7 Importers

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Oxford Scientific Software Ltd.

Contents

Aquator Importers

What are Importers?

Importers allow time series and profile data to be read into and stored on an Aquator database.

A time series is a contiguous sequence of daily or month values. Each value has an absolute date associated with it. For example a time series of daily rainfall might start on 1 April 2000 and end on 31 December 2000. There would be one value for each day even if that value was flagged as *missing*. Monthly time series have one value on the first day of every month. Aquator automatically converts monthly data to daily data as required in its calculations.

A daily profile must have 366 values, one value for each day of a leap year starting with the value for 1 January. A monthly profile has 12 values starting with January. Profiles do not have absolute dates; instead they are repeated year on year. Aquator automatically converts monthly and daily profiles to a daily time series for model calculations.

Aquator retains information about an import with the time series or profile. This then enables the importer to return to the original source next time an import is requested. For example if a reservoir control curve defined as a series of 12 monthly values were loaded from an Excel spreadsheet, Aquator would store the name of the spreadsheet, the name of the worksheet and the cell range imported. Subsequent imports can then automatically return to that location to re-load the data, perhaps after the control curve values have been modified in the spreadsheet. This feature should also make it easier to update time series as new data become available.

Aquator has an Import "Wizard" which assists with importing data. It enables this sometimes complex task to accomplished via question and answers on a succession of simple screens. This is an alternative to using the Imrter directly and is available via the menu item "Tools – Import - Wizard".

Standard Importers

The following is a list of standard Aquator importers

- *Microsoft® Excel ®* spreadsheet
- HYSIM format file
- Kisters WISKI format file
- WRA format file

Importer	Excel	HYSIM	WISKI	WRA
File format	Excel	Binary	Text	Text (CSV*)
Daily time series	Yes	Yes	Yes	Yes
Monthly time series	Yes	No	Yes	Yes
Daily profile	Yes	No	No	Yes
Monthly profile	Yes	No	No	Yes
Data type stored in file	No	Yes	Yes **	Yes
Data interval stored in file	No	Yes	Yes ***	Yes
Missing data supported	Yes	Yes	Yes	Yes

Importer features at a glance

* CSV = Comma Separated Value

** But the user must select the Aquator data type manually

*** But But the user must select daily or monthly

Excel Spreadsheet

The *Microsoft® Excel ®* spreadsheet importer allows *Time Series* and *Profile* data to be imported to Aquator from an Excel spreadsheet.
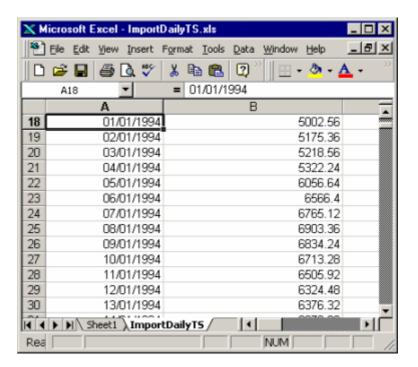
Data to be imported must be in a columns:

- A Time series data import requires two columns; one for the dates and one for values. The date column must contain a contiguous set of Excel dates. For the import of monthly data, this date must always be the first day of

each month. The value column must contain either numeric values or the *missing data* indicator. The *missing data* indicator is a user specified string that indicates a missing value. This string can be empty which indicates that a cell with no data is to be imported as a missing value. The length of the data import is determined by the length of the valid data in the date column.

- Profile data import requires only a single column of data for the values. 366 values are imported for a daily profile and 12 for a monthly profile. Values to be imported must be numeric.

For both Time series and Profiles, this importer allows:

- User selection of worksheet (tab) within a workbook (file)

- User selection of the cell containing the first date (Time series import only)

- User selection of the cell containing the first value. This need not be on the same row as the start date cell (which effectively provides a way of lagging data on import)

An example of a spreadsheet suitable for import of time series data is given below where dates are in column *A* and values in column *B*. In this instance both dates and values start in row 18:

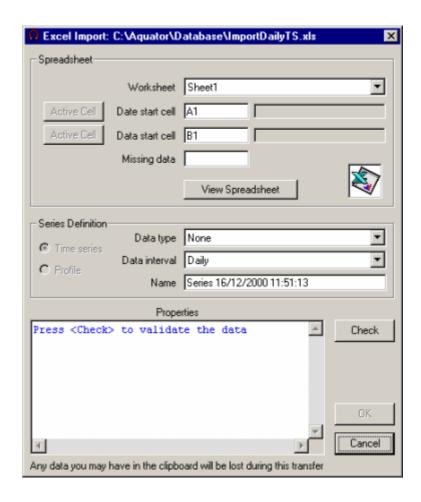An example of a spreadsheet suitable for import of a monthly profile is given below where values start in column *C* on row 9:

The Import Definition

The first stage of defining the data to be imported is the display of a standard windows *File selection* dialogue box which enables the name location of the Excel spreadsheet to be specified.

