

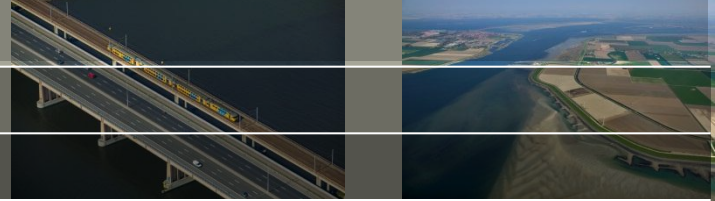


# **D-Water Quality modelling with DELWAQ: Open source code compiling and start modelling in Windows**

**Webinar, March 13, 2013  
Michel Jeuken**



# Webinar overview

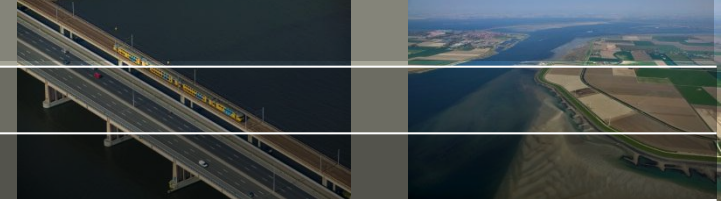


- Introduction
- Quick walkthrough getting and compiling Delft3D and DELWAQ
- Short tour through the source code of DELWAQ
- Common errors when trying to run DELWAQ in debug mode
- Performing a D-Water Quality calculation using the Delft3D GUI
- Questions & answers

An aerial photograph of a coastal area. A large body of water is on the left, with a green dike or embankment running along the shore. Behind the dike, there are various agricultural fields in shades of green and brown. In the distance, a small town or village is visible on the left side. The sky is clear and blue.

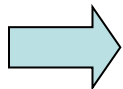
# Introduction

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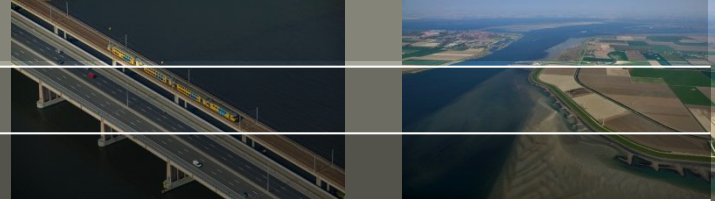
About this webinar:

Presenter: Michel Jeuken  
Organization: Roderik Hoekstra  
Cooperators: Jan van Beek  
Adri Mourits



Use the webinar chat option for questions

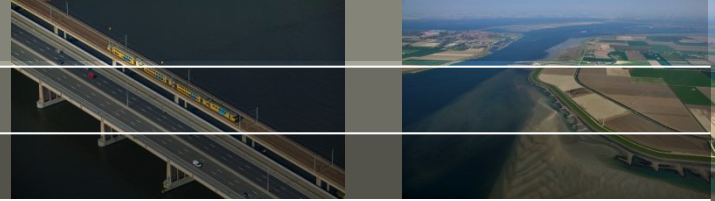
# Introduction



Assumed knowledge to follow this webinar

- Just some general knowledge about (what is):
  - Downloading
  - Source code
  - Compiling
  - Binaries (executable, dlls)
  - Run a simulation
- Advised:
  - What is water quality modelling
  - What is Subversion?

# Introduction



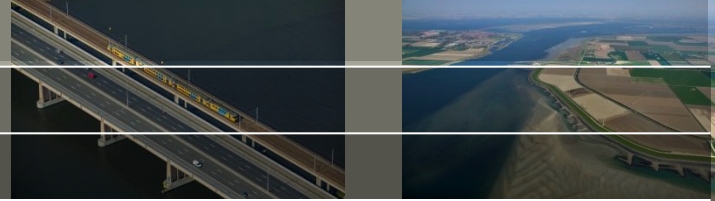
Previous webinars on compiling and running Delft3D:

- January 2012 webinar: [Compiling on Linux](#)
- February 2012 webinar: [Compiling on Windows](#)

This webinar:

- Compiling and running **DELWAQ D-Water Quality** on **Windows**
- DELWAQ also compiles and runs on Linux. We tested this using the both the Intel Fortran compiler and GNU Fortran compiler on Red Hat Enterprise

# Introduction



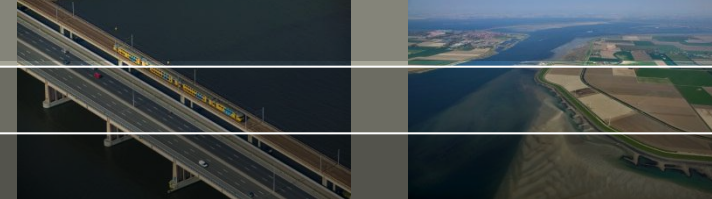
What is DELWAQ D-Water Quality modelling?

