SWS Weather Data Format

1   Background

The Speedwell Weather System (SWS) is a complete software product for the weather risk market and includes:

> -Front Office tools (Pricing, correlation, statistical analysis etc)
> -Middle Office tools (VaR, Credit Risk report etc)
> -Back Office tools
> -Weather Dependency Analysis

SWS is used by clients world wide. These include energy companies, banks, brokers, investment funds and insurance/reinsurance groups.

SWS is an enterprise system hosted by the client. SWS customers therefore operate their own database with their own weather data in it. The historical daily and hourly data are imported directly from data providers through automatic tools:

1. The software automatically connects to the FTP server of the data provider. The client ID, (not Speedwell ID), is provided to connect to the FTP server. A manual mode is also available.

2. The software downloads any files that had not been previously downloaded.

3. The software populates the new sites/locations, if any, and imports the data automatically.

As an open system SWS offers seamless data importation with as multiple data providers.

SWS requires the data file to be formatted in a specific format. The idea is to have one unique format whether the file, formatted as a CSV file, contains multiple sites information, multiple data quality for the same days, etc.

Please find the specification for the SWS weather data import file format in the next section followed by two example files, one for daily and one for hourly data.

2   Fields Specification

COLUMN NAME	DESCRIPTION	MANDATORY
DATE	Date the MEASUREMENT was taken, in American or European format with years expressed with 4 digits. The date format must be unique for all the files provided by the data provider. Examples of valid date format: DD/MM/YYYY MM/DD/YYYY MM-DD-YYYY YYYY-MM-DD (MUST BE MM/DD/YYYY for EarthSat)	Y
HOUR	Hour of the Measure as an integer (between 0 and 23). ONLY FOR HOURLY DATA	N
SRC_ID (RMSID for EarthSat)	Alphanumeric (max length 50 char). This ID is the unique ID of the station specified by the data provider	Y
TYPE (DATATYPE for EarthSat)	Type of the data (integer). Values are: 1 - CLIMATE U or QC1 (NCDC for US), (or EarthSat Edited) 2 - SYNOPTIC U or QC1(NOAA for US), (or EarthSat on going) 3 - RECONSTRUCTED U (data filled and modified by the data provider to reflect instrument changes, etc), or EarthSat CLN/History 5 - SYNOP E or QC2, or EarthSat Preliminary 6 - CLIMATE E or QC2, reserved for EarthSat settlement data for the CME stations 7 - Reconstructed E (data filled and modified by the data provider to reflect instrument changes, etc) with a higher priority than RECONS U., or EarthSat enhanced data.	Y
WMO_NO (WMO for EarthSat)	Station WMO ID (integer)	N
WBAN	Station WBAN ID (integer)	N
COOPID	Station COOPID (integer)	N
NWS	Station NWS ID (alphanumeric - max length 15 char)	N
ICAO	Station ICAO ID (alphanumeric - max length 15 char)	N
TIMEZONE	Text (alphanumeric - max length 15 char)	N
COUNTRY	Alphanumeric Code (max length 50 char) that the data provider uses for the Country	N
STATE	Alphanumeric Code (max length 50 char) that the data provider uses for the State within the Country	N
COUNTY	Alphanumeric Code (max length 50 char) that the data provider uses for the County within the State	N
CITY	Text (alphanumeric - max length 100 char)	N
STN_NAME (STATIONNAME for EarthSat)	Text (alphanumeric - max length 255 char)	N
INFO POSTFIX	Alphanumeric keyword that allows an information column to be specified for a number of weather elements[i] in the same file. When this keyword is applied as a postfix to a weather element column in the file, it gives the expected name for the Info column for this	N

