Deltares

enabling delta life

Deltares

enabling delta life

Deltares

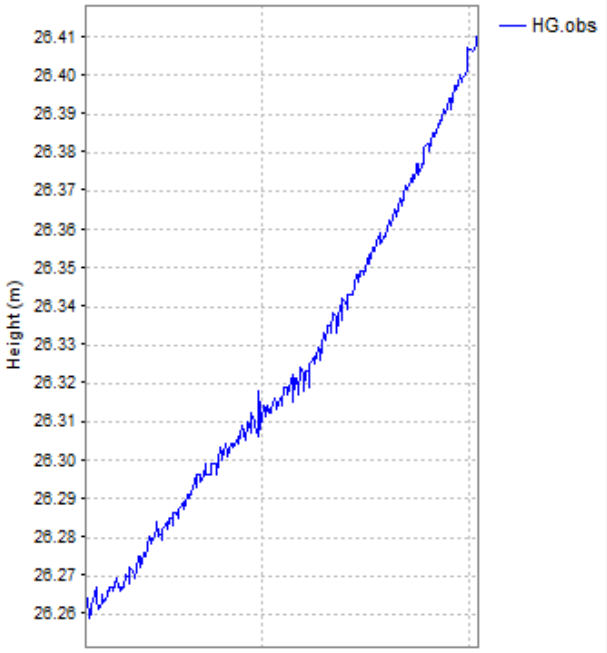
Delft-FEWS

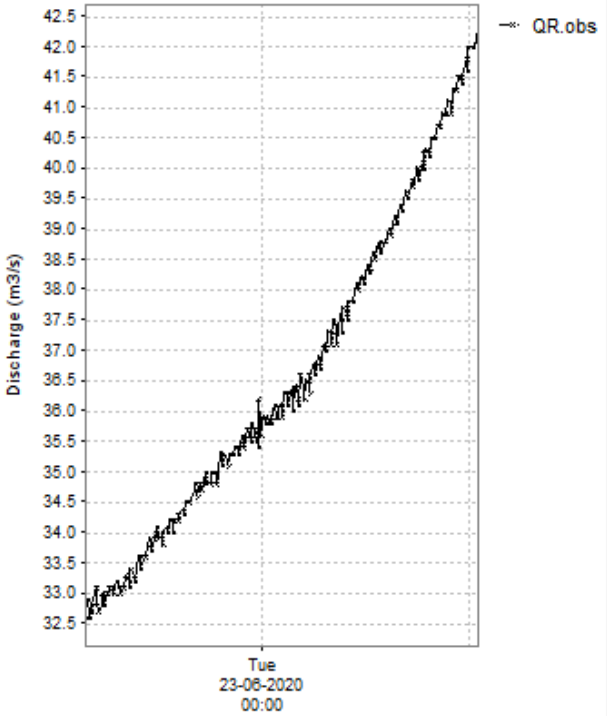
Basic Configuration Course

Module: Time and Timeseries

Module Motivation

- Timeseries are used to identify data in Delft-FEWS
- By referencing timeseries sets, you are able to access the data for
  - Display
  - Processing
  - Modelling
- Handling of data is also very dependent on the system time, and the TimeSeries definition





Deltares

Learning Objectives

By the end of this module, you will have met the following learning objectives:

1) Be able to explain the purpose of Timeseries and TimeseriesSets

2) Have knowledge of each required components of the TimeSeriesSet

3) Be able to distinguish between System Time, Forecast Time, Display Time and know the meaning of Relative View Period

TimeseriesSets

- Any module in DELFT-FEWS that requires data from the database, or produces data that must be stored in the database, does so through the use of a complex data type referred to as the Time Series Set.