- selective modelling of substance and process
- library with substances (>140) and processes (>100)
- several numerical schemes for different requirements
- grid aggregation of the flow grid (2D and 3D)
- output option of derived parameters
- statistical output

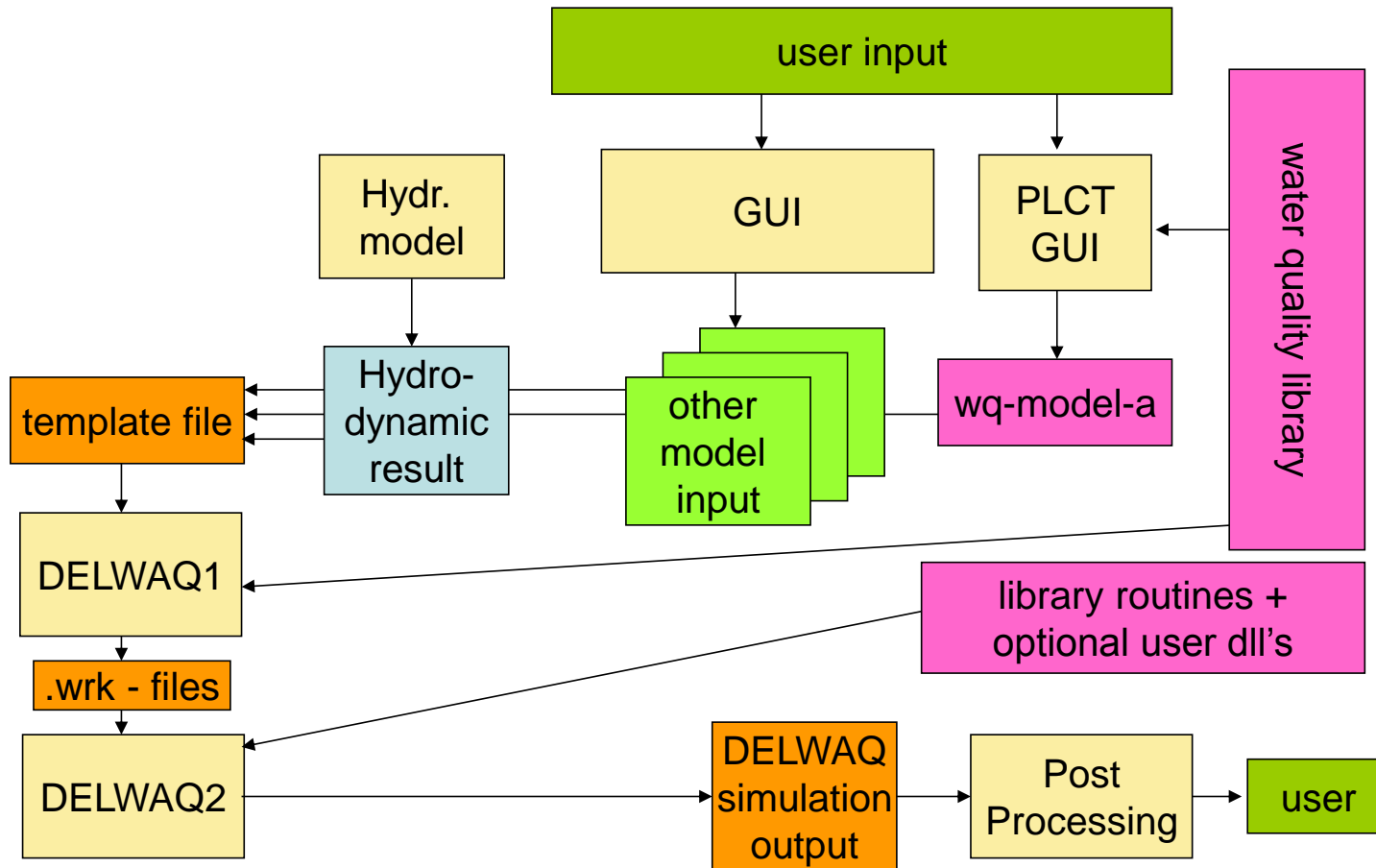
What is in open source?