The second stage of the import is the display of the *Excel Import* dialogue box. An example of this is given below:

This form allows the data to be from the previously selected file to be defined for import.

If you are importing a completely new series the definition precedes as follows. If you are updating an existing series steps 7 and 8 are omitted as the data type and data interval are already defined:

1. Click on *View Spreadsheet* or the Excel logo to display the spreadsheet.

2. It is convenient to have both the form above and the Excel spreadsheet both visible and located side by side.

3. Select the worksheet from either the *Worksheet* drop down list in the above form or by clicking on the appropriate tab on the spreadsheet.

4. Select the first cell in the data column. The cell reference should appear above the spreadsheet column headings and under the menu bar. The cell also is also given a thick black border and the row and column headers are in **bold** type. This is called the *active cell*.

5. On the above form click the *Active Cell* command button to th left of *Data start cell*. Note that causes the cell reference to change in the above form and the value in the cell to be displayed. This should help confirm that you have selected the correct cell.

6. If you are importing Time series data, repeat steps 4 and 5 above to define the *Date start cell*. If you are importing profile data this step is neither required or allowed.

7. Now specify the type of data to be imported using the *Data type* drop down list box. It is very important that you select the correct data type as the data type cannot be changed once a series is on Aquator's database.

8. Select either *Daily* or *Monthly* as the correct data interval.

9. Give the series a name in the *Name* text box. Names can be changed later but must be unique.

10. Finally click on the *Check* command button. This then validates you definition. If it is invalid, the *Properties* window on the above form has red text which describes the error. When the import has been validated, the *Properties* window text is green and a summary of the data is provided (example shown below). In this state the *OK* command button is enabled which will allow the import to proceed.
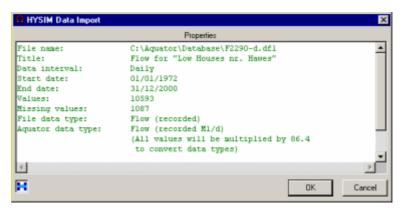
HYSIM Format File

The HYSIM importer allows HYSIM daily time series data to be imported into Aquator. HYSIM is an internationally known hydrological catchment model. Information of HYSIM can be found at http://www.watres.com/software/sf-hysim.html

HYSIM files have their own binary format and can hold data at intervals other than daily and also hold more than one variable. This importer is only able to import files holding a single variable at a daily time step.

The import definition

The first stage of defining the data to be imported is the display of a standard windows *File selection* dialogue box which enables the name location of the HYSIM file to be specified.

The second stage of the import is the display of the *HYSIM Import* dialogue box. An example of this is given below:

The *Properties* window summarises the contents of the file. Click on the *OK* command button to continue with the import of the *Cancel* command button to abort the input.

Kisters WISKI format file

The "Water Information Management System KISTERS" from Kisters AG (http://www.kisters.de/) is a comprehensive software package for managing, storing, viewing and converting time series data. The Aquator WISKI importer allows time series data to be
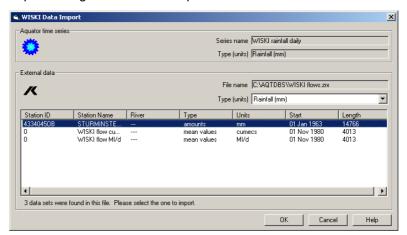
imported into Aquator from a text file created by exporting data from a Kisters WISKI database.

Aquator profile data is not available within WISKI and hence only time series data can be imported. Another difference is that WISKI timestamps data to the second while Aquator is only interested in daily or monthly values. Therefore files containing multiple values per day or daily values where the hh:mm:ss part of the timestamp varies from day to day may cause problems. These are best dealt with by cleaning the data file before attempting to import.

The Import Definition

The first stage of defining the data to be imported is the display of a standard windows *File selection* dialogue box which enables the name and location of the WISKI format file to be specified.

The second stage of the import is the display of the *WISKI Data Import* dialogue box. An example of this follows:

When importing into an existing time series (select the time series in the project tree view before importing) the *Series Name* will have been filled in otherwise, for a new time series, enter a new unique time series name.

If necessary, select the data type of the Aquator time series to be created. Select the data type of the data in the external file. If these data types differ the import tool wil convert the data e.g. cumecs to Ml/d.

If there is more than one data set in the external file then select the one to import. Finally click OK.

WISKI file format

A file of this format is organised into one or more data sets. Each data set consists of a header followed by the data. The header may be spread over several lines, each prefixed by a '#'

character. Empty lines and comment lines prefixed by '##' are ignored. Each data point is on a separate line and consists of a timestamp followed by a value e.g.

