Weather observing systems Datasets Upgrades

Meteorological Service of Canada

March 2019

Outline

- Dataset specific changes
  - MSC Surface Weather (CA)
  - Legacy Aviation AWOS (RA)
  - NAV CANADA (AWOS & HWOS)
  - Legacy Staffed Aviation (WinIDE)
  - New DND AWOS

Surface Weather (CA) Updates

- Created a new chain called CA 1.1, existing chain is 1.0
- Internal reference
  - Old:
    - msc/observation/atmospheric/surface_weather/ca-1.0-ascii/product_swob-xml-2.0
      - identifiers: /<date time>/<msc identifier>/<station name>/<revision level>
  - New:
    - msc/observation/atmospheric/surface_weather/ca-1.1-ascii/product_generic_swob-xml-2.0
      -
        identifiers: /<date time>/<msc identifier>/<tc identifier>/<revision level>/<content frequency>

Surface Weather (CA) Updates

Old Label (CA 1.0)	New Label (CA 1.1)
avg_wnd_spd_10m_mt50-60	avg_wnd_spd_10m_pst10mts
avg_wnd_dir_10m_mt50-60	avg_wnd_dir_10m_pst10mts
avg_wnd_spd_10m_mt58-60	avg_wnd_spd_10m_pst2mts
avg_wnd_dir_10m_mt58-60	avg_wnd_dir_10m_pst2mts
max_wnd_spd_10m_mt50-60	max_wnd_spd_10m_pst10mts
wnd_dir_10m_mt50-60_max_spd	wnd_dir_10m_pst10mts_max_spd
max_wnd_gst_spd_10m_mt50-60	max_wnd_gst_spd_10m_pst10mts
avg_cum_pcpn_gag_wt_fltrd_55-60	avg_cum_pcpn_gag_wt_fltrd_pst5mts
avg_wnd_spd_pcpn_gag_mt50-60	avg_wnd_spd_pcpn_gag_pst10mts
snw_dpth	avg_snw_dpth_pst5mts
snw_dpth_#	avg_snw_dpth_pst5mts_#

Surface Weather (CA) Updates

New additions:

- Province (prov)
- Data provider (data_pvdr): ability to distinguish between MSC's and NAV CANADA stations
- Multi-sensor values (such as air_temp_#; max_air_temp_pst1hr_#; min_air_temp_pst1hr_#; avg_cum_pcpn_gag_wt_fltrd_pst5mts_#; avg_snw_dpth_pst5mts_#, avg_wnd_spd_10m_pst10mts_# etc.) for instruments with redundancy
- 3-hour precipitation amount (derivation)
- Wet-bulb temperature (wetblb_temp)

Legacy AWOS (RA) Updates

- Creating a new chain called RA 1.1, existing chain is 1.0
- Internal reference:
  - Old:
    - /msc/observation/atmospheric/surface_weather/ra-1.0-ascii/product_swob-xml-2.0
      - identifiers: /<date time>/<msc identifier>/<station name>/<revision level>
  - New:
    - /msc/observation/atmospheric/surface_weather/ra-1.1-ascii/product_generic_swob-xml-2.0
      - identifiers: /<date time>/<msc identifier>/<tc identifier>/<revision level>/<content frequency>

Legacy AWOS (RA) Updates

Old Label (RA 1.0)	New Label (RA 1.1)
max_vis_mt50-60	max_vis_pst10mts
min_vis_mt50-60	min_vis_pst10mts
avg_wnd_spd_10m_mt50-60	avg_wnd_spd_10m_pst10mts
avg_wnd_dir_10m_mt50-60	avg_wnd_dir_10m_pst10mts
avg_wnd_spd_10m_mt58-60	avg_wnd_spd_10m_pst2mts
avg_wnd_dir_10m_mt58-60	avg_wnd_dir_10m_pst2mts
max_wnd_gst_spd_10m_mt50-60	max_wnd_gst_spd_10m_pst10mts
prsnt_wx	prsnt_wx_1