- delwaq1.exe & delwaq1\_lib.dll (pre-processing input)
- delwaq2.exe & delwaq2\_lib.dll (actual computational kernel)
- This includes the full processes library

# Introduction



Where are delwaq1 delwaq2 used?

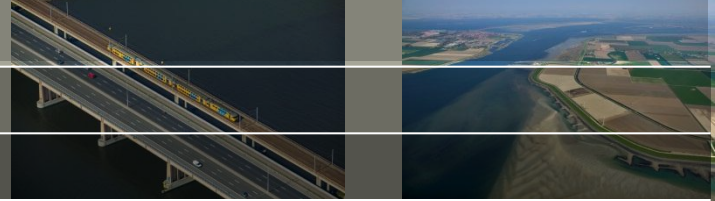




An aerial photograph showing a coastal region. On the left, a large body of water (likely a bay or estuary) meets a town with red-roofed buildings. To the right, a large agricultural area is protected by a long dike. A prominent storm surge barrier with several concrete pillars is visible in the foreground, separating the land from the water. The fields are a mix of green and brown, indicating different crops or stages of cultivation.

# Prerequisites

# Prerequisites



... for working with the Delft3D-FLOW/-WAVE/-DELWAQ open source code:

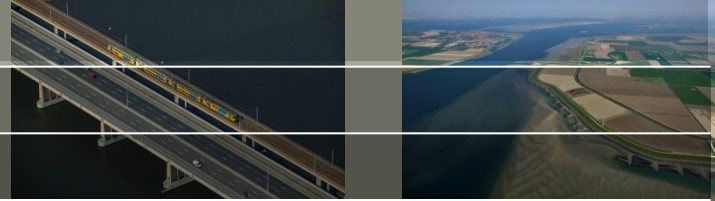
[www.oss.deltares.nl](http://www.oss.deltares.nl) -> Delft3D -> Download -> Source code ->

## 1. Prerequisites

- TortoiseSVN ([www.tortoisesvn.net](http://www.tortoisesvn.net)) (this webinar: 1.7)
- [Microsoft VisualStudio 2008/2010](#) (this webinar: 2010)
- [Intel Fortran compiler 11.0 or higher](#) (this webinar: 12.0)

Also used in this webinar: Total Commander ([www.ghisler.com](http://www.ghisler.com))  
(for exploring files/directories)

# Prerequisites



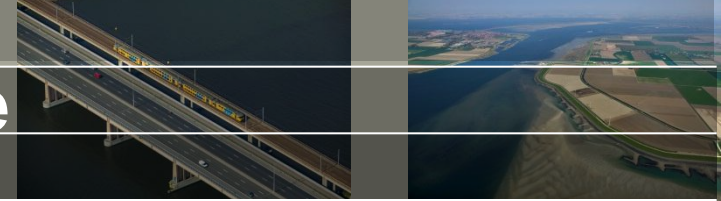
To run a water quality model you also need output from a hydraulic model like:

- Delft3D
- SOBEK (Not open source)
- Telemac

An aerial photograph of a coastal region. A large, dark blue body of water occupies the left side of the frame. A prominent green dike runs along the coast, separating the water from a large area of agricultural fields. The fields are divided into various colored plots, including green, brown, and tan. In the background, a small town or village is visible on the left side. The sky is clear and blue.

**Downloading the source code**

# Downloading the source code



First: register on [www.oss.deltares.nl](http://www.oss.deltares.nl) -> Delft3D -> Getting started

Then: follow [www.oss.deltares.nl](http://www.oss.deltares.nl) -> Delft3D -> Download

-> Source code -> 3. Download the source code

SVN repository:

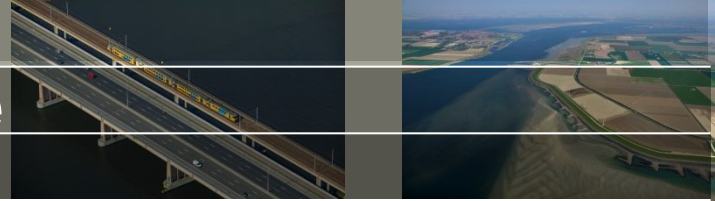
- Trunk, main line:
  - Fixing bugs, new developments being merged in, being tested  
=> Possibly not stable
- Tags: 

Always start with a tagged version!

