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Release Documentation

NGMS Version 1.0 (2007/02 β)

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Preface

The document describes NGMS release 1.0, based on the beta version of DelftFEWS release 2007/02.

The release documentation includes the following information:

- software functionality changes and extensions
- general configuration issues
- regional application issues

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I Introduction

This document provides information regarding the NGMS release 1.0, based on a β version of DelftFEWS release 2007/02. This version will be shipping to the EA on September, 10, 2007.

This document describes:

- software functionality incorporated
- software functionality outstanding
- configuration functionality incorporated
- configuration functionality outstanding
- regional issues

2 Software functionality

2.1 New in this Software Release

In the next sections the new features being useful for NGMS will be described. Most, but not all, features are developed for NGMS.

2.1.1 Operator Client

The following major software improvement and new features have been implemented:

Component	Feature	Developed for
Launcher	Ability to configure the roles	NGMS
Explorer	Added button to enable/disable	other projects
	Ability to change current system time for operator clients (i.e. same behaviour as for stand alone applications). This minimizes the need to change display times at each display.	NGMS
	Extend functionality to highlight data availability: <ul style="list-style-type: none"> ▪ purple crosses indicate no data available in the database ▪ red crosses indicate, data is available in the database, but not in the time window being viewed (the latter being based on current system time and the view period as configured). ▪ no crosses refer to data being available at current time frame 	NGMS
Time Series Display	Changed naming of zoom range from 'domain axis' and 'range axis' into vertical axis and horizontal axis	NGMS
	Preserve horizontal zoom ranges when changing between plots	NGMS
	Preserve vertical zoom range of a specific plot, i.e. when selecting another one and coming back to a plot, the vertical zoom range is remembered.	NGMS

Component	Feature	Developed for
	<p>Added functionality to highlight data availability:</p> <ul style="list-style-type: none"> ▪ purple crosses indicate no data available in the database ▪ red crosses indicate, data is available in the database, but not in the time window being viewed (the latter being based on current system time and the view period as configured). ▪ no crosses refer to data being available at current time frame <p>NB. the appearance of red crosses are updated when horizontal axis changes and data comes into (or out of) view</p>	NGMS
	Added Longitudinal profiles (i.e. accretion profiles as graph type	NGMS
	Ability to show multiple longitudinal profiles, vertically arranged, in one plot (sub-plots may refer to different river stretches)	NGMS
	Ability to animate and record (AVI) longitudinal profiles	NGMS
Spatial Display	<p>Added button to activate/disactivate contour lines where available (eqs. configured)</p>	NGMS
	<p>Added functionality to highlight data availability:</p> <ul style="list-style-type: none"> ▪ purple crosses indicate no data available in the database ▪ red crosses indicate, data is available in the database, but not in the time window being viewed (the latter being based on current system time and the view period as configured). ▪ no crosses refer to data being available at current time frame 	NGMS
	Added functionality to export data frame to ascii grid file (right click mouse)	NGMS
	<p>Added functionality to draw a line segment on the grid and show the data in a longitudinal profile</p> <ul style="list-style-type: none"> ▪ right mouse button or ▪ press CTRL, click begin point, release CTRL and click end point. The longitudinal display is shown instantly and can be animated 	NGMS
Scenario editor	<p>Final display release with the following functionalities</p> <ul style="list-style-type: none"> ▪ define workflow specific scenarios ▪ copy an existing scenario to a new one ▪ allows multiple scenarios to be opened for editing 	NGMS

Component	Feature	Developed for
	<p>Textual functionalities</p> <ul style="list-style-type: none"> ▪ allows extensive description of scenario contents ▪ enables extensive textual descriptions (configured) on the workflow/model behind the scenario ▪ enables extensive textual descriptions (configured) on the initial states available for dispatching ▪ allows extensive textual descriptions when selecting specific sets of input files (e.g. approved recharge files) 	NGMS
	<p>Data transformation functionality:</p> <ul style="list-style-type: none"> ▪ allows location selection (single or a set of multiples) based on search criteria ▪ displays selected location on the map ▪ allows formula (calculator) or table-based transformations for selected location(s) in one go ▪ displays graphs (per location) of original and modified time series 	NGMS
	<p>Functionality to add new locations:</p> <ul style="list-style-type: none"> ▪ allows entry of various location properties, including the Grid Reference of the object being added ▪ MapToGridDialog to relate the new location to a model gridcell (regular grid only) ▪ table-based time series entry for the parameter at the new location 	NGMS
	<p>Functionality to run the scenario directly:</p> <ul style="list-style-type: none"> ▪ provide run description ▪ select state (with preconfigured T0) ▪ adjust simulation period if desired ▪ dispatch 	NGMS
	Log panel for scenario editor specific messages.	NGMS
System monitor	bug fix: task status is properly updated	NGMS
	MSN type popup to highlight completion of a manually dispatched task	NGMS
Plugin interface	ability to kill a task which has been dispatched (beta, needs more remote system tests)	various projects incl. NGMS
	Standardized interface protocol for plug-ins added to the system	general purpose investment