- Added the following elements:
  - Time of peak wind: max_pk_wnd_tm_pst1hr
  - Type of peak wind: max_pk_wnd_typ_pst1hr

NAV CANADA AWOS Updates

- New chain 2.1, existing chain is 2.0
- Internal reference:
  - Old:
    - /nav_canada/observation/atmospheric/surface_weather/awos-2.0-binary/product_swob-xml-2.0
      - identifiers: /<date time>/<msc identifier>/<station name>/<revision level>
  - New:
    - /nav_canada/observation/atmospheric/surface_weather/awos-2.1-binary/product_generic_swob-xml-2.0
      - identifiers: /<date time>/<msc identifier>/<tc identifier>/<revision level>/<content frequency>

NAV CANADA AWOS Updates

Old Label (NC AWOS 2.0)	New Label (NC AWOS 2.1)
vis	avg_vis_pst10mts
max_vis_mt50-60	max_vis_pst10mts
min_vis_mt50-60	min_vis_pst10mts
avg_wnd_spd_10m_mt50-60	avg_wnd_spd_10m_pst10mts
avg_wnd_dir_10m_mt50-60	avg_wnd_dir_10m_pst10mts
avg_wnd_spd_10m_mt58-60	avg_wnd_spd_10m_pst2mts
avg_wnd_dir_10m_mt58-60	avg_wnd_dir_10m_pst2mts
max_wnd_gst_spd_10m_mt50-60	max_wnd_gst_spd_10m_pst10mts

- Added the following elements:
  - Time of peak wind: max_pk_wnd_tm_pst1hr
  - Type of peak wind: max_pk_wnd_typ_pst1hr

NAV CANADA HWOS Updates

- New chain is 1.1, existing is 1.0
- Internal reference:
  - Old:
    - /nav_canada/observation/atmospheric/surface_weather/hwos-1.0-binary/product_swob-xml-2.0
      - identifiers: /<date time>/<msc identifier>/<station name>/<revision level>
  - New:
    - /nav_canada/observation/atmospheric/surface_weather/hwos-1.1-binary/product_generic_swob-xml-2.0
      - identifiers: /<date time>/<msc identifier>/<tc identifier>/<revision level>/<content frequency>

NAV CANADA HWOS Updates

Old Label (NC HWOS 1.0)	New Label (NC HWOS 1.1)
avg_wnd_spd_10m_mt50-60	avg_wnd_spd_10m_pst10mts
avg_wnd_dir_10m_mt50-60	avg_wnd_dir_10m_pst10mts
avg_wnd_spd_10m_mt58-60	avg_wnd_spd_10m_pst2mts
avg_wnd_dir_10m_mt58-60	avg_wnd_dir_10m_pst2mts
max_wnd_gst_spd_10m_mt50-60	max_wnd_gst_spd_10m_pst10mts

- Element rmk does not have qa_summary flag
- Added the following elements:
  - Time of peak wind: max_pk_wnd_tm_pst24hrs
  - Type of peak wind: max_pk_wnd_typ_pst24hrs

Legacy Staffed Aviation (WinIDE) Updates

- New chain is WinIDE-FM12, existing chain is WinIDE-1.0
- Internal reference
  - Old:
    - /msc/observation/atmospheric/surface_weather/winide-1.0-binary/product_swob-xml-2.0
      - identifiers: /<date time>/<msc identifier>/<station name>/<revision level>
  - New:
    - /msc/observation/atmospheric/surface_weather/winide_fm12-1.0-xml/product_generic_swob-xml-2.0
      - identifiers: /<date time>/<msc identifier>/<tc identifier>/<revision level>/<content frequency>

