Continue
10	(3)Value=0,Flag=Action	<	0	T		<input type="checkbox"/>

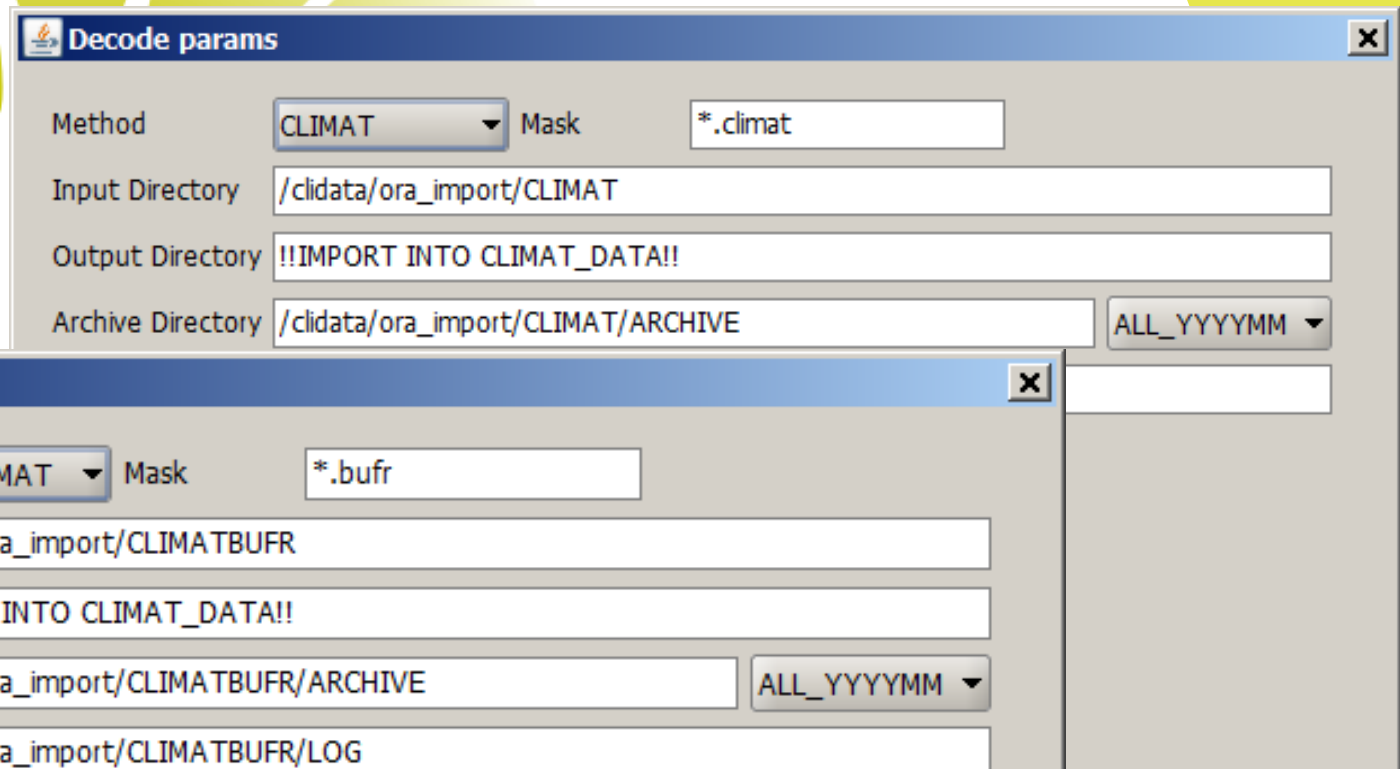
BUFR CLIMAT

- Wmo stations, WMO ID
- Monthly data
- Imported directly into CLIMAT_GEOGRAPHY, CLIMAT_DATA tables