  - Copies of stable, fully tested Trunk-revisions
- Branches:
  - Separate develop versions
  - “Your own private version”

We will refer to the folder where you downloaded the code as  
<myCode>

# Downloading the source code



Switching to hands on of downloading the source code

Using tagged version **research/2360**:

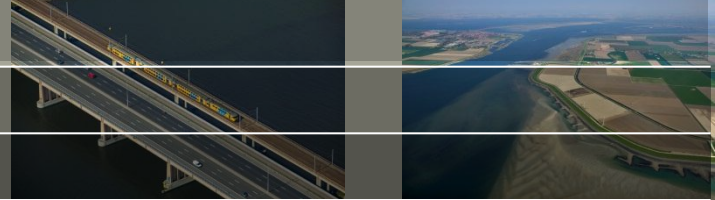
<https://svn.oss.deltares.nl/repos/delft3d/tags/research/2360>

NOTE: Because of current developments in flow, there is no tagged version of delft3d oss with DELWAQ. We temporarily tagged a version with a stable DELWAQ code that includes a flow that didn't pass the test bench.

An aerial photograph of a coastal region. On the left, a large body of water (likely a bay or estuary) flows towards the foreground. A town with numerous buildings is situated on a peninsula in the upper left. To the right, a large area of agricultural land is visible, divided into various colored plots (green, brown, tan). A prominent green dike or levee runs along the water's edge, separating the land from the water. The sky is clear and blue.

# Compiling the source code

# Compiling the source code



[www.oss.deltares.nl](http://www.oss.deltares.nl) -> Delft3D -> Download -> Source code

-> 4. Compile the source code

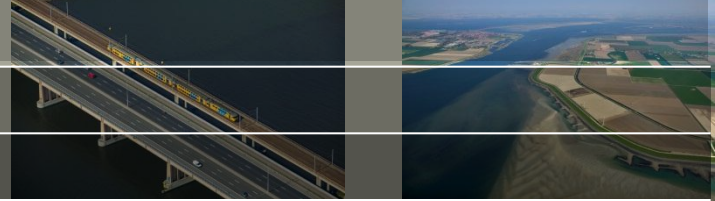
1. Open `<myCode>\src\d_hydro_open_source.sln` in VS2008  
or `<myCode>\src\d_hydro_open_source_vs2010.sln` in VS2010
2. Select the "solution configuration" you want: Debug or Release
3. `<Ctrl><Shift>B`
4. The binaries are installed in directory  
`<myCode>\bin\win32` (when building a release)

or in the subdirectory of the executable, e.g.

`<myCode>\src\engines_gpl\waq\bin\Debug` (when building a debug)



# Compiling the source code



Switch to hands on of compiling the source code

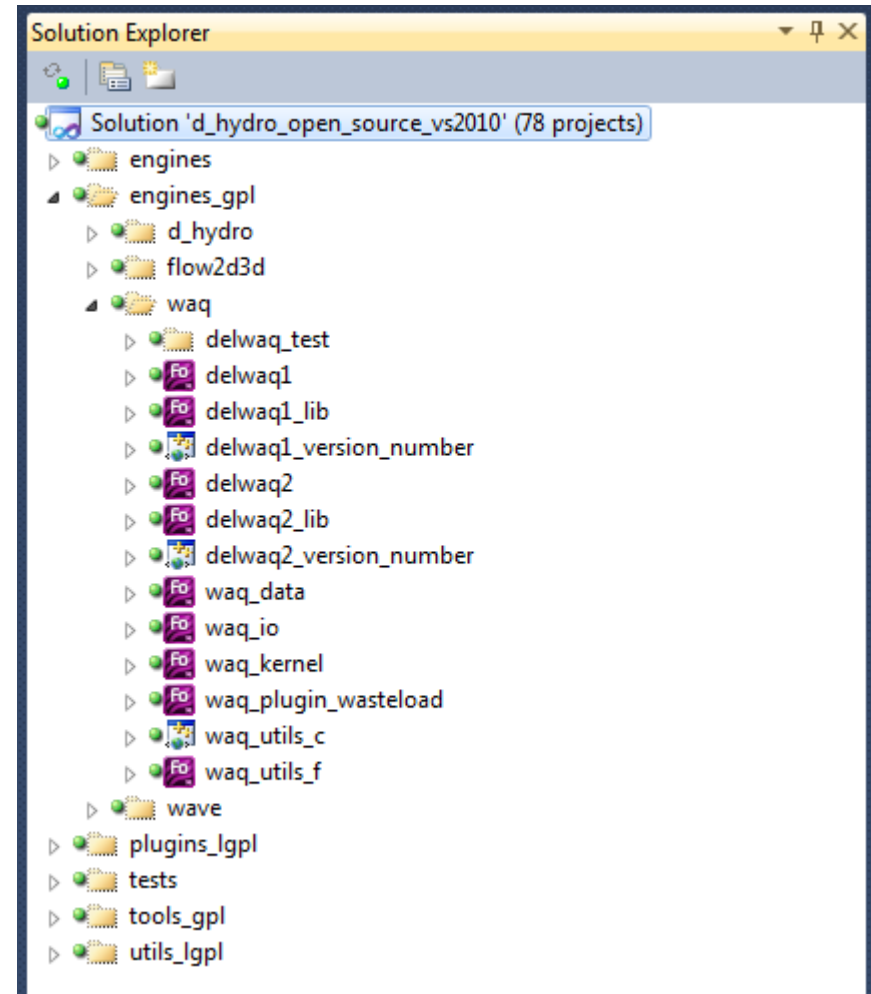
An aerial photograph of a Dutch polder landscape. A prominent dike runs diagonally across the frame, separating a large body of water on the left from a polder on the right. The polder is divided into various agricultural fields, some green and some brown. In the background, a small town is visible. The sky is clear and blue.

