Weather Forecast File Format Specification

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1 Introduction

This document covers the specification of the Forecast Weather data file format supported by the Speedwell Weather System, SWS.

Weather forecasts provided in this format can be easily imported into SWS and are then accessible to its weather risk pricing, portfolio management, visualisation, analytical and decision support tools. As a supplier of weather forecasts, Speedwell supplies its ensemble and deterministic forecasts in this format. However, this format can also be used by multiple third party and/or internal providers.

Both ensemble and deterministic forecasts are supported by this format.

A sample file and some background information about SWS are provided below.

2 Background

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

SWS is used by clients worldwide. These include energy companies, banks, brokers and insurance/reinsurance groups.

SWS is an enterprise system installed by the client internally or hosted by Speedwell on their behalf. Each SWS customer therefore has their own database with their own weather data and forecasts in it.

3 Scope

A Forecast Weather data file contains weather measures for one or more weather elements at one or more station sites for a number of consecutive days.

The specification allows one or more forecasts, each one potentially from a different Data Distributor, for these same sites over that period to be provided.

In this way, the specification support both Ensemble and Deterministic Forecasts.

4 Specification

The Weather Forecast data file is a simple ASCII CSV file.

The first line of the file must contain header information about the content of the file. The order of the fields must be observed and all columns are mandatory. When one or more of an item type may be present, say Element[1..EN], at least one field containing that item must be present.

The rest of the file, the body, must contain the Ensemble data.

The end of the file is reached when no more member data is present, i.e. the field is empty or blank.

Please note the following notation used:

Ensemble: Forecast Weather Data set containing Members of Elements, sourced from a single Data Distributor

Element: Weather Element, such as Temperature Max

Member: Range of measure values of a weather Element at a particular weather Station Site, for the number of days of the forecast

Name[1..N]:   This is equivalent to a CSV list of N fields,

as in Name1, Name2, Name3, …, NameN

PLEASE NOTE THAT NO COLUMN NAMES MUST APPEAR IN THE FILE.

4.1 File Naming Convention

The Forecast data file must match start with the name of the provider and have a CSV extension, as in PROVIDER_xxx.csv (case insensitive, no fixed length).

4.2 Header

FIELD	DESCRIPTION
DATE OF ISSUE	Date the Weather Forecast was issued, in American, European or ISO 8601 format with years expressed with 4 digits. Examples of valid date format: DD/MM/YYYY, MM/DD/YYYY, MM-DD-YYYY, YYYY-MM-DD
NUMBER OF DAYS (DN)	Number of Days in the Forecast [*Integer*]
NUMBER OF WEEKS (WN)	Reserved for future use. Please use zero (0) [*Integer*]
NUMBER OF SITES (SN)	Number of Weather Station/Sites in Forecast [*Integer*]
NUMBER OF ENSEMBLES (FN)	Number of Ensemble Data Distributors whose Forecast data is present in the file [*Integer*]

NUMBER OF MEMBERS FOR ENSEMBLE (MN[1..FN])	List of Number of Members that each Ensemble contains.
	 The number of values must match the number of Ensembles.
	 E.g. If the file contains FN Ensembles, then this corresponds to:
	     MN1; MN2; ..; MNFN;
	 Where MN1 = number of members for Ensemble 1,
	     MN2 = number of members for Ensemble 2,
	     MNFN = number of members for Ensemble FN
	 [*Integer*]

NUMBER OF ELEMENTS (EN)	Number of Elements if the Forecast [*Integer*]

ELEMENT (1..EN)	List of names of the Elements in each Ensemble. [*Alphanumeric*] The number of names must match the number of Elements. E.g. If the file contains EN Elements, then this corresponds to Element1; Element2; …; ElementEN
ENSEMBLE[1..FN]	List of names of the Data Distributors the file. [*Alphanumeric*] The number of names must match the number of Ensembles. E.g. If the file contains FN Ensembles, then this corresponds to: FDistributor1; FDistributor2; ..; FDistributorFN;
TIMERUN	The forecast timerun, 0 or 12 as an example for the ECMWF forecast

Important Notes:

1. Forecast data within the file may contain one or more ensembles from multiple data distributors.

2. The Element names are defined by the distributor of the data. Both the names of *each data distributor and the names of all the Elements* supported by each data distributor likely to be present within the file from a provider must be made available separately so that SWS may be configured to map these names to its internal list of Weather Elements.

4.3 Body

The body contains the data Ensembles ordered from left to right, where each Ensemble contains the Members for each Element in the forecast.

Each Ensemble contains a row for each day of the forecast and each site, ordered by Element Members.