Region: EUROPE Country: GERMANY Year: 2013 Month: 4										
Wmo Id	Name	Latitude	Longitude	Elevation	P0	P	T	T Std	Tx	Tx Type
10756	Feuchtwangen-Heilbro	49.16330	10.36720	475.1	959.0	1015.6	8.0	5.2	12.6	
10761	Weissenburg	49.02030	10.96170	422.0	965.3	1015.6	9.3	5.5	14.1	
10777	Gelbelsee	48.94890	11.43000	536.0	952.0	1015.6	8.3	5.5	12.7	
10782	Waldmuenchen	49.39220	12.68530	498.8	956.5	1015.9	7.3	5.0	12.1	
10796	Zwiesel	49.02920	13.24030	615.0	943.1	1015.9	7.2	5.1	12.6	
10803	Freiburg	48.02420	7.83530	236.3	986.8	1015.3	10.5	4.5	15.3	
10818	Klippeneck	48.10640	8.75580	973.4	902.4		5.8	5.9	9.8	
10838	Ulm	48.38470	9.95390	566.8	948.2	1015.5	8.3	5.4	12.6	
10850	Harburg	48.79280	10.70750	501.9	956.0	1015.6	8.3	5.4	12.8	
10863	Weihenstephan-Duern	48.40330	11.69580	477.1	958.8	1015.6	8.6	5.0	13.4	
10865	Muenchen-Stadt	48.16420	11.54420	515.2	953.5	1015.4	9.7	5.5	14.1	
10872	Gottfrieding	48.66060	12.54030	350.4	973.8	1015.7	9.2	5.0	14.8	
10875	Muehldorf	48.28000	12.50390	405.6	967.3	1015.7	9.0	4.8	14.3	
10945	Leutkirch-Herlazhofe	47.79640	10.03360	671.7	936.5	1015.7	7.4	4.9	11.9	
10963	Garmisch-Partenkirch	47.48390	11.06360	719.0	931.2	1015.4	7.9	5.0	13.6	
10982	Chieming	47.88530	12.54190	551.2	950.4	1015.6	8.5	5.3	13.0	
10015	Helgoland	54.17640	7.89310	4.0	1014.6	1015.6	5.1	1.9	7.4	
10020	List auf Sylt	55.01110	8.41250	26.0	1012.0	1015.3	5.3	2.4	9.0	
10035	Schleswig	54.52890	9.54940	43.0	1009.7	1015.6	6.3	3.9	11.0	
10046	Kiel-Holtenau	54.37610	10.14330	27.0						
10055	Fehmarn	54.52970	11.06190	3.0	1014.7	1015.8	6.0	3.3	9.6	
10147	Hamburg-Fuhlsbuettel	53.63500	9.99000	11.0	1014.1	1015.9	7.6	4.6	12.4	
10162	Schwerin	53.64250	11.38720	59.0	1007.7	1015.0	7.5	4.7	12.2	
10184	Greifswald	54.09780	13.40750	2.0	1015.3	1016.1	7.3	4.7	11.4	
10200	Frankfurt	50.10910	8.78060	100.0	1015.0	1015.4	7.0	4.0	10.1	