2.1.2 FEWS Modules

The following bug fixes and new features have been implemented:

Component	Feature	Developed for
Core	Time series equidistant identifiers: <ul style="list-style-type: none"> ▪ months ▪ dayOfMonths="5 8" ▪ times ="12:00 18:00" ▪ dates="1jan 1dec" ▪ dateTimes="12jan12:00 12dec12:00" 	Dutch water boards (NGMS will benefit later especially from dayOfMonths)
	JDBC-driver to open up locations, parameters and scalar time series to external software components	Dutch water boards
Import	Import of various new data formats	
	Timeseries Import from central database (i.e. not through synchronization)	Singapore (NGMS may benefit later for conducting stand-alone exercises based on approved model results)
Interpolation	Added polygon interpolation methods: <ul style="list-style-type: none"> ▪ output average × area surface ▪ sum scalar set within polygon 	NGMS
Transformation	Memory usage reduced by over 30%	various incl. NGMS
	Various statistical functions added for consecutive seasons and years: <ul style="list-style-type: none"> ▪ mean ▪ min. ▪ max. ▪ percentiles 	Dutch water boards (NGMS will benefit later, demo at PR08 workshop)

2.1.3 Config Manager

The following enhancements and bug fixes have been implemented...

Component	Action
	Minor bug fixes

2.1.4 Admin Interface & Master Controller

The following enhancements and bug fixes have been implemented...

Component	Feature	Developed for
Admin Interfaces		
Master Controller	MC-webservice under development as additional data access protocol (next to JMS)	US-NWS
	small bug fixes	all
Synchronisation	redesign on its way	general purpose investment (NGMS will benefit later as it enables more interactive driven)

2.1.5 Various

The following enhancements and bug fixes have been implemented...

Component	Feature	Developed for
Database	support for Postgress	US-NWS (used by test infrastructure of NGMS and EA-T46 project)

2.1.6 Module Adapter

Component	Feature	Developed for
Modflow Module Adapter	bug fixes: <ul style="list-style-type: none"> ▪ dateTime handling ▪ output generated for stream cells in non-active layers ▪ WELLS_IN stack overflow (for YNN model) ▪ WELLS_ADD 	NGMS
	Output support for non-standard Modflow-VKD enhancements (e.g. MFSSQ02), allowing output from any specific UNIT to be converted.	NGMS

2.2 Outstanding

The following major enhancements are outstanding for NGMS or ongoing and of interest for NGMS...

2.2.1 Operator Client

Component	Feature	Remark
Spatial Display	classification rendering (i.e. add button which automatically adjustw classification breaks based on data values within zoom extent)	preferred over toggling pre-defined sets of class breaks
Scenario Editor	Geology/borehole viewer	for discussion/design
	distinction between public / private scenarios	for discussion
Duration curves	Display to show duration curves	to be combined with Waterboards
Authorisation/ Explorer/ Manual Forecast/ Forecast Manager System Monitor	facilities to hide/show displays or buttons within displays based on user and authorisation settings	under development for Waterboards
TimeSeriesDisplay/ GridDisplay	facilities to filter the locations/grids shown based on the user and its authorisation settings	for discussion NGMS

2.2.2 FEWS Modules

The following major enhancements are outstanding for NGMS...

Component	Feature	Remark
Core	Just-in-time reading of grid data from the database (not before hand)	<ul style="list-style-type: none"> ▪ will Kennet Valley post-processing in one workflow (currently run is split in two) ▪ will improve performance of spatial animations
Transformation	functionality to derive duration curves	to be combined with Waterboards

Component	Feature	Remark
	percentiles	review if current seasonal/annual based functionality needs extension
??	ability to asses GW budgets for other polygons than current pre-defined GW units	to be designed by Delft and discussed with EA
	update GIS-maps from the EA-server	manual procedure will be proposed to CIS, to be discussed

NB. It is expected that the new synchronisation opportunities will accommodate better on-demand synchronisation of portions of the database. This may overcome the need for a specific data slicer for this purpose.