19801101000000 54.2

is a value of 54.2 for midnight on 1 Jan 1980.

A header consists of keywords, values and separators. Values may be numeric or textual. The following keywords are defined but not all will occur in every header.

Keyword	Meaning
SANR	Station identification number
SNAME	station Name
SSNR	WISKI-internal station identification number
SWATER	River Name
CDASA	Data collector number
CKONV	Converter Number
CMW	Values per day, for equidistant values
CNAME	Parameter Name
CNR	canal Number
CNTYPE	Type of precipitation parameter (totalisator or recorder)
CTYPE	Canal or value type
CUNIT	Parameter unit
REXCHANGE	Exchange Number
RID	always set to –1, without importance
RINVAL	Value for invalid data
RNR	Values per day for equidistant values or –1 for non-equidistant values
RORPR	Quality of values (original, production)
RTIMELVL	Time level of values (high-resolution, daily, monthly, annual values)
RTYPE	Value type (minimum, maximum, mean values, amounts, instantaneous values)

All keywords and their values are ignored by the importer except the following:

Keyword	Shown	Used
SANR	yes	no
SNAME	yes	yes *
SWATER	yes	no
CUNIT	yes	no **
RINVAL	no	yes
RTYPE	yes	no

*   Used as the default name of the time series

** This is a string and cannot be precisely converted to an Aquator data type, which must therefore be chosen manually

Missing data is flagged by data lines containing the value specified by the RINVAL keyword, typically –777. The WISKI file format specification document says that two successive lines containing this value indicate the start and the end of a period of missing data. Example data files supplied by Kisters actually indicated missing data with an RINVAL value for every missing data point.

This import tool handles both cases. The second case is preferred because the first case is ambiguous when it comes to a single missing value.

Daily mean flows example

(nominal timestamp is midnight so CMW=1 and RNR=1)

```
#SANR200003|*|SNAMEGreim|*|
#SWATER DING|*|CNR446967|*|CNAMEFQ|*|
#CTYPEn-min-equi|*|CMW1|*|
#CUNITm3/s|*|RINVAL-777|*|RNR1|*|
```

```
#RTYPEmean values|*|
19801101000000 54.2
19801102000000 53.0
19801103000000 50.7
19801104000000 50.6
```

Daily minimum flow example

(one value per day but could occur at any second of the day, so CMW=86400 and RNR=-1)

```
#SANR200003|*|SNAMEGreim|*|SWATER DING|*|
#CNR446967|*|CNAMEFQ|*|
#CTYPEn-min-ip|*|CMW86400|*|CUNITm3/s|*|
#RINVAL-777|*|RNR-1|*|
#RTYPEMinimum|*|
19801101234500 54.9
19801102221500 50.5
19801103003000 49.9
19801104153000 49.9
```

Daily rainfall example

(one value per day, nominal timestamp is midnight, so CMW=1 and RNR=1)

```
#SANR4334045OB|*|SNAMESTURMINSTER NEWTON|*|
#SWATER ---|*|CNRRS|*|CNAMERS|*|
#CTYPEn-min-equi|*|CMW1|*|CUNITmm|*|
#RINVAL-777|*|RNR1|*|RTYPEamounts|*|
19630101000000 0.80
19630102000000 10.20
19630103000000 6.10
19630104000000 0.00
```

Monthly rainfall example

(one value per month, nominal timestamp is midnight on 1st of the month, so CMW is missing and RNR=-1)

```
#SANR4334045OB|*|SNAMESTURMINSTER NEWTON|*|
#SWATER ---|*|CNRRS|*|CNAMERS|*|
```

```
#CTYPEn-min-ip|*|CUNITmm|*|RINVAL-777|*|
#RNR-1|*|RTYPEamounts|*|
19630101000000 19.60
19630201000000 56.50
19630301000000 113.00
19630401000000 97.90
```
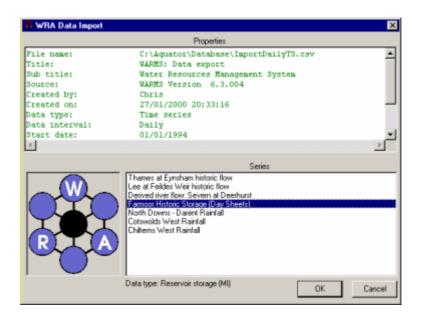
WRA Format File

The WRA (Water Resource Associates) format file importer allows time series and profile data to be imported to Aquator from a text file. The format of data in this text file is CSV (Comma Separated Value) and described below (*WRA CSV file format*). This format has a close resemblance to the way time series and data are stored on the Aquator database and allows not only the transfer of data, but also series information such as data types, series names and units.

Because of this close coupling with Aquator, it provides a more secure way of transferring data between Aquator database.