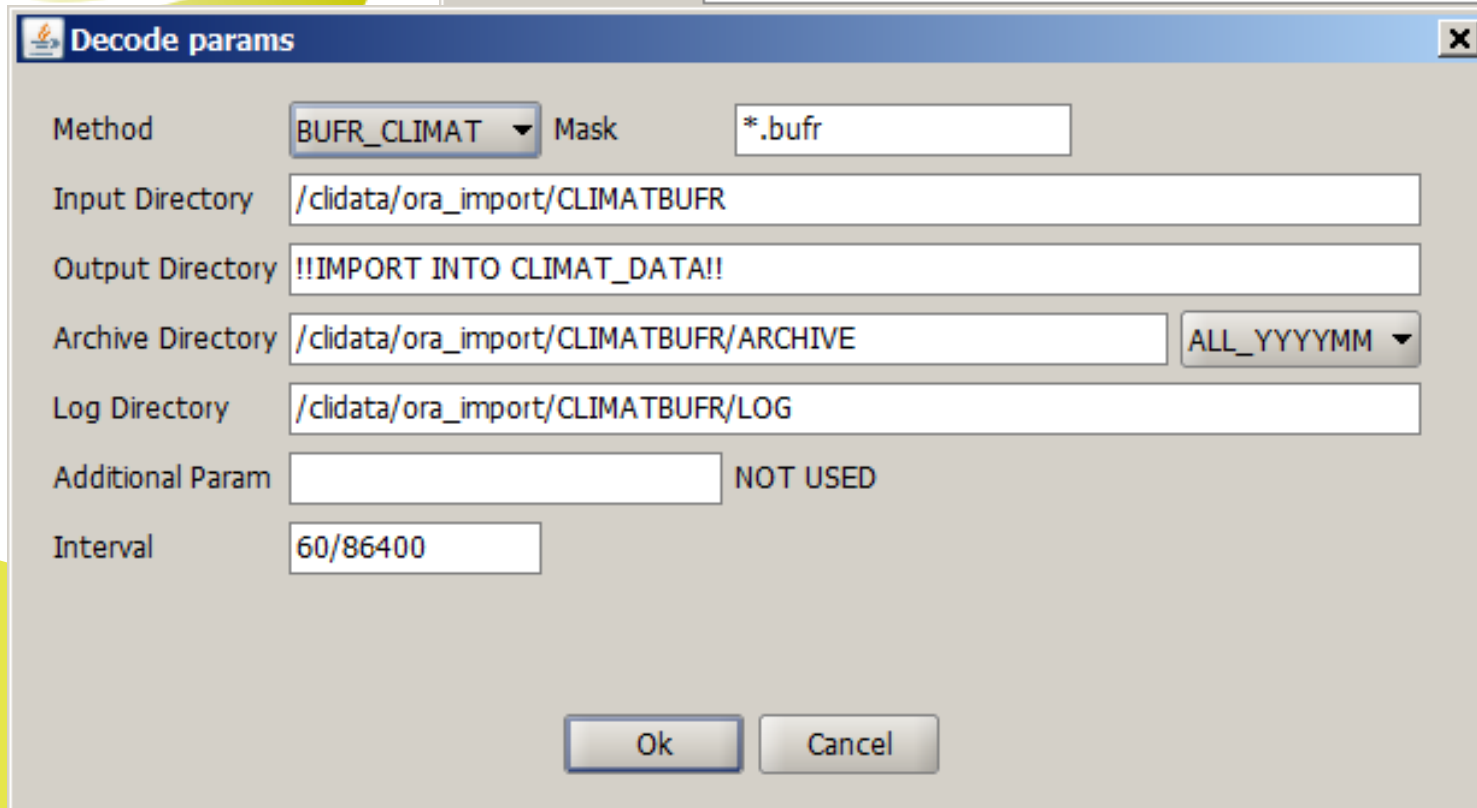
DECODE method - BUFR CLIMAT

- Special decode method, not need to have import method



The screenshot shows a 'Decode params' dialog box with the following fields:

- Method: CLIMAT (dropdown)
- Mask: *.climat (text box)
- Input Directory: /clidata/ora_import/CLIMAT (text box)
- Output Directory: !!IMPORT INTO CLIMAT_DATA!! (text box)
- Archive Directory: /clidata/ora_import/CLIMAT/ARCHIVE (text box)
- Archive Format: ALL_YYYYMM (dropdown)



The screenshot shows a 'Decode params' dialog box with the following fields:

- Method: BUFR_CLIMAT (dropdown)
- Mask: *.bufr (text box)
- Input Directory: /clidata/ora_import/CLIMATBUFR (text box)
- Output Directory: !!IMPORT INTO CLIMAT_DATA!! (text box)
- Archive Directory: /clidata/ora_import/CLIMATBUFR/ARCHIVE (text box)
- Archive Format: ALL_YYYYMM (dropdown)
- Log Directory: /clidata/ora_import/CLIMATBUFR/LOG (text box)
- Additional Param: (text box) NOT USED
- Interval: 60/86400 (text box)

Buttons: Ok, Cancel

ENCODE BUFR – SYNOP, CLIMAT

- Generate text File
- Create binary BUFR file
- Definition consist of:
 - Variable list
 - BUFR Template file
 - BUFR generator file
 - Encode JOB

ENCODE BUFR - Variable list

- Definition of all data sources for selecting data into BUFR
- Defined in CSV format, UTF-8, comma delimited
- Possible sources:
- RDATA_N, RDATA_R, MDATA,MDATA_COUNT,NDATA

```
'#DT, set in UTC!!!',,,,,,  
'#RESULT:YEAR,MONTH,DAY,HOURL,MINUTE,SECOND,MONTH_DAYS',,,,,,  
,,,,,  
#TYPE_TIME,,,,,  
#RESULT:TIME_DISTANCE(UTC-LST),,,,,,  
#ID,DEFAULT,,,,,  
TYPE_TIME.TIME_DISPLACEMENT,-1,,,,,  
,,,,,  
#GEOGRAPHY,,,,,  
'#RESULT: ALL COLUMNS,COUNT(pocet radku)',,,,,,  
,,,,,  
#RDATA,,,,,  
#SUBSTITUTION: MORE LINES WITH SAME ID,,,,,  
'#RESULT:VALUE,HEIGHT(vyska nad zemi v m),TIME(HOURS),INSTRUMENT(pristroj)',,,,,,  
#ID,REF,ELEMENT,REGULAR(Y/N),TIME,SHIFT,HEIGHT,TIME,INSTRUMENT,Desc  
RDATA.P0,,P,Y,XX:XX,'0,-60,-120,-180,-1440',,,,Pressure  
RDATA.P,,P_hm,Y,XX:XX,0,,,Pressure sea lev  
RDATA.G,RDATA.G1,S-G925,Y,XX:XX,0,,,Geopotential height  
RDATA.G1,RDATA.G2,S-G850,Y,XX:XX,0,,,  
RDATA.G2,,S-G700,Y,XX:XX,0,,,  
RDATA.T,,T,Y,XX:XX,0,Y,,,Temperature  
RDATA.TD,,Td,Y,XX:XX,0,,,Dew point temperature  
RDATA.RH,,H,Y,XX:XX,0,,,Relative humidity  
RDATA.V,,S-VV,Y,XX:XX,0,Y,,,Visibility  
RDATA.R1,,SRA1H,Y,XX:XX,0,Y,,,Precipitation 1 Hour
```