2.2.3 Admin Interface & Master Controller

The following enhancements are under development.

Component	Feature	Developed for
Admin Interfaces		
Master Controller	MC-webservice under development as additional data access protocol (next to JMS)	US-NWS
	small bug fixes	all
Synchronisation	redesign on its way	general purpose investment (NGMS will benefit later as it enables more interactive driven)

3 Configuration issues

3.1 Workflow issues

The following workflows are included:

Workflow	Contents	Run
XX_import	import historic observation data (if place in the proper FSS-folder) imports aquifer properties	once via Manual Forecast display
XX_default_scenarios	runs the default scenarios (Historic, Naturalized, recent Actual, fully Licenced) <ul style="list-style-type: none"> ▪ runs the Modflow model ▪ derives the tributary inflows to the main river branches ▪ interpolates grid data to points and profiles ▪ compares the results against the Naturalized run 	once via Manual Forecast display
XX_modified_Historic	what-if scenario for the Historic run: <ul style="list-style-type: none"> ▪ runs the Modflow models ▪ retrieves transient model inputs (recharge, abstractions) and model results ▪ derives the tributary inflows to the main river branches ▪ interpolates grid data to points and profiles ▪ compares the results against the default Calibrated Historic run 	defined but not accessible in the Scenario Editor
XX_modified_RecentActual	what-if scenario for the RecentActual run: <ul style="list-style-type: none"> ▪ changes abstraction rates of the default RecentActual run ▪ runs the Modflow model ▪ retrieves transient model results ▪ derives the tributary inflows to the main river branches ▪ interpolates grid data to points and profiles ▪ compares the results against the default Recent Actual run 	multiple via the Scenario Editor

Workflow	Contents	Run
XX_modified_FullyLicenced	what-if scenario for the FullyLicenced run: <ul style="list-style-type: none"> ▪ changes abstraction rates of the default FullyLicenced run ▪ add new abstractions to the FullyLicenced run ▪ runs the Modflow model ▪ retrieves transient model results ▪ derives the tributary inflows to the main river branches ▪ interpolates grid data to points and profiles ▪ compares the results against the default FullyLicenced run 	multiple via the Scenario Editor
XX_modified_LongTermAverage	what-if scenario for the LongTermAverage run: <ul style="list-style-type: none"> ▪ changes abstraction rates of the default LongTermAverage run ▪ add new abstractions to the LongTermAverage runs ▪ accommodates choice of recharge files ▪ runs the Modflow model ▪ retrieves transient model results ▪ derives the tributary inflows to the main river branches ▪ interpolates grid data to points and profiles ▪ compares the results against the default LongTermAverage run 	multiple via the Scenario Editor. NB: choice of recharge files not yet configured in Scenario Editor

Important notes:

- The scenario editor has not yet been configured to define or run a modified-historic scenario
- The scenario editor has been configured to add new abstractions for demo purposes. However, the appropriate workflow to feed these new abstractions to the model didn't pass the test in time. Therefore, new abstractions are not yet fed into the model run.
In other words, a modified scenario only computes the results of modifications to new abstractions.

3.2 State issues

For each model, the following model states have been computed and placed in a separate Modflow input file (the BAS file) for selection and use in the Scenario Editor. The data associated to each state is model dependent.

- InitialCold: the initial state of the model as provided
- InitialWarm: initial heads typically 01-01-1970)
- MostRecent: most recent heads computed with provided model runs.

- DryConditions: heads from selected date representing dry hydrological conditions (date is model dependent)
- WetConditions heads from selected date representing wet hydrological conditions (date is model dependent)
- AvgConditions heads from selected date representing average hydrological conditions (date is model dependent)

Important notes:

- Factory tests have been conducted for runs starting from an InitialCold state only.
- Stress period patterns in all BAS files (i.e. accounting for differences in month lengths) start from January, even while the heads account for a different moment. The workflow to update the recharge data and stress periods (accounting for leap years etc.) based on the selected state has not passed the factory-test in time. Therefore, selection of states other than the InitialCold state may result in strange date patterns due to difference in the length of a month.

3.3 Synchronization

3.3.1 Configuration distribution

This release uses the 2007/01 facility to distribute and update configurations from the central database. This allows the system administrators to automatically distribute of configuration patches or GIS-file updates via the systems synchronization protocols.

