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National Groundwater Modelling System

Release Documentation

Release 105330_NGMS_1.2

February, 2008

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Release Document
NGMS 1.1 (software version development build) | | | | | | |

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Preface

The document describes NGMS release 1.2, based on development build of DelftFEWS. The Master Controller is based on stable release 2007/02 (buildnr. 16492).

The release documentation includes the following information:
- software functionality changes and extensions
- general configuration issues
- regional application issues

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Preface

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1 Introduction

This document provides information regarding the NGMS release 1.2, based on development build. This version will be shipping to the EA on February 13, 2008.

This document describes:
- software functionality incorporated
- software functionality outstanding
- configuration functionality incorporated
- configuration functionality outstanding
- regional issues

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2   Software functionality

2.1   New in this Software Release

In the next sections the new features being useful for NGMS will be described. Some developments for Dutch water boards line up nicely with NGMS requests.

2.1.1   Operator Client

A selection of useful software improvements and new features since release 105330_NGMS_1.1 (December 2007).

Component	(NGMS related ISSUE nr) Feature	Developed for
Explorer	Child locations available in filters list	Dutch Waterboards
	(1124) Allow different colours for different polygons in one ESRI shape file	NGMS
	(1056) restrict filters access based on ViewPermission (not configured yet)	NGMS
Time Series Display	(1285) bug fix: moving Average exception should not occur for daysOfMonth	
	(1288) Add instructions at empty 'info' row to obtain descriptive statistics	NGMS
	(1289) Add copy-paste functionality for descriptive tables	NGMS
	(1321) bug fix: exception when view period is changed for longitudinal profile	NGMS
	(1365) Statistics should accommodate reverse interpretation of percentage	NGMS
	(1054) ViewPermission added for Shortcuts to hide locations (not configured yet)	NGMS
Spatial Display	(96) Classification rendering; i.e. right mouse click option which automatically adjust classification breaks based on data values within zoom extent	NGMS
	(1050) Ability to save/reload sketched cross section	NGMS
	(1051) Allow drawing a polygon to compute volume/budget inside polygon (Shift+click to start, intermediate vertices=click, double click to close polygon and release mouse)	NGMS
	(1056) Plot access restrictions based on ViewPermission	NGMS

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Component	(NGMS related ISSUE nr) Feature	Developed for
	(1124) Allow different colours for different polygons in one ESRI shape file	NGMS
	(1125) GIS-tooltip button to overrules tooltip of grid time series	NGMS
	(1126) animation speed, has been slowed down is configurable per plot	NGMS
	(1127) Ability to specify (relative) end time of animation	NGMS
	(1371) Allow on-the-fly massBalance for multiple grid layers	NGMS
Workflow	(1014) Extend authentification to workflow: viewPermission, runPermission, approvePermission; not configured yet	NGMS
Forecast Management	(1014, 1052) Manage access to forecasts based on workflows (viewPermission, runPermission, approvePermission); not configured yet	NGMS
Manual Forecast	(1014, 1052) Manage access to forecasts based on workflows (runPermission, approvePermission); not configured yet	NGMS
ScenarioEditor	(1053) Restrict scenario management functionality based on permissions (edit, persist/lock, create, delete, run); not configured yet	NGMS

2.1.2   FEWS Modules

The following bug fixes and new features have been implemented:

Component	Feature	Developed for
Transformation	(1048) Accommodate grid statistics	NGMS

2.1.3   Config Manager

The following enhancements and bug fixes have been implemented…

Component	Action
ConfigEditor	Ability to automatically upload location changes

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2.1.4   Admin Interface & Master Controller

The following enhancements and bug fixes have been implemented…

Component	Feature	Developed for
Synchronisation	in test phase	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
Datamodel	Added 'sample' data-format for water quality samples	Dutch Waterboards
Database	Update local datastore to Firebird v.2.1 database format (required for new synchronisation)	general purpose investment

2.1.6   Module Adapter

Component	Feature	Developed for
Modflow Module Adapter	bug fixes: ▪ BAS_TEMPLATE (generate BAS-template for LAST STEP) ▪ BAS_IN (stress period updating) ▪ WELLS_ADD (adding wells)	NGMS

2.2   Known bugs

2.2.1   NGMS-Modflow Module Adapter interaction

Stress period updating works fine. The issue to add new wells has also been solved.

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Since the STR-file updating has not been severely tested so far, some bugs are expected when NGMS starts to use this functionality.

2.2.2   Scenario Editor

The dates shown when in the table editor when specifying a new time series are not always as expected. Sometimes dates are shown relative to the current system time, some times not.

Currently, the editor creates new values at dates relative to the system time. A feature will be added to enable 'fixing' the date to the calendar date as shown in the table.

2.3   Outstanding issues

The CCN2008/02 proposal, i.e. the follow up plan for PR08, lists all software development issues currently outstanding for NGMS. Features listed below may need to be revisited/discussed again.