FIELD	DESCRIPTION
DATE	Date of the Weather measure, in American or European format with years expressed with 4 digits. Examples of valid date format: DD/MM/YYYY, MM/DD/YYYY, MM-DD-YYYY, YYYY-MM-DD
SITE WMO	The WMO number of a Weather Station/Site [*Integer*] – this may be blank
SITE WBAN	The WBAN id where available (WBAN is Weather Bureau Army Navy identifier used for many US stations) – this may be blank

ENSEMBLE[1..FN]_ **ELEMENT[1..EN]_** **MEMBER[1..MNFN]**	List of Measure values, one for each of all the Members of all the Elements of all the Ensembles in the forecast. [List of *Floats*] PLEASE NOT USE FILL VALUES FOR MISSING DATA – leave empty or use a blank instead. The number of values must be equal to the sum of the number of Members (MN) times the number of Elements (EN) for each Ensemble. E.g. Given Number of Members MN, number of Elements EN and number of Ensembles FN, then a row corresponds to these values: 11/04/2004;7026;Ens1_ Ele1_Mem1; Ens1_ Ele1_Mem2; …….; Ens1_Ele1_MemMN; Ens1_ Ele2_Mem1; Ens1_ Ele2_Mem2; …….; Ens1_Ele2_MemMN; Ens1_ EleEN_Mem1; Ens1_ EleEN_Mem2; …….; Ens1_EleEN_MemMN; Ens2_ Ele1_Mem1; Ens2_ Ele1_Mem2; …….; Ens2_Ele1_MemMN; Ens2_ Ele2_Mem1; Ens2_ Ele2_Mem2; …….; Ens2_Ele2_MemMN; Ens2_ EleEN_Mem1; Ens2_ EleEN_Mem2; …….; Ens2_EleEN_MemMN; EnsFN_ Ele1_Mem1; EnsFN_ Ele1_Mem2; …….; EnsFN_Ele1_MemMN; EnsFN_ Ele2_Mem1; EnsFN_ Ele2_Mem2; …….; EnsFN_Ele2_MemMN; EnsFN_ EleEN_Mem1; EnsFN_ EleEN_Mem2; …….; EnsFN_EleEN_MemMN

Important Notes:

1. The date format used by each provider must be specified separately so that SWS may be configured accordingly.

2. Missing data – **PLEASE DO NOT USE FILL VALUES FOR MISSING DATA – leave empty or use a blank instead.**

5 Sample Weather Forecast File

This sample file from fictitious provider ForeData contains a 9 day 51 member ensemble forecasts from a fictitious data distributor PROVe and the MetOffice for the following elements for 2 sites: Daily TMean, TMax, TMin, Rain

In this file, there are no data from the MetOffice ensemble since the number of members for it has been specified as 0 (zero).

14/04/2004,9,0,2,2,0,51,4,Tmean,Tmax,Tmin,Rain,MetOffice,PROVe,12,,

14/04/2004,1490,,5.6,6.1,4.9,5,6.1,6.4,5.5,5.6,5.6,5.6,5.8,5.5,6.2,6.3,5.1,5.8,5.3,5.4,6,6.4,5.4,6,6.1,5.3,5.8,5.8,5.9,6.5,3.5,1,6.1,5.7,5.3,6.5,4.8,5.9,5.2,5.9,4.9,5.4,4.5,5.5,6.6,6.1,6.2,5.9,
6,5.4,5,6.1,5.8,5.2,8.1,8.3,8,8.8,9,8.8,8,7.9,8.4,8.2,8.1,8.2,8.7,9.1,7.8,8.7,7.8,2.8,8.6,9.2,8.3,8.8,8.9,7.5,8.2,8.8,7.9,9.1,7,7.7,8.8,9,8.4,8.1,8.9,7.4,8.1,8.1,8.4,7.5,7.9,7.7,8.3,8.8,8.5,8.4
,8.2,8.1,7.5,8.1,8,7.7,3.3,1.7,2.6,3.3,3.7,3.3,2.2,2.6,2.4,3.3,3.2,3.4,3.4,2.8,2.7,2.7,3.1,3.2,3.5,2.6,3.2,3.2,3.1,3.2,4,3.4,2.8,3.1,2.5,3.1,3.1,2.7,3.3,3.2,8,3.2,2.6,3.2,2.7,3,3,3.1,3.2,3.4,3.3,
3.1,3.1,2.8,3.5,3.1,2.8,0.3,1,0,0.5,0.7,0.7,0.2,0.6,0.3,0.2,0.2,0.2,0.3,0.4,0.4,0.1,0.3,0.1,0.7,0.2,0.2,0,0.2,1.2,0.4,0,1,0.1,0.6,0.2,0.7,0.3,0.6,2,0.4,0.6,0,0.1,0.4,0.7,0.6,0.1,0.3,0.8,0.3,0
.8,0.4,0.6,1.5,1.1,0.2