The Import Definition

The first stage of defining the data to be imported is the display of a standard windows *File selection* dialogue box which enables the name location of the WRA format CSV file to be specified.

The second stage of the import is the display of the *WRA Data Import* dialogue box. An example of this is given below:

The *Properties* window summarises the contents of the file. The *Series* list box shows the series in the CSV file that can be imported in the *current context**. Click on the *OK* command button

to continue with the import of the *Cancel* command button to abort the input.

Current context* = If an existing Aquator series is being updated, only those series in the import file that have a matching data type are shown. If a completely new series is being imported all those series in the file whose data type is known to Aquator are shown as being available.

WRA CSV File Format

Both time series and profile transfer file formats are Comma Separated Value (CSV) files and are similar in structure. Each can hold any number of time series of any data type provided they are of the same data interval. The header information in the file has sufficient information to enable transfer to a Aquator database with minimum user intervention.

The use of CSV format also means that spreadsheets and other applications can read these files. Note however that some older spreadsheets have a limit on the number of rows that can be imported and this might not be sufficient to import more than about 44 years of daily data. Note also that some spreadsheets add unwanted commas "," to end of some rows of data when the file is saved. This will render the file unreadable by this importer.

The structure of the time series transfer file is as follows:

Line / Description	Entries / Example
1. Title (version must be 2.30)	**2** "WRA TS file version","2.30"
2. Title of file	**2** "Title","ResSim: Data export"
3. Sub title	**2** "Sub title","ResSim"
4. Where the file was created	**2** "Source","ResSim Version 6.1.129"
5. Who created the file	**2** "Created by","Chris"
6. When file was created	**2** "Created on",#1998-11-06 10:07:33#
7. Extra information	**2** "Additional information",""
8. Time series/profile	**2** "Data type","Time series"
9. Daily or Monthly	**2** "Data interval","Daily"
10. Start date	**2** "Start date",#1920-01-01#
11. End date	**2** "End date",#1997-12-31#
12. Number of values (NV)	**2** "Values",28490
13. Indicator for missing data	**2** "Missing indicator",-999
14. Number of series in file (NS)	**2** "Series",3
15. Names of series	**NS+1** "Series names","Cotswolds West (6010) -

Line / Description	Entries / Example
	A","Cotswolds East (6020) - B","Thames at Eynsham historic flow"
16. Data types – exact match reqd.	**NS+1** "Series types","Rainfall","Rainfall","Flow (Ml/d)"
17. Units	**NS+1** "Units","mm","mm","Ml/d"
18. First line of data starting with date/time of reading	**NS+1** #1920-01-01#,0,0,-2E+10
19. Second line of data	**NS+1** #1920-01-02#0.46,0,-2E+10
… …	**NS+1** …
NV+17	**NS+1** #1997-12-31#0,0.03,2661.12

The structure of the profile transfer file is as follows:

Line / Description	Entries / Example
1. Title (version must be 2.30)	**2** "WRA TS file version","2.30"
2. Title of file	**2** "Title","ResSim: Data export"
3. Sub title	**2** "Sub title","ResSim"
4. Where the file was created	**2** "Source","ResSim Version 6.1.129"
5. Who created the file	**2** "Created by","Chris"
6. When file was created	**2** "Created on",#1998-11-06 10:07:33#
7. Extra information	**2** "Additional information",""
8. Time series/profile	**2** "Data type","Profile"
9. Daily or Monthly	**2** "Data interval","Daily"
10. Start value	**2** "Start date",1
11. End value	**2** "End date",366
12. Number of values (NV)	**2** "Values",366
13. Indicator for missing data	**2** "Missing indicator",-999
14. Number of series in file (NS)	**2** "Series",5
15. Names of series	**NS+1** Names of series NS + 1 "Series names","Eynsham: Average rainfall","Eynsham: 80% Av. rainfall","Eynsham: 75% Av. rainfall","Eynsham: 60% Av. rainfall","Eynsham: Zero rainfall"

Line / Description	Entries / Example
16. Data types – exact martch required	**NS+1** "Series types","Rainfall","Rainfall","Rainfall","Rainfall","Rainfall"
17. Units	**NS+1** "Units","mm","mm","mm","mm","mm"
18. First line of data starting with the reading sequence number	**NS+1** 1,0,0,0,0,0
19. Second line of data	**NS+1** 2,3.69,2.95,2.76,2.21,0
… …	**NS+1** …
NV+17	**NS+1** 366,3.24,2.6,2.43,1.95,0

Note for daily profiles there must always be 366 values per series with the first value representing January 1st. For monthly profiles there must always be 12 values per series with the first value representing January.

Note that an exact character match is required for the data type in lines 16 for both time series and profile data import to Aquator.