- Better to view in Excel (Open Office)

ENCODE BUFR - Variable list

variables.csv - LibreOffice Calc

Soubor Úpravy Zobrazit Vložit Formát Nástroje Data Okno Nápověda

Arial 10

H10

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	#DT, set in UTC!!!												
2	#RESULT:YEAR,MONTH,DAY,HOUR,MINUTE,SECOND,MONTH_DAYS												
3													
4	#TYPE_TIME												
5	#RESULT:TIME_DISTANCE(UTC-LST)												
6	#ID	DEFAULT											
7	TYPE_TIME	-1											
8													
9	#GEOGRAPHY												
10	#RESULT: ALL COLUMNS,COUNT(<u>pocet radku</u>)												
11													
12													
13	#RDATA												
14	#SUBSTITUTION: MORE LINES WITH SAME ID												
15	#RESULT:VALUE,HEIGHT(<u>vyška nad zemí v m</u>),TIME(HOURS),INSTRUMENT(<u>pristroj</u>)												
16	#ID	REF	ELEMENT	REGULAR	TIME	SHIFT	HEIGHT	TIME	INSTRUMENT	Desc			
17	RDATA.P0		P	Y	XX:XX	0,-60,-120,-180,-1440				Pressure			
18	RDATA.P		P_hm	Y	XX:XX		0			Pressure sea lev			
19	RDATA.G	RDATA.G1	S-G925	Y	XX:XX		0			Geopotential height			
20	RDATA.G1	RDATA.G2	S-G850	Y	XX:XX		0						
21	RDATA.G2		S-G700	Y	XX:XX		0						
22	RDATA.T		T	Y	XX:XX		0 Y			Temperature			
23	RDATA.TD		Td	Y	XX:XX		0			Dew point temperature			
24	RDATA.RH		H	Y	XX:XX		0			Relative humidity			
25	RDATA.V		S-VV	Y	XX:XX		0 Y			Visibility			
26	RDATA.R1		SRA1H	Y	XX:XX		0 Y			Precipitation 1 Hour			
27	RDATA.R24		SRA	N	07:00		-1440			Precipitation 24 Hour			
28	RDATA.N		S-N	Y	XX:XX		0			Cloud cover (total)			
29	RDATA.CLAM1		CT1M	Y	XX:XX		0			Cloud Amount Low			
30	RDATA.CLAM2		CT2M	Y	XX:XX		0			Cloud Amount Mid			
31	RDATA.CLAM3		CT3M	Y	XX:XX		0			Cloud Amount High			
32	RDATA.HOCB1		CT1H	Y	XX:XX		0			Base Low			
33	RDATA.HOCB2		CT2H	Y	XX:XX		0			Base Mid			
34	RDATA.HOCB3		CT3H	Y	XX:XX		0			Base High			
35	RDATA.CLTP1		S-C1	Y	XX:XX		0			Type Low			
36	RDATA.CLTP2		S-C2	Y	XX:XX		0			Type Mid			

List1

Najít

List 1 / 1 Výchozí Součet=0 100%

ENCODE BUFR – Possible data sources definition:

RDATA.X.VALUE daily value

RDATA.X.VALUE.-60 daily value 60 minutes before

RDATA.X.FLAG flag

RDATA.X.FLAG.-60 flag 60 minutes before

RDATA.X.HEIGHT ... height of the instrument measuring X

RDATA.X.TIME ... time of X observation in hours

RDATA.X.INSTRUMENT ... instrument name

GEOGRAPHY.COUNT ... number of datasets (stations)

GEOGRAPHY.? ... any attribute from GEOGRAPHY table (E.g. GEOGRAPH.WMO_ID is wmo id)