15/04/2004,1490,,8,7.9,7.6,7.8,8,7.9,7.6,7.5,8,8.2,8,7.6,8,8.2,7.8,8.4,7.4,7.6,8.4,8.5,7.9,8.1,7.6,7.6,8.1,8.3,7.4,8.3,7.7,7.6,8.1,7.6,8,7.9,7.3,7.4,7.9,7.7,8.8,7.8,7.5,7.9,7.6,7.7,8.5,7.5,
7.4,8,7.8,7.7,10.3,10.2,10.2,9.8,10.5,9.6,9.9,9.4,10.1,10.6,10.6,9.3,10.6,10.6,9.7,11,9.1,9.5,10.8,11,10.7,9.3,9.8,10.4,10.6,9.3,10.4,10.1,9.5,10.8,9.8,10.6,9.7,9.9,9,10.5,9.6,10.5,
10.1,10.1,8.9,10.6,9.9,9.9,11,9.7,10.1,10.4,10,9.5,5.9,5.9,5.6,6.2,6,6.1,6,6.3,5.9,5.9,6,5.9,5.8,6,6,6.3,5.9,6,6.3,5.9,6.4,5.7,6.2,5.9,5.8,6,6,6.3,5.8,6,6.2,5.9,5.8,5.9,5.9,5.9,6.3,5.8,6,6,
5.8,6.1,5.9,5.8,5.9,6.1,5.9,5.3,5.8,6.1,6.1,0.7,0.6,0.7,2.5,0.7,0.4,0.8,1.1,0.3,0.3,0.8,1.3,0.4,0.4,1.8,0.1,1.5,1,0.2,0.2,0.7,0.4,0.9,1.5,0.4,0.1,1.7,0.3,1.5,1.2,0.5,1.1,0.4,0.3,1.7,0.9,0.4,0
.5,1.1,0.9,0.6,0.9,0.3,1.7,1.2,0.3,1.4,1.8,0.3,0.8,1.1

16/04/2004,1490,,8,7.1,7.7,6,8.5,6.5,7.8,6.4,8.3,8.1,6.7,6.8,7.6,8.3,6.2,8,7.4,7.4,8,8.6,7.8,5.9,7.1,8,7.4,7.5,7.9,6.7,5.7,8.3,8.6,7.7,7.6.1,6.8,7.9,7.6,7.4,6.9,7.8,5.9,8.3,8.2,5.4,8.2,6.6,
7.9,6.4,7.9,6.7,11.1,10,11,9.2,11.8,9,10.9,9.4,11.7,11.6,9.7,9.5,10.8,11.5,8.5,11.5,11.3,11.1,11.1,11,9.4,11.8,5,10.1,11.3,9.7,11.4,10.7,10.7,8.3,11.5,11.5,9.8,11.3,8.5,10.9,11.5,11.
2,10.3,9.3,11.2,8.9,11.4,11.6,8.7,10.2,9.9,10.7,10.4,11,9.9,6,4.2,5.4,2.3,6.1,4.5,5.3,3.9,6.5,7,4.7,4.6,4.8,6.4,3.9,5.3,4.6,4.7,5.8,5.9,4.4,5.9,3.9,4.2,5.8,4.6,5.1,6.2,3.5,3.6,5.9,5.8,4,5.
4,3,3.4,4.6,5.3,4.6,5.3,5.5,3.6,6.4,5.9,2.6,6.3,4,5.5,2.1,5.8,3.9,0.5,0.2,0.1,0,0.1,0.1,0.1,0.6,0,0,2.9,0.7,0.3,0.1,0,0.3,0.2,0.2,0,0.1,0.2,0.1,5,0,0,0.5,0.4,0.8,0,0.1,0.1,0.2,0.3,0,0.4,0,0,0
,0.2,2.5,0,0,0.3,0.1,0,0,0.3,0.1,0,0.6,0.2

