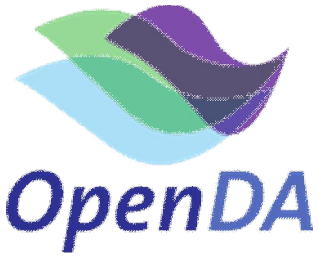

RELEASE NOTES

OPENDA 2.0

(december 2011)

TU Delft Delft University of Technology

Deltares Enabling Delta Life

VORTECH BV THE SCIENTIFIC SOFTWARE ENGINEERS

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1 Introduction

These release notes are part of the OpenDA 2.0 release. Version 2.0 is based on the trunk version of OpenDA of december 2011. Version 1.0 did not contain release notes.

OpenDA has been much improved from version 1.0 to 2.0. To give an impression: the number of modifications of the source code (in subversion) went from 1630 to almost 3000. The number of changes is too large to describe in detail. Here we list only three major changes:

1. The support for real-time data-assimilation, such as ensemble-Kalman filtering or 3D-VAR is now improved. Features such as restarting, output to NetCDF and noise-specification were added or completely refactored. The performance and stability of the code has also improved.
2. Two additional platforms are supported: 64-bit Linux and darwin for Apple pc's and laptops.
3. The support for new users is improved with better documentation, examples and a course with presentations and exercises, all of which are available on-line at our web site.

2 Information for users

Since the launch of OpenDA version 1.0 in May 2010, much effort was put into improving the reliability and robustness of OpenDA. In addition, new features and algorithms have been added.

OpenDA version 2.0 provides the following functionality:

- Model calibration algorithms
  - Dud
  - Sparse Dud
  - Simplex
  - Powell
  - Gridded full search
  - SCE (Shuffled Complex Evolution)
  - GLUE (Generalized Likelihood Uncertainty Estimation)
  - CG (Conjugate Gradient: Fleetjer-Reeves, Polak-Ribiere, Steepest Descent)
  - (L)BFGS

- Cost functions
  - SimulationKwadraticCostFunction
  - RosenbrockCostFunctionR
  - MSECostFunction

- Data assimilation options
  - Ensemble KF (EnKF)
  - Ensemble SquareRoot KF (EnSR)
  - Steady State KF
  - Particle Filter
  - 3DVar
  - DudEnKF (still under research)
  - DudEnSR (still under research)

- (Stochastic) Simulation options
    - SequentialSimulation
    - SequentialEnsembleSimulation

All documentation is included in the download. The information in the doc directory always corresponds to the downloaded version of the code. The documentation on the website (http://www.openda.org) corresponds to the most recent stable release of OpenDA.

3 Information for Programmers

3.1 JUnit tests

JUnit tests are available for all OpenDA classes.

3.2 Automatic build and test runs

As of January 2012, automatic build and test runs of the OpenDA project are performed every night. The automated test suite is running with Java version 1.6 on

- 32-bit Linux
- 32-bit Windows

More details on the automatic build and test runs can be found and are kept up to date on the OpenDA wiki site that is accessible for OpenDA developers.

The code that is available through SourceForge has always passed this nightly test suite.

3.3 Restructuring of exchange item and data object interfaces

OpenDA makes use of exchange item objects for storing and exchanging data values in memory. Furthermore, it uses data objects for reading data from files into memory and for writing data from memory to files. OpenDA contains interfaces for the exchange item and data objects.
To allow for more flexibility, new versions of these interfaces are currently being developed, in parallel to the original interfaces. These new interfaces will allow to store and exchange metadata in addition to the data itself. Also, converting data between different formats will be a lot easier using the new interfaces.

For this development, the interface *IExchangeItem* is renamed to *IPrevExchangeItem*. Apart from the name change of this interface, the existing OpenDA code is not affected by the development of these new interfaces.
The old and new names of the interfaces are:

OPENDA 1.0	**OPENDA 2.0**
org.openda.interfaces.IExchangeItem	org.openda.interfaces.IPrevExchangeItem
-	org.openda.interfaces.IExchangeItem
org.openda.blackbox.interfaces.IoObjectInterface	org.openda.blackbox.interfaces.IoObjectInterface
-	org.openda.interfaces.IDataObject

Most parts of OpenDA recognize the classes that implement the old interfaces and the classes that implement the new interfaces. Therefore, the existing exchange items and data objects will continue to work. New implementations of exchange items and data objects should implement the new interfaces to take advantage of the new possibilities that these offer.

However, as these interfaces refer to work in progress, please keep in mind that it is possible that they will change in the near future. When that happens the implementing classes will need to be changed accordingly. While the new interfaces are further developed, the existing exchange item and data objects will be migrated to the new interfaces one by one, when the need arises.

OpenDA also contains tools for copying and dumping data:

- org.openda.exchange.iotools.ioCopier
- org.openda.exchange.iotools.ioDumper
- org.openda.exchange.iotools.DataCopier
- org.openda.exchange.iotools.DataDumper

DataCopier and DataDumper are the new versions of repectively ioCopier and ioDumper and they work in the same way as the old versions. The ioCopier and ioDumper only work for classes that implement the old interfaces. The DataCopier and DataDumper only work for classes that implement the new interfaces.

4 Compatibility with version 1.0

All functionality of version 1.0 is still available. However, changes have been made to some xml-files and the location and contents of some xsd-files have changed. Also, some classes have been moved. You can find examples for all possible xml-files in directory `core/xmlSchemas/examples`. Depending on your application, it may be necessary to change your input files to match the new layout. It is recommended to use an xml-editor with xsd-support.

5 Known bugs

This release contains the following known bugs:

- The restart functionality for the EnKF algorithm fails in one specific situation: if the moment of restart coincides *exactly* with an observation time. In that case, the EnKF algorithm assimilates the observation data twice, both before and after the moment of restart.

  This problem is easily circumvented by changing the input: make sure the restart- and observation time do not coincide exactly.

6 Configuration

OpenDA 2.0 is build with:

- Sun (Oracle) Java version 1.6 standard edition
- ifort 11.x (Windows)
- GFortran (Mac and Linux)
- mpich2 version 1.3.2
- NetCDF 4.1.1 (without NetCDF4 and OPeNDAP support)

The native components of OpenDA 2.0 are available for

- 32- and 64-bit Linux
- Mac
- 32-bit Windows

(end document)