2.3.1   Operator Client

Component	Feature	Remark
Spatial Display	(111) Double click should add time series to existing graph	skipped
	Geology/borehole viewer, overtaken by (1370): show top/bottom of model layer when drawing a cross section in the spatial display	overtaken by 1370

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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) ▪ 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_modifed_Historic	what-if scenario for the Historic run: ▪ 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: ▪ 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 runs via the Scenario Editor

Workflow	Contents	Run
XX_modified_FullyLicenced	what-if scenario for the FullyLicenced run: ▪ 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 runs via the Scenario Editor
XX_modified_LongTermAverage	what-if scenario for the LongTermAverage run: ▪ 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, <u>new abstractions are not yet fed into the model</u> 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.
- What-if scenarios are by default 10 years in length. Longer runs require setting the run length to the suggested value in the scenario editor.
- In issue is still outstanding with respect to the leap year 2000. The date switch may cause missing values.

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

Table 3.1 Data contents of snchronization profiles

Profile	Minimal	Custom (Merged Grids)	Custom (Head Details)	Custom (Flow details)	Full
Data types					
Point locations ■ Observation boreholes ■ Gauging stations ■ Abstraction wells ■ SW laterals	×	×	×	×	×
GW units	×	×	×	×	×
Accretion Profiles	×	×	×	×	×
Aquifer properties	×	×	×	×	×
Recharge		×			×

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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			1 Gb
TI			
KV			
YNN			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. Please be aware that whatif-scenarios can only be compared against an approved XX_default_scenarios run.

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. Since the horizontal flows are not properly computed, the zone budget algorithm of Modflow has been incorporated in the software. Due to a software bug, the workflow doesn't use this functionality yet.

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 (m2)

Missing values may occur if the polygon representing the GW unit outreaches the model grid.

4   Regional application issues

4.1   General

What-if scenarios are conducted with the recharge and GW abstractions being provided by the NGMS-database. Intermediate tests have shown that this input resulted in inappropriate Modflow runs, with 'Not available' values appearing from stress period 3. The problems were caused by a data compression which was set too tight for those input values. Hence the parameter settings have been adjusted to prevent undesirable impacts of data compression.

4.2   Anglian (YNN and EO)

Outstanding configuration issues:
- GIS-files: wetlands (to be provided)
- model documentation (to be provided)
- (new) update configuration for mass balance/GW budget computation

Checks on model outputs are highly desirable. Inspection of factory test results has shown that some observation boreholes of YNN have been placed in layer 1 while the model only has active cells in layer 2-6. EO IdMapping, linking locations to model data, needs major improvement.

Changes compared to release 105330_NGMS_1.1:
- migration to equidistant daysOfMonth time stepping completed (accommodates duration curves and statistics)
- added Ely Ouse and merged with YNN

4.3   Southern (TI)

Outstanding configuration issues:
- GIS-files: wetlands (to be provided)
- model documentation (to be provided)
- (new) update configuration for mass balance/GW budget computation

Limited factory test are conducted on LongTermAverage run,
Checks on model outputs are highly desirable.

Changes compared to release 105330_NGMS_1.0:
- added Intel compiled version of MFSSQ-code
- migration to equidistant daysOfMonth time stepping completed (accommodates duration curves and statistics)

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4.4   Midlands (WMW)

Outstanding configuration issues:
- GIS-files: wetlands (to be provided)
- model documentation (to be provided)
- (new) update configuration for mass balance/GW budget computation

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

Changes compared to release 105330_NGMS_1.1:
- migration to equidistant daysOfMonth time stepping completed (accommodates duration curves and statistics)

4.5   Thames (KV)

After the familiarization workshop, it appeared that the results of the West Berkshire Groundwater Study had not been included in the model provided. The data has been provided and incorporated.

Outstanding configuration issues:
- GIS-files: wetlands (provision incomplete, to be included)
- model documentation (has been provided, to be included)
- (new) update configuration for mass balance/GW budget computation

Checks on model outputs are highly desirable.

Changes compared to release 105330_NGMS_1.1:
- defined output for every stress period instead of every step
- fixed errors in new WBGWS data and the WEL/STR-files
- migration to equidistant daysOfMonth time stepping completed (accommodates duration curves and statistics)

4.6   SouthWest (HA)

ESI has developed the first version of the SouthWest-application with the Hampshire Avon model. Some minor parts of the configuration have not yet been completed.

Outstanding configuration issues:
- GIS-files (have been provided, to be included)
- model documentation (has not been provided, to be included)
- (new) update configuration for mass balance/GW budget computation
- migration to equidistant daysOfMonth time stepping completed (accommodates duration curves and statistics)

Checks on model outputs are highly desirable.

Changes compared to release 105330_NGMS_1.1:

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- horizontal and upwards flows are included
- derivation of tributary inflows
- what-if scenarios for modified recent actual
- new application

4.7   Wales (WYE)

Based on the database provided for the Wye catchment, an initial application for Wales has been developed. Given the queries on inconsistencies on the data provided, it is recommended to obtain data from WISKI to be incorporated in the system.

Outstanding configuration issues:
- time series data to be provided from WISKI
- GIS-files (have been provided, to be included)
- documentation (have been provided, to be included)

Checks and instructions for further development on this application are highly desirable.

Changes compared to release 105330_NGMS_1.0:
- new application