# Short tour through the source-code of DELWAQ

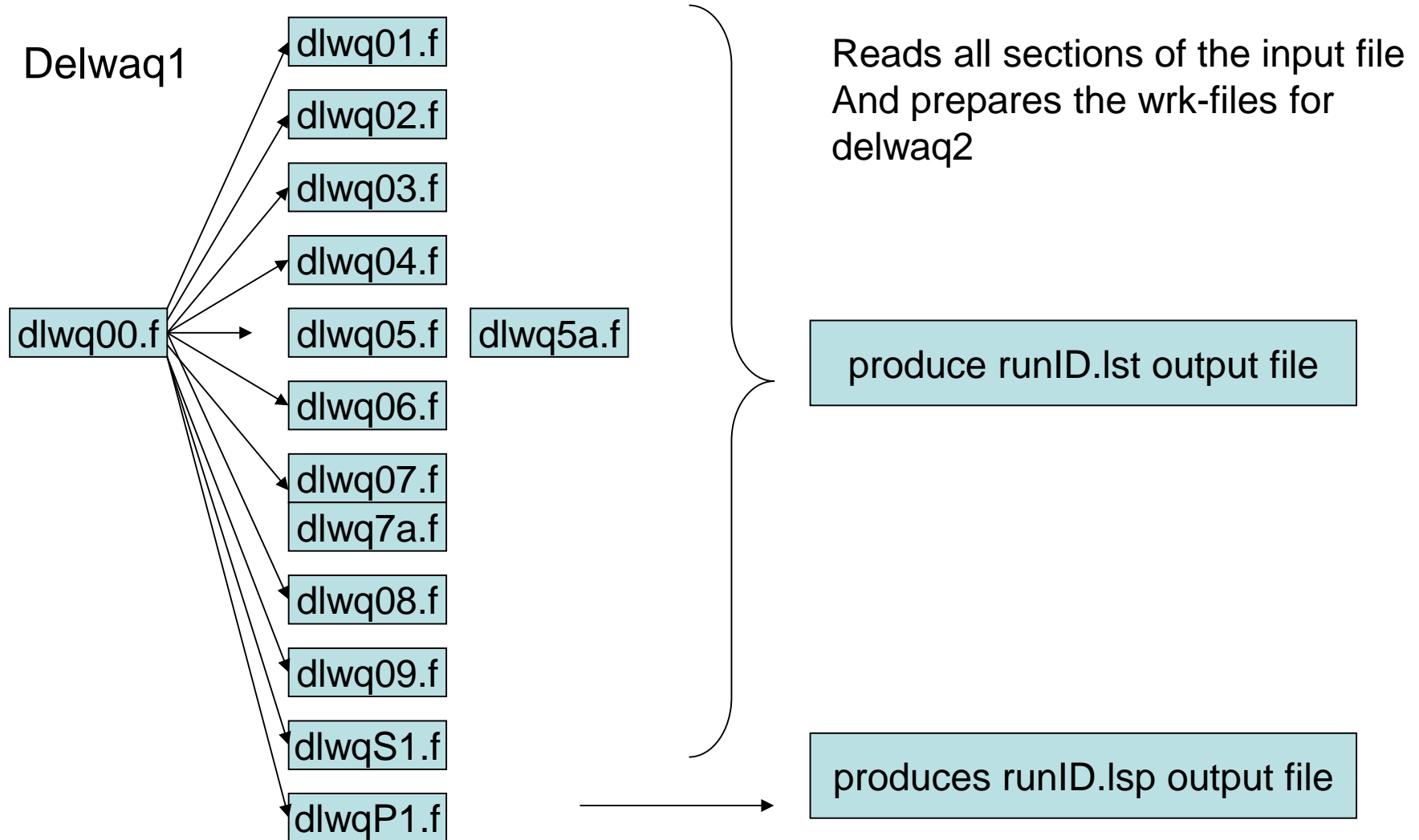
# Short tour through the source-code of DELWAQ