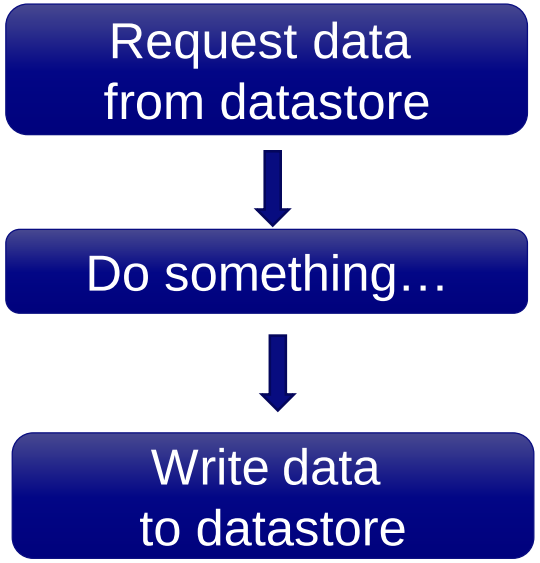
- A time series set can be compared to a query that is run against the database. It contains all the keys to uniquely identify the set of data to be retrieved (for more information on key attributes, see Key attributes).

```
<timeSeriesSet>
        <moduleInstanceId>ImportForecast</moduleInstanceId>
        <valueType>grid</valueType>
        <parameterId>PC.nwp</parameterId>
        <locationId>ForecastGrid</locationId>
        <timeSeriesType>external forecasting</timeSeriesType>
        <timeStep unit="hour" multiplier="3"/>
        <readWriteMode>add originals</readWriteMode>
</timeSeriesSet>
```

Using TimeSeriesSets

- Time series sets form a large part of the configuration.

- Most modules have a standard structure
  1. Configuration starts with a request of specific set of data from the database using one or more input time series sets,
  2. A number of functional items which describe how the data is transformed
  3. and one or more output time series sets which are used to store the data in the database under a unique combination of keys.



Delft-FEWS Concepts - Time Series

Delft-FEWS elements for time series identification:

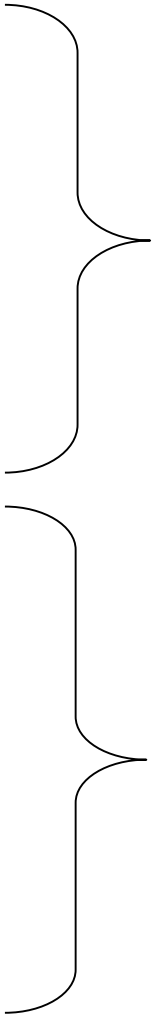
- Module instance: how and who created a time series
- Value type: its internal data format
- Parameter: what the time series represents
- Location: where a time series value applies
- Time series type: its behavior in the system
- Time step: when a time series value applies

This combination of information makes the time series unique

```
<timeSeriesSet>
    <moduleInstanceId>ImportForecast</moduleInstanceId>
    <valueType>grid</valueType>
    <parameterId>PC.nwp</parameterId>
    <locationId>Forecast Grid</locationId>
    <timeSeriesType>external forecasting</timeSeriesType>
    <timeStep unit="hour" multiplier="3"/>
    <readWriteMode>add originals</readWriteMode>
</timeSeriesSet>
```

Delft-FEWS Time Series Characterisation

- Time series are available from two sources:
  - external
  - simulated
- Time series are in two categories in relation to time:
  - historical (continuous in time)
  - forecasting (characterised by its start time)
- Time series can be in various formats:
  - 0D – scalar
  - 1D – vector or longitudinal profile
  - 2D – grid
  - rating curve
  - sample
  - spectra