Legacy Staffed Aviation (WinIDE) Updates

Old Label (WinIDE 1.0)	New Label (WinIDE _FM12 1.0)
avg_wnd_spd_10m_mt58-60	avg_wnd_spd_10m_pst2mts
avg_wnd_dir_10m_mt58-60	avg_wnd_dir_10m_pst2mts
max_wnd_gst_spd_10m_mt50-60	max_wnd_gst_spd_10m_pst10mts
wnd_gst_char_10m_mt50-60	wnd_gst_char_10m_pst10mts
cld_cvr_#	cld_amt_code_#

- Elements cld_opcty_# and clg_hgt do not have qa_summary flags

Legacy Staffed Aviation (WinIDE) Updates

- Due to the switch of labels from cld_cvr_# to cld_amt_code_#, there is an inconsistency between the value reported in the SWOB and its code table.
  - Although the following is in the SWOB (code type = total_cloud_amount, code-src = std_code_src):

```
</element>
- <element name="cld_amt_code_1" value="4" uom="code" code-type="total_cloud_amount" code-src="std_code_src">
    <qualifier name="qa_summary" value="100" uom="unitless"/>
```

  - The value shown in the SWOB (e.g. 4 above) corresponds to the INCOMING code table (code-type = 020206, code-src = local_bufr) and NOT the one indicated in the SWOB (total_cloud_amount)

- This is a known issue with the new generic SWOB and will be resolved in a next release, planned for February 2019 (exact date to come).

Legacy Staffed Aviation (WinIDE) Updates

- Until the issue is resolved in early 2019, users evaluating the new generic SWOB will need to look at the following code table to determine what the SWOB value means

CODE SRC	CODE TYPE	VALUE	**Text Value**	DESCRIPTION
local_bufr	020206	0	CLR	Clear - The sky condition when no cloud or obscuring phenomena are present
		1	-SCT	Thin scattered
		2	SCT	Scattered - a layer aloft with a summation opacity of 4/10 to 5/10, inclusive
		3	-BKN	Thin broken
		4		Broken - a layer aloft with a summation opacity of 6/10 - 9/10, inclusive
		5	-OVC	Thin overcast
		6	OVC	Overcast - a layer aloft with a summation amount of 10/10
		7	X	Obscured - a surface-based layer with summation opacity of 10/10
		8	-X	Partially obscured - a surface-based layer with summation opacity of at least 1/10 but less than 10/10
		9	-FEW	Thin few
		10	FEW	Few - a layer aloft with a summation opacity of 3/10 or less

Legacy Staffed Aviation (WinIDE) Updates

- When the issue is resolved in the next the release, elements referencing the code table “total_cloud_amount” will use this table *(see the next slide for the end of the list)*

VALUE	Text Value	DESCRIPTION
0	SKC	Sky clear (cloud amount of 0 octas or 0/10) - Manned or Auto station
1	FEW	FEW - cloud amount of 1 to 2 octas (1/10 to 3/10)
2	SCT	Scattered (SCT) - cloud amount of 3 to 4 octas (cloud coverage of ≤49% for MSC AWOS observations)
3	BKN	Broken (BKN) - cloud amount of 5 to 7 octas (cloud coverage of 50% to 89% for MSC AWOS observations)
4	OVC	Overcast (OVC) - cloud amount of 8 octas (cloud coverage of ≥90% for MSC AWOS observations)
6		Scattered/broken (Many forecasts use scattered/broken or broken/overcast
7		Broken/overcast followed by cloud type(s))
8		Isolated (Used on aviation charts to describe the cloud type Cb)
9		Isolated embedded (Used on aviation charts to describe the cloud type Cb)
10		Occasional (Used on aviation charts to describe the cloud type Cb)
11		Occasional embedded (Used on aviation charts to describe the cloud type Cb)
12		Frequent (Used on aviation charts to describe the cloud type Cb)
13		Dense (Used on aviation charts to describe cloud that would cause sudden changes in visibility (less than 1 000 m))
14		Layers
15		Obscured (OBSC)
16		Embedded (EMBD)
17		Frequent embedded
31	MSNG	missing
32		1 okta or less, but not zero (1/10 or less, but not zero)
33		2 oktas (2/10 - 3/10)
34		3 oktas (4/10)
35		4 oktas (5/10)
36		5 oktas (6/10)
37		6 oktas (7/10 - 8/10)
38		7 oktas or more, but not 8 oktas (9/10 or more, but not 10/10)