## Hands on in Visual Studio

- delwaq1.exe which runs delwaq1\_lib.dll
- delwaq2.exe which runs delwaq2\_lib.dll
- waq\_plugin\_wasteload.dll
  
- Most of the actual code in:
  - waq\_io
  - waq\_kernel
  - waq\_utils\_c
  - waq\_utils\_f

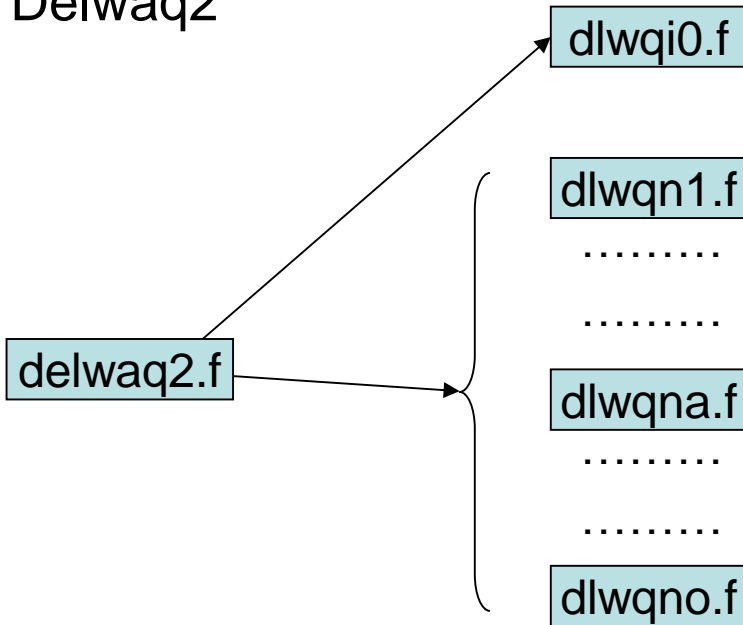


# Short tour through the source-code of DELWAQ



# Short tour through the source-code of DELWAQ

Delwaq2



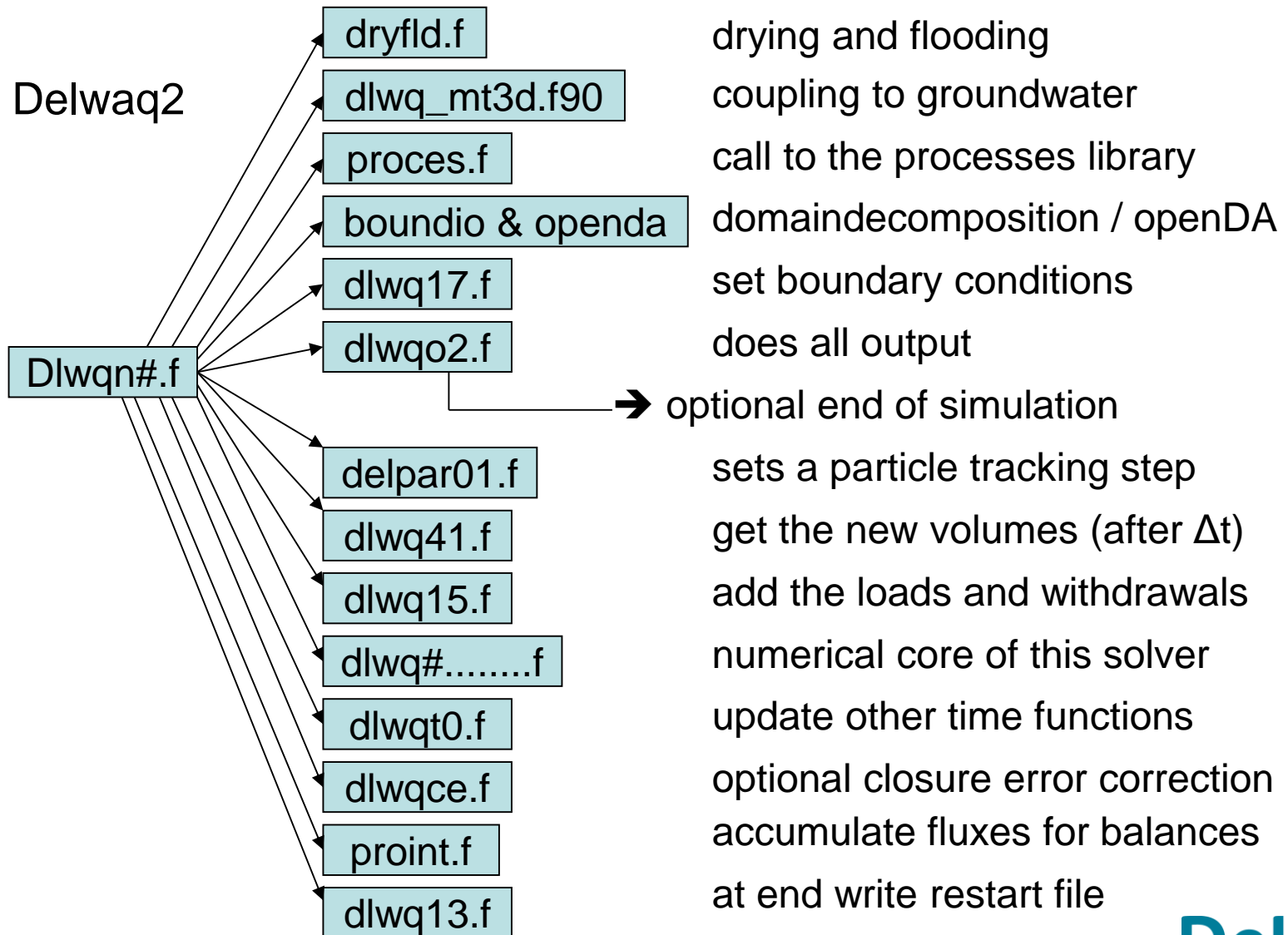
initialization

switch to 1 of the  
23 integration routines

For historical reasons:

- in 1986 a PC had 640 kB memory
- the (then 7) integration routines were placed in overlays to save memory

# Short tour through the source-code of DELWAQ



# Compiling the source code (reprise)



Test the resulting binaries:

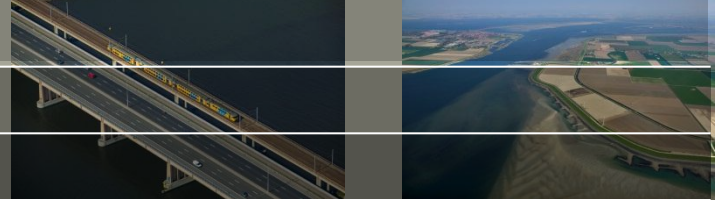
- Run the script in `<myCode>/examples/06_delwaq`

An aerial photograph of a coastal region. On the left, a large body of water (likely a bay or estuary) meets a town with numerous buildings. To the right, there are extensive agricultural fields in various shades of green and brown, separated by roads and ditches. A prominent feature is a long, narrow strip of land or a dike that runs from the town towards the bottom right, with a bridge crossing a waterway at the end. The sky is clear and blue.

# Debugging in Visual Studio



# Debugging in Visual Studio



Give the right arguments to delwaq (1+2):

- Compile the debug version
- Set the right start-up project
- Set the correct working directory (1+2)
- Set the name of the inp-project file (1+2) and  
-p "<myCode>\bin\win32\waq\default\proc\_def" as arguments  
(1 only)
- Add a breakpoint
- And start debugging...
  
- Hands on example data: <myCode>/examples/06\_delwaq

An aerial photograph of a coastal region. A large body of water is on the left, with a dike and a road running along the coast. The land is divided into various agricultural plots, some green and some brown. In the background, a town is visible. The sky is clear and blue.