17/04/2004,1490,,7.8,8.1,7.2,4.8,7.7,7.6,7.2,7.4,8.1,8.3,7.7,7.1,7.9,7.3,6.7,7.5,7.2,7.9,7.4,7.4,8.5,7.8,6,7.8,8.1,8.1,7.8,6.8,7.7,5.6,7.6,8.5,8.1,8.5,5.7,7.8,8.6,7.3,7.6,6.4,8.1,6.6,7.1,7.
7,5.6,7.9,7.3,6.6,6.5,8.1,7.5,11.1,12.3,10.7,9.7,11.9,10.5,11,11.2,11.4,11.8,11.1,10.5,11.3,11.3,10.7,11.6,10.8,12,10.8,9.3,12,11.1,8.9,12.8,11.7,11.2,12,10.7,11.7,10,10.8,11.9,11.5
,11.4,10.3,10.8,12.6,10.3,11.1,8.1,11.6,11,10.5,11.8,8.9,12.1,11,11.1,11.2,11.2,12.6,10.7,5.1,4.3,3.8,0.1,3.5,5.2,3.8,4.1,5.3,5.7,4.6,4.7,4.5,3.8,3.3,3.9,3.6,4.8,4.7,5.4,6.1,4.8,3.6,4.1,5.4,6
.2,4.5,2.4,4.5,1.5,4.4,6.2,5.1,6.1,1.3,5.8,4.7,4.6,4.7,5,4.7,2.9,3.7,4.2,2.3,3.7,4.5,2.3,2.8,4.4,4.9,0,0,0,0,0.1,0,0,0,0.6,0.1,0,0,0,0,0,0.2,0.6,0.1,0,0,0,0,0.1,0,0.1,0,0,0,0,0,0,0.7,
0,0.4,0.1,1.5,0,0,0.3,0,0,0,0,0,0,0.2

18/04/2004,1490,,6.6,8,5.8,5.7,7.6,7.8,6.2,7.4,6.9,6.6,6.5,5.8,7.7,7.7,5.2,6.6,6.9,5.8,7,6.8,3,7,6.1,8,7.9,6.6,8.3,8,6.6,4.8,6.9,8.2,7.2,8,5.4,7.7,8.6,7.3,7,7.2,7.7,7.2,6.3,8.6,6.2,6.3,5.5,
7,7.1,9,5.9,8.9,10.6,7.9,9.6,11.2,10.7,7.4,10.3,11.1,10.5,9.2,8,10,11.7,8.7,10.6,10.8,8,10.5,8.8,10.7,9.5,9.1,12.7,10.9,9.8,11.4,11.4,9.3,7.9,11.2,10.6,11,11.7,9.7,10.4,14,10.7,10.7,10,
12.9,10.6,8.3,12.1,10.3,10.5,9.2,9.6,10.8,13.4,9.2,3.6,3.9,4,1.5,4.9,4.1,4.3,4.8,3.2,3.3,7,3.3,4.9,4.1,0.9,2.7,3.4,2.7,3,3.5,6,4.1,3.8,3.8,4.6,3.7,5.7,5.3,3.6,1.8,2.7,6,3.6,4,1.1,1.5,9,4.7,3.
9,3.5,5,2.8,3.5,3.7,5.8,1.9,2.5,1.6,4.5,3.2,5.6,2.3,0,0,0,0,0,0.1,0,0,0.1,0,0,0.1,0.2,0,0,0,0.2,0.1,0.2,0.4,0,0,0,0,0,0,0.1,0,0,0.1,0,0,0.6,0,0.5,0,1.5,0,0.1,0.4,0,0,0,0,0.4,0,0,1.1

19/04/2004,1490,,8.1,8.6,5.9,6.2,5.1,8.6,9.7,8.1,6.2,8,6.3,7.3,8.7,6.3,7,7.7,4.6,7,8.1,6.7,7.6,7.7,5.9,6.8,7.4,6.7,8.8,8.7,6.1,6.6,6.4,7,9.6,7,9.2,7.1,7.6,8.1,7.3,6.8,7.5,7.4,8.2,7.6,7.5,7.
3,6.3,7,7.2,7.5,7.3,6.3,11.3,10.8,7.2,8.8,7.7,9.5,7.7,14,11.2,9.1,11.2,9.3,9.5,12.5,9.5,11.7,10.1,8.4,10.7,10.1,11.4,11,9.6,10.5,10.4,10.3,13.4,11.2,9.2,9.6,8.9,11,11.1,11.8,11.1,10.4,