As a result, of this distribution method, each deletion of a localDatastore will require a full download of the configuration.

3.3.2 Model data retrieval

The model data retrieval is based on three synchronisation profiles, each having a different scope of data being included. The 0.9 release bug, which prevented synchronization of grids of non-approved runs, has been fixed.

Table 3.1 provides an overview of the type of data included in each synchronization profile.

Table 3.1 Data contents of sncronization profiles

Profile	Minimal	Custom (Merged Grids)	Custom (Head Details)	Custom (Flow details)	Full
Data types					
Point locations <ul style="list-style-type: none"> ▪ Observation boreholes ▪ Gauging stations ▪ Abstraction wells ▪ SW laterals 	×	×	×	×	×
GW units	×	×	×	×	×
Accretion Profiles	×	×	×	×	×

Aquifer properties	×	×	×	×	×
Recharge		×			×
Surface water flows		×			×
Upper GW table		×			×
Total cell flows		×			×
Heads for individual layers			×		×
Cell flows for individual layers				×	×

Table 3.2 provides an indication of the data set size for the default_scenarios workflow for each of the models included.

Table 3.2 Estimated data set sizes for the default_scenarios workflow

Model	Minimum	Custom (merged grids only)	Full
WMW	2.2 MB	<i>to be filled in</i>	1 Gb
TI	2.2 MB	<i>to be filled in</i>	2 Gb
KV	2.3 MB	<i>to be filled in</i>	<i>to be filled in</i>
YNN	2.3 MB	<i>to be filled in</i>	11 Gb

3.3.3 Approved and non-approved runs

Approved runs have a green triangle. They are synchronised automatically to all users who log on. The amount of data being synchronised depends on the profile chosen at logon.

Non approved runs have to be downloaded manually.

To prevent that people have to wait for hours when logging on, it is recommended that only one successful XX_default_scenarios workflow is approved per model. All other runs should be downloaded manually.

If a model run has been downloaded with minimal profile and one would like to view spatial plots, the user should delete its database and log on again with a custom or full profile. Please allow for sufficient time to synchronize.

NB acquiring the download times should be one of the main purposes of the tests to be conducted.

3.4 Budget computations

For the budget computations, we've used the methods as described in Table 3.3. A content check on the outcome is desirable as we are not yet convinced that it is OK.

Table 3.3 Budget calculation method

Parameter	Method
Storage change	Sum (proportional) values of all grid cells in the polygon,

	skipping missing values
Cell flows	Sum (proportional) values of all grid cells in the polygon, skipping missing values
SW laterals (abstractions and discharges)	Sum (proportional) values of all grid cells in the polygon, skipping missing values
GW abstractions	Sum of all abstractions in the polygon
Recharge	area average (m/d) * area surface (m ²)

Missing values may occur if the polygon representing the GW unit outreaches the model grid. Further checks and tests are required to find out if this is the only reason for missing values.

4 Regional application issues

4.1 Anglian/YNN

Outstanding configuration issues:

- GIS-files: wetlands (to be provided)
- model documentation (to be provided)
- location information checks (some missing items have been spotted in the spreadsheets provide, need another XML-update to fix those empty locations)

Checks on model outputs are highly desirable. Inspection of factory test results has shown that some observation boreholes have been placed in layer 1 while the model only has active cells in layer 2-6.

Specific checks on budgets required.

4.2 Southern/TI

Outstanding configuration issues:

- GIS-files: wetlands (to be provided)
- model documentation (to be provided)

Limited factory test conducted on LongTermAverage run,

General on model outputs are highly desirable.
Specific checks on budgets required.

4.3 Midlands/WMWI

Outstanding configuration issues:

- GIS-files: wetlands (to be provided)
- model documentation (to be provided)

Checks on model outputs are highly desirable. Some river flows seem to deviate a bit from the original data provided.

Specific checks on budgets required.

4.4 Thames/KV

Due to the 3-day time step, bulky model results are produced. Currently the FEWS-software cannot post process the entire simulation in one go. Therefore, an additional state (MidWarm) has been defined. To obtain the default_scenario results for the entire simulation period (1971-2004), one should dispatch the KV_default_scenarios workflow twice. The first task starts with the InitialWarm state (01-01-1971). The second task starts with the MidWarm state (01-09-1987).

Outstanding configuration issues:

- GIS-files: wetlands (has been provided, to be included)
- model documentation (has been provided, to be included)

Checks on model outputs are highly desirable.

Specific checks on budgets required.