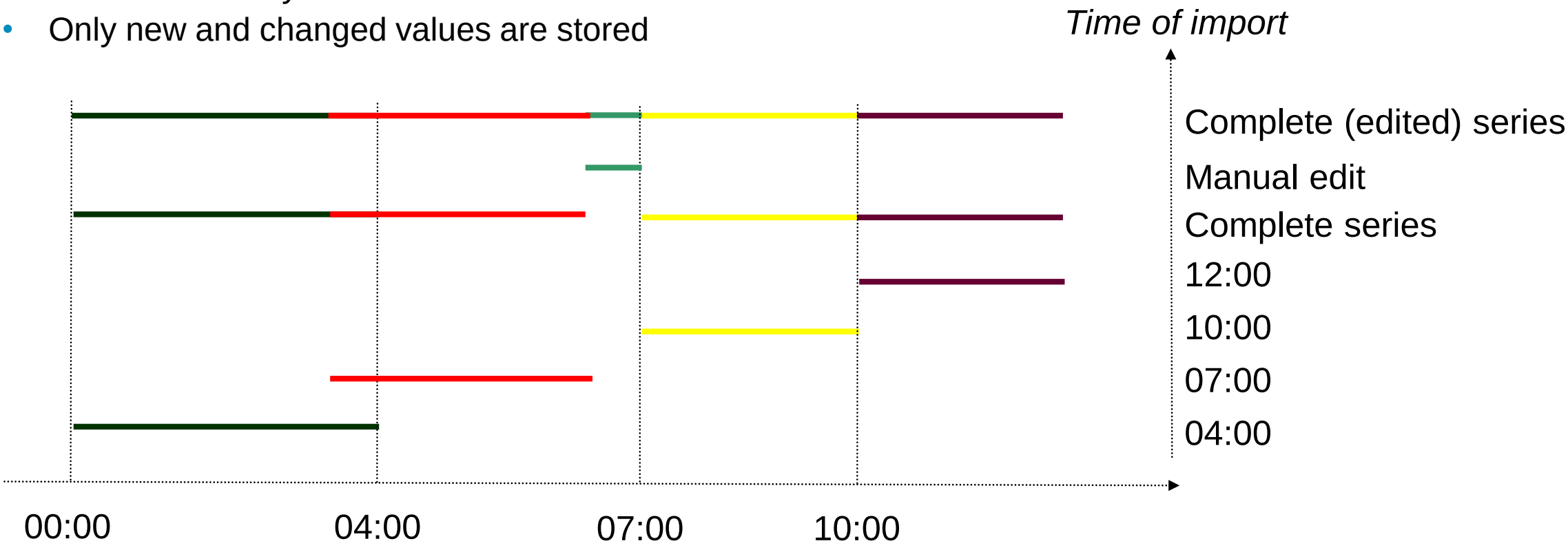


timeSeriesType
(behaviour)

valueType
(data storage format)

FEWS timeSeriesType – external historical

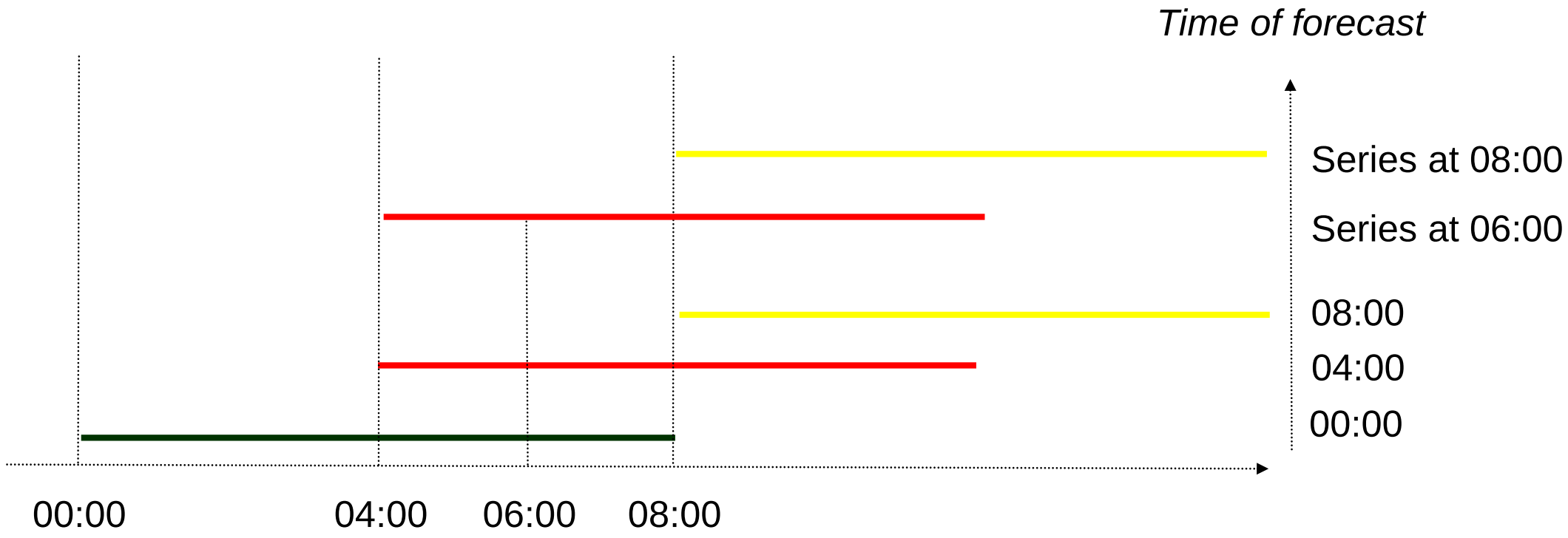
- Added incrementally
- Can be edited by the user
- Only new and changed values are stored