MDATA.X.VALUE ... monthly value

MDATA.X.FLAG ... monthly value flag (1 .. more occurrence, 0 one occurrence)

ENCODE BUFR – Possible data sources definition:

MDATA.X.DAY ... day of occurrence of maximum or minimum

MDATA.X.QUINTILE ... kvintil of X

MDATA.R.MISS .. number of missing values in month

MDATA_COUNT.X ... number of values in month satisfying some condition

NDATA.X.VALUE ... value of normal

NDATA.X.HEIGHT ... height of the instrument measuring X

TYPE_TIME.TIME_DISTANCE ... difference between GMT and local time

NDATA.X.STD_DEV ... standard deviation of X element

NDATA_PERIOD.FROM period of for normal

NDATA_PERIOD.TO

ENCODE BUFR - Template

- Definition of BUFR file structure in readable format, available for BUFR SYNOP and CLIMAT message
- Use Variables in {SOURCE.ATTR} format, link to Variable list file

```
#HEADER
IS.EDITION;4
IS.MASTER_TABLE_ID;0
IS.CENTER_ID;0
IS.SUBCENTER_ID;0
IS.UPDATE_SEQUENCE;0
IS.OPTIONAL_SECTION;false
IS.DATA_CATEGORY;0
IS.DATA_SUBCATEGORY;20
IS.DATA_LOCALSUBCATEGORY;0
IS.MASTER_TABLE_VERSION;13
IS.LOCAL_TABLE_VERSION;0
IS.YEAR;{DT.YYYY}
IS.MONTH;{DT.MM}
IS.DAY;1
IS.HOUR;0
IS.MINUTE;0
IS.SECOND;0
DDS.DATASETS;{GEOGRAPHY.COUNT}
DDS.COMPRESSED;false
DDS.OBSERVED;true
DDS.DEScriptors;[3-07-073]
#DATA
/3-07-073/3-07-071/3-01-090/3-01-004/0-01-001;WMOB;{substr({GEOGRAPHY.WMO_ID},1,2)}
/3-07-073/3-07-071/3-01-090/3-01-004/0-01-002;WMOS;{substr({GEOGRAPHY.WMO_ID},3,3)}
/3-07-073/3-07-071/3-01-090/3-01-004/0-01-015;STSN;{nvl(substr({GEOGRAPHY.WMO_NAME},1,20),substr(upper({GEO
/3-07-073/3-07-071/3-01-090/3-01-004/0-02-001;TOST;{decode(substr({GEOGRAPHY.STATION_TYPE},1,1),'A',0,'M',1
/3-07-073/3-07-071/3-01-090/3-01-011/0-04-001;YEAR;{DT.YYYY}
/3-07-073/3-07-071/3-01-090/3-01-011/0-04-002;MNTN;{DT.MM}
/3-07-073/3-07-071/3-01-090/3-01-011/0-04-003;DAYS;1
/3-07-073/3-07-071/3-01-090/3-01-012/0-04-004;HOUR;0
/3-07-073/3-07-071/3-01-090/3-01-012/0-04-005;MINUTE;0
```

ENCODE BUFR – Generator File

- Definition of procedure to build BUFR message
- Available for CLIMAT and SYNOP

```
parameters='GH_ID, YEAR, MONTH'  
executeCommand='begin kw_report.getBufr('C:\encode_method\BUFR_CLIMAT\CFG\variables.csv', 'C:\encode_me  
outputFile='{YEAR}-{MONTH}.bufr'
```

- Definition of input parameters
 - Synop: gh_id, year, month, day, hour
 - Climat: gh_id, year, month
- Execute command
- Output file name

ENCODE BUFR – To generate BUFR manually

- In sql command:
- ```
select kw_report.getMessageFile(
 'C:\encode_method\BUFR_SYNOP\CFG\bufr.txt'
 , 'O1PORU01,2013,01'
 , 'c:\tmp'
) from dual
```
- Definition of:
  - Generator file
  - Input params
  - Output directory
- Returns output filename.

# ENCODE BUFR – To generate BUFR automatically

- Job:

```
kw_report.jobMessageFile(
 thisDate date ... server date
 ,refDate date ... date for data
 ,intervalMin varchar2 ... interval
 ,configFile varchar2 ... generating file
 ,params varchar2 ... dynamic parameters {YYYY},{MM},{DD},{HH24}
 ,outputDir varchar2 ... output directory
 ,pHostName varchar2,pUserName varchar2,pPassword varchar
 ,deleteAfterSend varchar2);
```

- **Created and Send by FTP**