	weather element. E.g. If weather element name is say 'RAIN' and data info column name for it is 'RAIN_INFO', then specify the INFO POSTFIX field as '_INFO'	
QC	Quality control type (integer). See Data comments below	**N**
LAT	Latitude (float) (Positive for North, negative for South). Range is -90 to 90	**N**
LONG	Longitude (float) (positive for East, Negative for West). Range is -180 to 180	**N**
ALT	Altitude (Float)	**N**
HOURLY_RAIN	Hourly Rainfall measure (float). If no data: leave blank or specify "NIL"	**N**
HOURLY_TEMP (HOURLY_TAVG for EarthSat)	Hourly Temperature measure (float). If no data: leave blank or specify "NIL"	**N**
HOURLY_MEAN_WIND	Hourly Wind measure (float). If no data: leave blank or specify "NIL"	**N**
HOURLY_12Z_MSLP	Hourly Pressure measure (float). If no data: leave blank or specify "NIL"	**N**
HOURLY_12Z_REL_HUM	Hourly Humidity measure (float). If no data: leave blank or specify "NIL"	**N**
HOURLY_SUNSHINE	Hourly Sunshine measure (float). If no data: leave blank or specify "NIL"	**N**
DAILY_RAIN (RAIN for EarthSat)	Daily Rainfall measure (float). If no data: leave blank or specify "NIL"	**N**
DAILY_MAX_TEMP (TMAX for EarthSat)	Daily Maximum Temperature measure (float). If no data: leave blank or specify "NIL"	**N**
DAILY_MIN_TEMP (TMIN for EarthSat)	Daily Minimum Temperature measure (float). If no data: leave blank or specify "NIL"	**N**
DAILY_MEAN_WIND (WIND for EarthSat)	Daily Wind measure (float). If no data: leave blank or specify "NIL"	**N**
12Z_MSLP	Daily Pressure measure (float). If no data: leave blank or specify "NIL"	**N**
12Z_REL_HUM	Daily Humidity measure (float). If no data: leave blank or specify "NIL"	**N**

Notes:
- Columns may appear in any order in the data file.
- As a minimum, a data file in this format would have these minimum set of columns (although, as a rule the more optional fields present in the data file, the more useful the data – please see Section 3 *Weather Variables Supported* for a full list of supported fields):

Daily Data: **DATE, SRC_ID, STN_NAME, TYPE**, *A_WEATHER_VARIABLE**[i]
Hourly Data: **DATE, HOUR, SRC_ID, STN_NAME, TYPE**, *A_WEATHER_VARIABLE**

Where *A_WEATHER_VARIABLE** denotes a placeholder for a weather variable column as defined above.

3   Weather Variables Supported

As standard SWS supports the following weather variables:

Carbon Dioxide	Sea Temperature
Cloud Cover	Snow
Dew point	Sun Radiation
Electricity Demand	Sun Spots
Evaporation	Sunshine
Gas Demand	Temp. Wind Chill Adj.
Humidity Ave	Temperature Ave
Humidity Max	Temperature Max
Humidity Min	Temperature Min
Hydro Generation	Visibility
Magnetic	Waves Ave
Ozone	Waves Max
Pressure Ave	Wind Ave
Pressure Max	Wind Max
Pressure Min	Wind Max Gust
Rain	Wind Power
River Flow	

Additionally, SWS users can create new fields at a press of a button.

For each weather variable in the above list, a corresponding column may be present in the data file.

3.1   Data Comments

The hour and date should be local time (the one at the station corresponding to when the measure was taken) but always formatted with the same convention. Eg in the US the date format is MM/DD/YYYY whereas for Europe it is DD/MM/YYYY. It is important that all the files issued have a unique format for the date and hour unrelated to the usual date/hour format of the country where the measures were read. The hour should be integers from 0 to 23, so 0, 1, 2, 3, ..., 23 and not 00, 01, 02, 03, ..., 23. We also require that the date is formatted using a four year digits format. So the following samples are accepted by our system:

```
        DATE          HOUR
        01/01/1900    1
        01/02/1900    1
        01/03/1900    1
        01/04/1900    1

        But this is not acceptable:
        DATE          HOUR
        01/01/00      01:00
        01/02/00      01:30
        01/03-1900    01:00
        01041900      01:00
```

NB: some data provider reports the hour "24". SWS does not recognize this hour which should be hour "0" on the following day.

Dates: Data files should be created with a consistent data format (DD/MM/YYYY, MM/DD/YYYY, YYYY/MM/DD ...). SWS sets a date format as part of the filter for a given data provider so that a European, Japanese or South Africa user can import any provider's data even though the date may not be properly formatted for him. The date separator can be "/", "-", "." or a few other uncommon symbols. SWS then reformats the date for the customer.

The **QC flag** is an integer that uniquely identifies the level of quality control that has been applied to the data. If for example, NCDC and NOAA data is being sent directly the QC will be a blank value. If these values are subject to some form of checking (eg that there is no obvious problem like temperature < -50C or T>50C, or that rainfall values are always positive) then the QC value can be set to 1. If further tests are applied (eg regression against other stations), the QC could be 2.

If there is no data value for a day then no value should appear! Please do not use a -999 or other value in the weather variable column to represent a missing data point. It can be left blank or "NIL" may be entered.

If rain is zero, it must be explicitly stated as such. The absence of rain data will not be interpreted as representing zero rainfall.

Hourly 12z pressure and humidity refer only to the hourly value and the 12z term is irrelevant.