Deltares

FEWS timeSeriesType – external forecasting

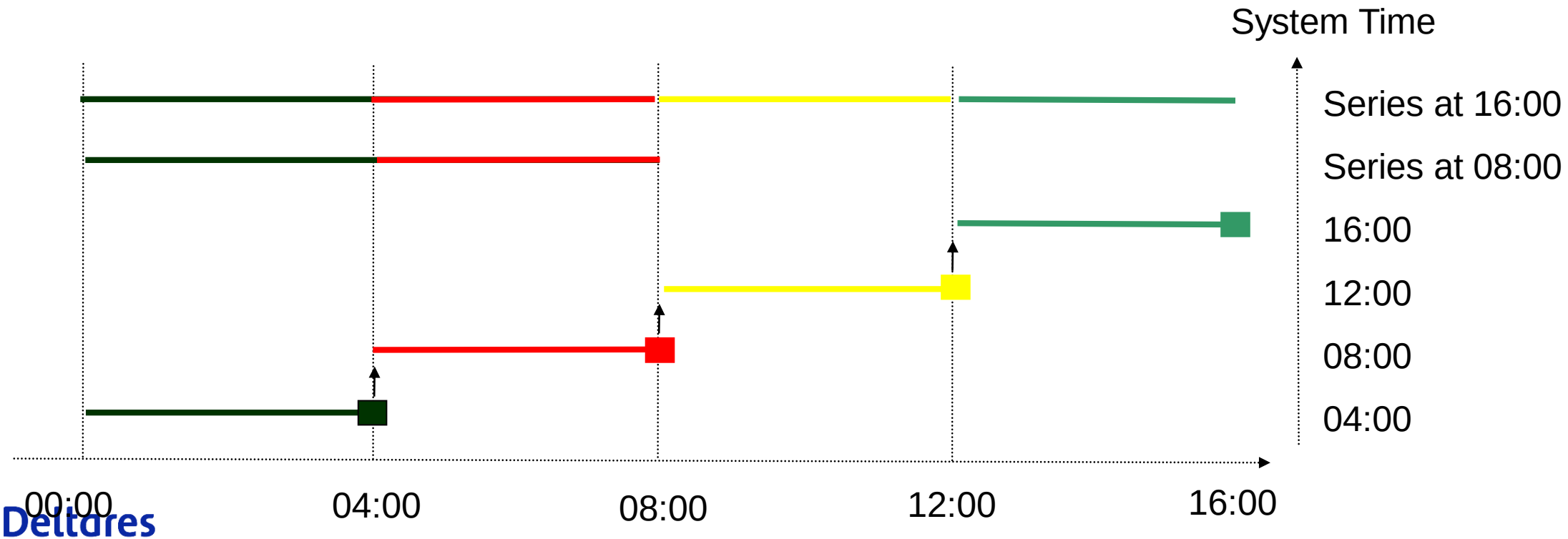
- Added and stored individually
- Can be edited by the user
- Usage of series depends on T0