Legacy Staffed Aviation (WinIDE) Updates

VALUE	Text Value	DESCRIPTION
39		8 oktas (10/10)
40		Sky obscured by fog and/or other meteorological phenomena
41		Cloud cover is indiscernible for reasons other than for or other meteorological phenomena, or observation is not made
42		Sky Clear reported from manned station.
43	NSC	Nil Significant Cloud (clear below 1500 meters)
44	VV	Obscured Significance
45	CLR	Sky Clear reported from auto station.
46	X	Sky obscured by a surface-based layer of coverage ≥90%
47	-X	Sky partially obscured by a surface-based layer with coverage of <90%
48	CLR BLO 100	No clouds detected below 10000 ft (MSC AWOS)
49		Sky partially obscured by fog and/or other meteorological phenomena
50	NCD	No cloud detected
51	CLR BLO 250	No clouds detected below 25,000 ft (NC-AWOS)
52	CAVOK	Ceiling and Visibility OK
53	NSW	No significant weather
54	-FEW	Thin few
55	-SCT	Thin scattered
56	-BKN	Thin broken
57	-OVC	Thin overcast

New Data Set: DND AWOS

- National Defense is deploying a new generation Automatic Weather Station to replace the legacy system
- New AWOS is a COTS solution, purchased and maintained by DND
- Implementation is scheduled, controlled, and managed by DND
- Official METAR is created by vendor software at source, higher resolution data made available to MSC
- CSFB-DWI encodes data into NC-AWOS BUFR template and makes it available to MSC

New Data Set: DND AWOS

- MSC does not create the METAR from new DND-AWOS; MSC will create best possible SYNO given the data changes
- MSC retains GTS distribution responsibility for METAR and SYNO
- SWOB labels are identical to NC-AWOS 2.1
- Only available in generic SWOB format (not currently publically available on DD)
- Available now on DD.alpha, and will be available operationally on DD public when the transition is complete (April 1, 2019)

Upcoming SWOB Upgrade- data_flag

- In addition to the current qa_summary qualifier, additional (optional) metadata may be attached to SWOB elements if certain flags have been set as part of the data decode and processing chain
- The new qualifier has the name "**data_flag**" and will have code values that correspond to meanings like 'derived', 'Trace', 'Estimated', etc.:

Code	*Text Value*	*Description*
0	reserved	reserved
1	derived	Value has been reformulated or mathematically derived
2	estimate	Reported value received as an estimate
3	adjusted	Reported value the result of an adjustment (e.g. precipitation under catch, extrapolated wind speed to 10m, etc.)
4	incomplete	Incomplete - element derivation contains at least one missing value
5	trace	Trace. Value is zero
6	multiple	More than one occurrence
7	interpolated	Missing inputs interpolated within completeness constraints

Upcoming SWOB Upgrade- data_flag

- If one or more data_flags are attached to an element in the full DMS XML, it will be represented in the SWOB like this:
  - One flag:

```
<element name="mslp" value="1020.8" uom="hPa"/>
        <qualifier code-src="std_code_src" code-type="data_flags" name="data_flag" uom="code" value="1"/>
</element>
```

  - Two flags (note comma-separated list for the value):

```
<element name="tot_precip_pst24hrs" value="0" uom="mm"/>
        <qualifier code-src="std_code_src" code-type="data_flags" name="data_flag" uom="code" value="1,5"/>
</element>
```

- Clients have the option of using the new qualifier or ignoring it
- See new SWOB guide for more details on data_flag