# Running D-Water Quality using the Delft3D GUI

# Running D-Water Quality using the Delft3D GUI

Obtaining the GUI for the open source engines:

- Visit <http://oss.deltares.nl/web/delft3d/source-code>
- Send a mail to receive a download link to:  
delft3d\_ohmw\_4.01.00.rc.01.zip
- Unzip the contents of Delft3D folder in the zip-file to a desired location (e.g. C:\delft3d\_ohmw\_4.01.00.rc.01\
  - We will refer to the folder where you downloaded the code as <myDelft3D>
- Run <myDelft3D>\substitute\_delft3d\_env.bat
- Don't forget to copy the binaries you created from the Delft3D oss source!
  - Copy <myCode>\bin\win32 to <myDelft3D>\win32
- To start the GUI run <myDelft3D>\Delft3D\d3d\_menu.bat

# Running D-Water Quality using the Delft3D GUI



Switching to hands on running DELWAQ with the GUI

Tutorial data can be found in:

<myDelft3D>\tutorial\waq\friesian\_tidal\_inlet

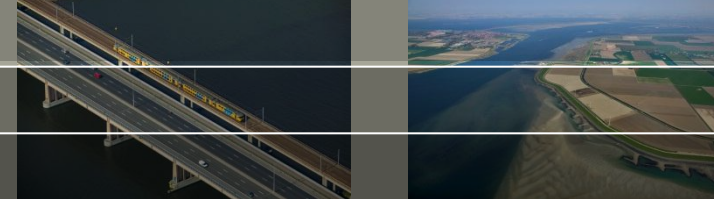
Problems running DELWAQ?

First look in **lst** and **isp** file (delwaq1) and the **mon** file (delwaq2)

An aerial photograph showing a coastal area. On the left, a large body of water (likely a bay or estuary) meets the land. A town with numerous buildings is visible on the left side. The right side of the image is dominated by a large, flat area of agricultural fields, some of which are brown (plowed) and others are green. A prominent green dike or levee runs along the edge of the fields, separating them from the water. The sky is clear and blue.

# Questions & answers

# Questions & answers



## **Q: Where do I start from here?**

A: Read the general *User Manual*, and do the tutorial (Chapter 7):  
D-Water\_Quality\_User\_Manual.pdf

## **Q: What processes are available in DELWAQ?**

A: Read the *Processes Technical Reference Manual*:  
D-Water\_Quality\_Processes\_Technical\_Reference\_Manual.pdf

## **Q: Can I edit the DELWAQ input file without the GUI?**

A: Read the *Description Input File*:  
D-Water\_Quality\_Description\_Input\_File.pdf

## **Q: Can I use my own definition of water quality processes in DELWAQ?**

A: Yes, please read the *Open Processes Library User Manual*:  
D-Water\_Quality\_Open\_Proc\_Lib\_User\_Manual.pdf

**Find these and all other manuals in <myDelft3D>\manuals**

An aerial photograph of a coastal region. On the left, a large body of water (likely a bay or estuary) is visible. In the upper left, a town with numerous buildings is situated on a peninsula. The central and right portions of the image are dominated by a large, green dike system that separates the land from the water. Behind the dike, there are various agricultural fields in shades of brown, tan, and green. A bridge with several concrete piers crosses the dike, connecting the land to the water. The sky is clear and blue.

# General Delft3D Questions & answers

# General Delft3D questions & answers



**Q: Can I get pre-built tested executables?**

A: Yes, via service packages:

[www.oss.deltares.nl](http://www.oss.deltares.nl) -> Delft3D -> Services

**Q: How can I get help on compiling?**

A: 1) Info: [www.oss.deltares.nl](http://www.oss.deltares.nl) -> Delft3D -> Download

-> Source code

2) FAQ: [www.oss.deltares.nl](http://www.oss.deltares.nl) -> Delft3D -> FAQ

3) Forum: [www.oss.deltares.nl](http://www.oss.deltares.nl) -> Delft3D -> Discussion Groups

-> General

**Q: How can I get help on modelling?**

A: 1) Training courses: [www.oss.deltares.nl](http://www.oss.deltares.nl) -> Delft3D -> Services

2) Forum: [www.oss.deltares.nl](http://www.oss.deltares.nl) -> Delft3D -> Discussion Groups



# General Delft3D questions & answers



**Q: How can I contribute my own source code?**

A: Bugfixes/minor improvements: put on the forum

(optional: TortoiseSVN -> create patch)

Get your own branch to work in: mail to [oss-webmaster@deltares.nl](mailto:oss-webmaster@deltares.nl)

**Q: Will this webinar be placed on the oss-site?**

A: Yes, together with this presentation:

[www.oss.deltares.nl](http://www.oss.deltares.nl) -> Delft3D -> Webinars

**Q: What is the next webinar about?**

A: “Water Quality modelling with DELWAQ: Principles and notable applications”

Presenter: Jos van Gils

Wednesday 10 April 2013, at 17:00 CET

See [www.oss.deltares.nl](http://www.oss.deltares.nl) -> Delft3D -> Webinars