Deltares

FEWS timeSeriesType – simulated historical

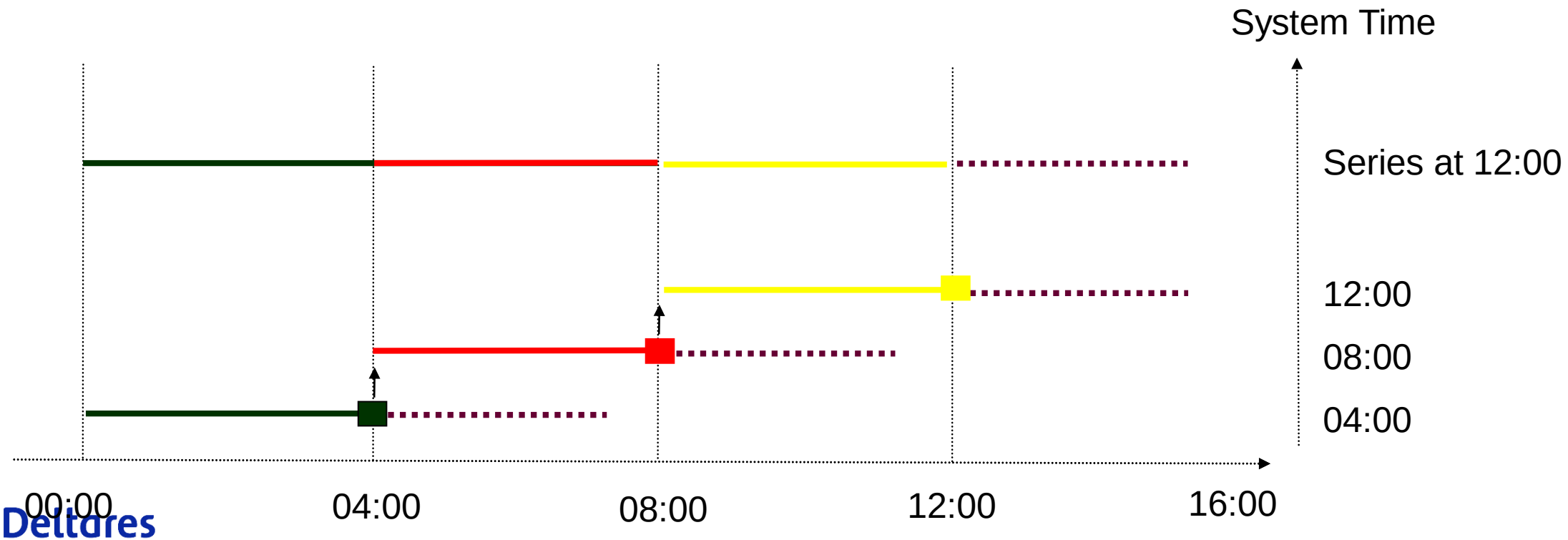
- Continuous in time
- Referenced by the forecast model that produced them
- Approved series shown automatically (including history)
- Most often linked by model states



Deltares

FEWS timeSeriesType – simulated forecasting

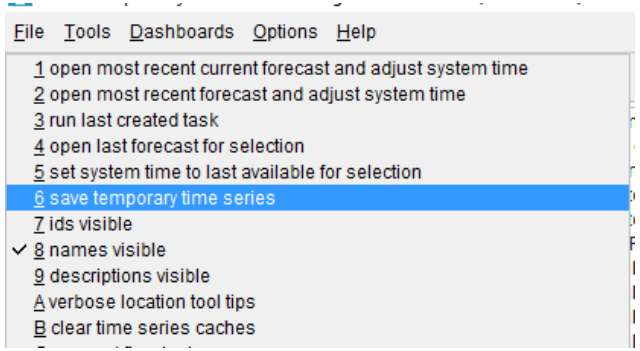
- Continuous in time (in combination with simulated historical)
- Referenced by the forecast model that produced them
- Approved and selected series can be viewed