9.7,9.8,10.6,11.9,10.4,12.7,11.3,10.7,11.2,9.3,9.8,10.2,10.5,9.9,10.2,4.4,6.5,4,3.3,1.6,6.4,4.2,6.3,5.4,2.6,5.5,3.8,5.7,4.9,2.9,4.4,5.4,4.4,5.6,2.6,3.7,4.7,2.2,3.6,4.9,3.7,4.2,6.6,2.7,3.5,
3,4.8,1.2,6.8,3.1,5.7,6.6,5.3,3.2,3.4,3.9,4.4,4,4.8,3.2,3.8,4.6,3.9,4.8,3.2,2,0,2.4,1.8,0.1,0.1,1.8,1.6,0,0,0.2,0.1,0.2,0.7,0,0,0,0,0,0.1,0,0,0,0.1,1.4,0,0,0.8,0,0,0,0,0,0.9,0,1.4,0.3,0.6,0
,0.2,0,0,0.1,0,0,0,0,0,0,0.1

20/04/2004,1490,,8.8,7.3,7.4,7.2,6.1,8.7,7.1,9.4,7.9,6.9,8.4,7.2,6.3,10.1,7,7.8,7.7,7,7,9.4,8.1,7.8,7.6,4.8,6.7,8.9,9.3,7.9,9.6,6.6,6.7,6.5,8.1,9.9,6.9,7.6,6.1,7,7.4,7.4,6.6,6.6,8.6,6.9,7.9,
7.6,7.1,6.7,7.6,9.3,9.3,11,10.4,10.9,10.6,9,11.7,9.6,10.4,10.5,9.5,11.9,11.1,10.7,13.5,9.5,10.7,12.9,8.1,10.7,14.3,12.7,9.3,11.6,8.3,8.9,14.1,12,11.2,13.9,9.5,10.2,9.9,11.4,11.7,9.6,10.
8,10.7,11.3,11.5,9.5,9.3,9.8,12.8,9.4,9.8,11.4,11.5,6.8,11.7,13.4,13.2,6.1,3.8,3.8,4.3,3.7,6.4,4.8,7.1,5.7,4.6,5.2,4.4,2.2,6.2,4.8,5.7,3.2,4.9,3.3,4.7,3.8,6.4,4.1,6.3,6.3,9,6.7,4.9,6.4,4.2
,3,3.5,4.6,7.9,4.7,4.4,1.8,3.3,3.3,5.3,4.4,2.9,5.7,3.9,5.9,4.6,3.2,5,3.9,5.6,6.4,0,1.1,0.7,3.7,0.2,0.8,0.7,0.9,0.5,0,0,0.2,2.2,0,3.6,0.5,0.7,0,0,0,0,3,0,0.7,1.9,0,0.5,0.7,0,0,0,1,0,2.3,0,0.5,0.8,
0,0,0,3,0.3,1,0,0,2,0.1,0,3.8,0,0,0

21/04/2004,1490,,8.4,8.5,8.5,6.2,7.3,8.1,7.4,7.5,6.8,5.3,8.1,8.5,6.3,8.8,6.7,7.2,10.3,6.8,8.1,10.5,9.4,7.9,8.2,4.5,6.3,11.4,9.2,6.9,7.9,5.7,9.2,9.7,9.9,5.6,1.9,8.8,8,11,8.6,6.2,7.8,8.5,7.8,
8.9,8.9,4.7,7,9.2,10.1,9.6,12.9,12.6,11.9,10.9,10.5,11.7,10.4,8.5,10.2,9.1,11.8,11.7,7.8,10.6,9.1,11.4,13.8,9.1,11.5,15.9,12.5,9.1,12.7,8.8,9.4,14.3,12.4,12,11.8,8.1,13.3,12.7,11.5,1
3,10.2,12.9,12.2,14.9,12.1,8.9,11.6,11.4,12.5,13.2,11.2,13.4,10.7,9.5,11.3,13.8,12.6,3.9,4.3,5.3,1.3,5.1,4.5,4.8,5.4,3,1.7,4.4,5.7,4.3,6.9,4.5,2.5,7.2,5.5,3.5,3.6,1.6,3.9,0.2,3.2,8.9,6.5
,1.8,3.4,2.8,5.8,6.3,3.3,6.9,1.4,7.9,4.7,8.4,5.6,4.3,3.7,6.2,2.9,5.4,5.2,6.1,2.2,4.6,7.9,5.8,7.1,0,0,0.2,0,0.3,0,0.2,0.5,0,0,0,28.8,5.1,1.3,0.2,0,10.7,0,0,0.7,6,0.2,0.4,5,1.4,0,0.1,3.8,0,0.5.
6,0.1,4.2,0.6,0.5,0,0,0,2.2,2.6,3.6,0,0,1.6,0,0,2.4,0.6,0.1,0

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2.3,11,0.5,5.5,4.3,0.1,6.8,3.4,0.1,8.4,5.8,0.1,0.1

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