For Hourly Sunshine, SWS can accept any values like:
- 0 or 1 to say not sunny or sunny
- number of sunny minutes
- sunny hour ratio

SWS requires the data provider's unique station identifier (SRC_ID) and we need to have as much information as available concerning WMO, WBAN, COOPID, NWS, ICAO, time zone, etc.

The information for the town must appear in the first row but not necessarily in the succeeding rows except for the Station ID which must be repeated (it is used as a key in the database). The repetition can be avoided if disk space is a matter and compression is not used.

4 Sample files

4.1 Daily data .csv examples

i) Single station:

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	WMO_NO	WBAN	COOPID	NWS	ICAO	TIMEZONE	SRC_ID	CITY	STN_NAME	TYPE	QC	LAT	LONG	ALT	DATE	DAILY_RAIN	DAILY_MAX_TEMP	DAILY_MIN_TEMP	DAILY_MEAN_WIND	12Z_MSLP	12Z_REL_HUM	SUNSHINE
2	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	NIL	8	-5	7	1010	75	3.5
3	3772						7080	LONDON	HEATHROW	2	2	51.483	-0.45	25	01/01/1961	5	7	1	7	995	85	1
4	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	02/01/1961	2.2	6	-2	7	981	79	3
5																						

ii) Multiple Stations

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	WMO_NO	COUNTRY	SRC_ID	CITY	STN_NAME	TYPE	QC	LAT	LONG	ALT	DATE	DAILY_RAIN	DAILY_MAX_TEMP	DAILY_MAX_TEMP_INFO	DAILY_MIN_TEMP	DAILY_MEAN_WIND	12Z_MSLP	12Z_MSLP_INFO	12Z_REL_HUM	SUNSHINE
2	3772		7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	NIL	8		-5	7	1010		75	3.5
3						2	1				01/01/1961	5	7		1	7	995		85	1
4						1					02/01/1961	2.2	6		-2	7	981		79	3
5	7149	F	FRA112		PARIS ORLY	1		48.44	2.4	89	01/01/1961		9	-FO--			1015	-GO--		NIL
6						2					01/01/1961		8.5	-FO--			1010	-GO--		NIL
7						1					02/01/1961		7	-FO--			990	-GO--		NIL
8																				

4.2 Hourly data .csv example

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	WMO_NO	WBAN	COOP ID	NWS	ICAO	TIMEZ ONE	SRC_ID	CITY	STN_NAME	TYPE	QC	LAT	LONG	ALT	DATE	HOUR	HOURLY _RAIN	HOURLY_TEMP	HOURLY _MEAN_ WIND	HOURLY_ 12Z_MSL P	HOURLY _12Z_RE L_HUM	HOURLY_SUN SHINE
2	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	1	NIL	8	7	1010	75	3.5
3	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	2	2.2	6	7	981	79	3
4	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	3	2.2	6	7	981	79	3
5	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	4	2.2	6	7	981	79	3
6	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	5	2.2	6	7	981	79	3
7	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	6	2.2	6	7	981	79	3
8	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	7	2.2	6	7	981	79	3
9	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	8	2.2	6	7	981	79	3
10	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	9	2.2	6	7	981	79	3
11	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	10	2.2	6	7	981	79	3
12	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	11	2.2	6	7	981	79	3
13	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	12	2.2	6	7	981	79	3
14	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	13	2.2	6	7	981	79	3
15	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	14	2.2	6	7	981	79	3
16	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	15	2.2	6	7	981	79	3
17	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	16	2.2	6	7	981	79	3
18	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	17	2.2	6	7	981	79	3
19	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	18	2.2	6	7	981	79	3
20	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	19	2.2	6	7	981	79	3
21	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	20	2.2	6	7	981	79	3
22	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	21	2.2	6	7	981	79	3
23	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	22	2.2	6	7	981	79	3
24	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	01/01/1961	23	2.2	6	7	981	79	3
25	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	02/01/1961	1	NIL	8	7	1010	75	3.5
26	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	02/01/1961	2	2.2	6	7	981	79	3
27	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	02/01/1961	3	2.2	6	7	981	79	3
28	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	02/01/1961	4	2.2	6	7	981	79	3
29	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	02/01/1961	5	2.2	6	7	981	79	3
30	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	02/01/1961	6	2.2	6	7	981	79	3
31	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	02/01/1961	7	2.2	6	7	981	79	3
32	3772						7080	LONDON	HEATHROW	1	2	51.483	-0.45	25	02/01/1961	8	2.2	6	7	981	79	3

Further Information

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[i] Terms weather element and weather variable are used interchangeably in this document.