Deltares

Time Series – temporary

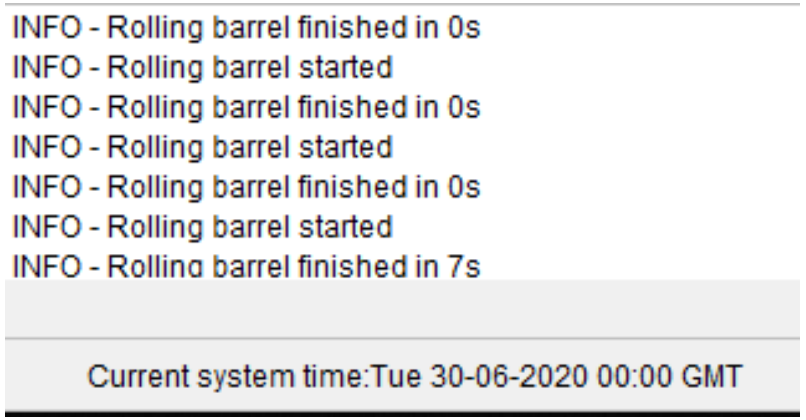
- Referenced by the module instance that produced them
- Exist ONLY during the workflow run that created the series
  - E.g. time series used in pre- / post-processing
- Use Example 1:
  - I'm importing at entire forecast grid, but only need to keep a small part
  - I set the entire forecast grid timeseries to temporary, and when the workflow is complete it is not saved to memory.
- Use Example 2:
  - I have an intermediary data processing steps, and only need to save the result.
  - I set all intermeditate timeseries to temporary, and they are not saved.
- You can save temporary timeseries if you want for debugging. Press F12 → 6



Deltares

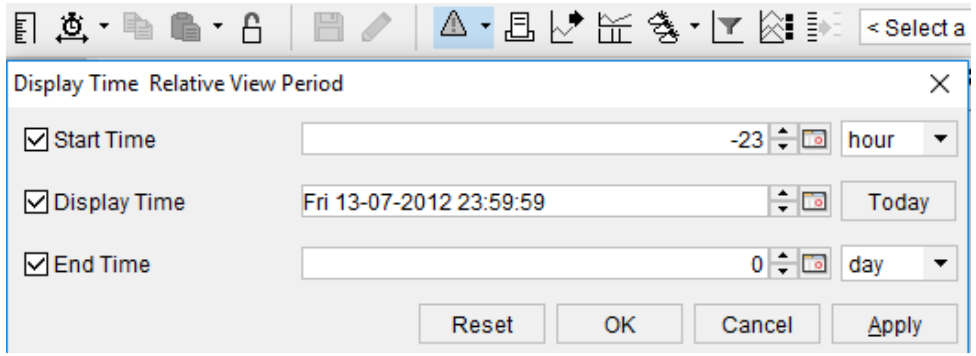
System Time

- System Time
  - This is the “Time” at which the system “lives”
  - Rounded down to nearest cardinal time step, set in the Explorer.xml
  - Live System: shifts with “real” time
  - Stand alone system: set manually



FEWS & Time

- Display Time
  - This is the “Time” reference for the time series display
  - Defaults to system time but can be changed
  - Allows panning display window in time
  - Display view window relative to display time
  - External forecast data with External T0 < Display time is shown



Forecast Time (T0)

- This is the reference (start) “Time” of a forecast run
- Defaults to System Time
- Change T0 back in time to allow hindcasting
- For observed data, use all available data < T0
- For forecast data, use available data where External Forecast T0 is < T0

Relative View Period

- Relative View Period (RVP) is a very important and useful!

- Central to all configuration
  - Filters: Determines window of data shown
  - Requesting data: Determines window of data retreived

relativeViewPeriod	
unit	hour
start	-48
end	2

Module Summary

- TimeSeries are the identifier of data in Delft-FEWS
- To access existing data, or write a new data output, a timeseries definition is required.
- The TimeSeries definitions contain information which is obvious, and some you need to learn the meaning of:

Module instance:	how and who created a time series
Value type:	its internal data format
Parameter:	what the time series represents
Location:	where a time series value applies
Time series type:	its behavior in the system
Time step:	when a time series value applies

- Additional options (such as EnsembleId) have not yet been discussed.

Additional Resources

- Google “Delft-FEWS WIKI”
- Google “Delft-FEWS Configuration Guide”
- Google “Delft-FEWS Forum”
- Email fews-pm@Deltares.nl

Next Steps

- What is the point of all this if we don’t have any data?
- The next module will focus on importing data.
- Delft-FEWS can import data from a variety of sources, we’ll focus on simple examples.
- We can view this data in many ways once imported, this will also be explored.