MIKE
Powered by DHI

MIKE to Google Earth

Displaying 2D results in Google Earth

User Guide

PLEASE NOTE

CONTENTS

1 Introduction

The MIKE to Google Earth is a visualisation tool to be used in conjunction with the Google Earth viewer to display contour maps of geo-referenced dfs2 or dfsu files, e.g. inundation flood maps or water surface maps, on top of satellite images.

To use this plug-in Google Earth must be installed (http://earth.google.com/).

This document provides a guide to getting started with using MIKE to Google Earth.

1.1 Input data

Presently it is possible to display the values from dfs2 and dfsu data files in 2 dimensions.

Along with the data you must define a color palette to use for the coloring of the images and the path to an output folder in which the generated images and .KML file is located. Note that values displayed by “white” color (RGB=255,255,255) will be interpreted as 100% transparent.

Per default all grid cells containing a ‘real’ value will be displayed whereas delete values will not be displayed in Google Earth.

In case the data file is a standard HPQ-output dfs2 file from MIKE 21 it is possible to select derived items as well.

1.2 Georeferencing

Google Earth is based on the WGS 1984 ellipsoid. In case the input data is georeferenced in a map projection using another ellipsoid it is possible that it will be necessary to specify additional datum shift parameters in order for the image data to be located correctly.

2 Working With MIKE to Google Earth

To visualize contour maps in Google Earth you first have to generate the image(s) and then import the images to Google Earth. This procedure is automized using the MIKE to Google Earth dialog shown in Figure 2.1 below.

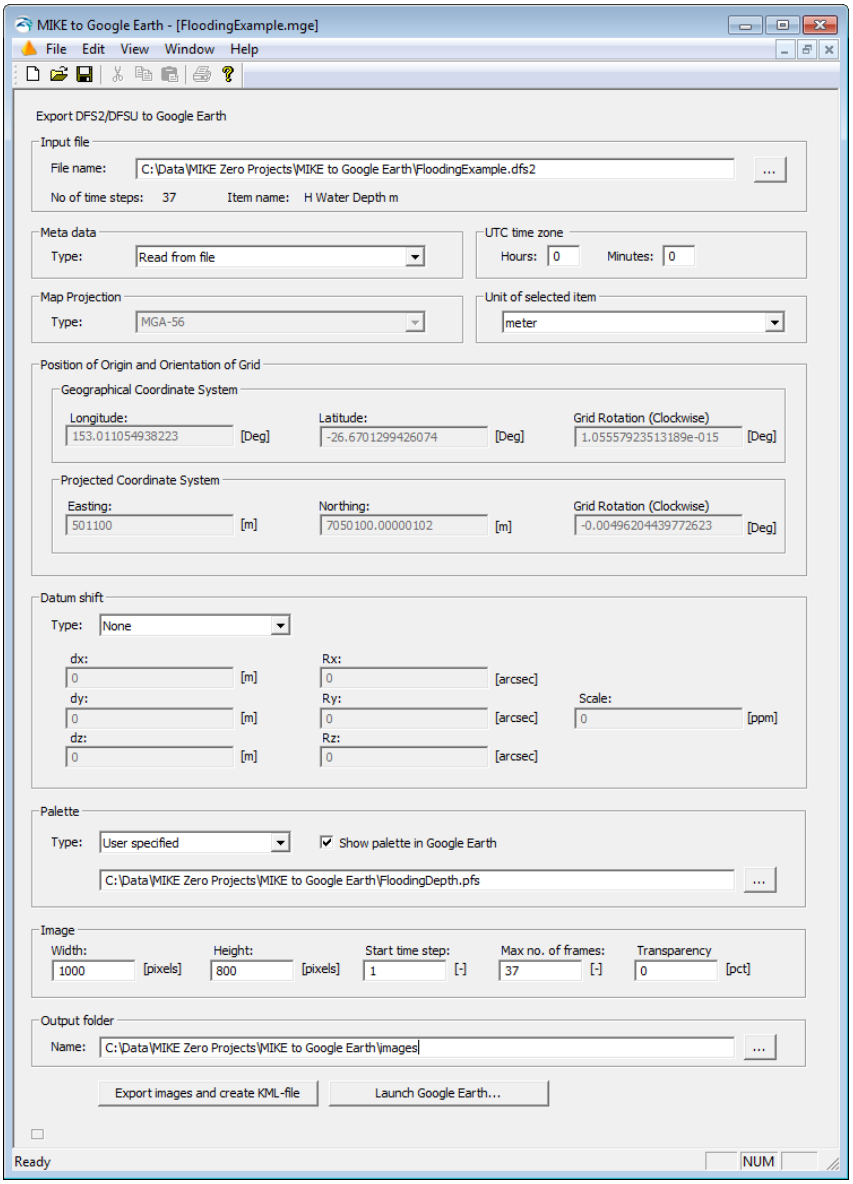


Figure 2.1 Dialog for exporting dfs2 files to display in Google Earth

MIKE to Google Earth is installed as a tool together with one of the other MIKE Powered by DHI software models. You access the program from the Start menu.

2.1 Input File

Browse for the data file to be used. Note that the file must be geo-referenced otherwise the file cannot be placed correctly on the globe.

You have to select which item to use. Note that the item type may influence the display of the contours.

After selecting the data the dialog will be updated with the geographical information available from the file.

2.2 Geographical Settings

2.2.1 Meta data

You have the opportunity to define the geographical information for the file data independent of the settings in the file.

Per default the meta data is read from the file.

2.2.2 Position of Origin and Orientation of Grid

In case the Meta data is User defined, these values must reflect the position and orientation of the grid data in the file.

Per default the data is read from the file.

2.2.3 Datum Shift

Google Earth is using the WGS 1984 ellipsoid to define geo-positions on the earth. If the data file uses a projection that is based on another ellipsoid the area may not be displayed correctly compared to the satellite images. In this case it may be necessary to apply Datum shift in addition to the automatic coordinate transformation in order for the image to be located correctly.

Here you can specify the parameters needed to transfer the data from the defined map projection into the domain used by Google Earth.

You can read more about Datum Conversion in the Geodesy manual supplied with the installation (MIKE_Zero_Geodesy.pdf). See also: http://www.arcwebservices.com/arcwebonline/services/dattrans.htm.

2.3 Display Properties

2.3.1 UTC time zone

In Google Earth it is possible to apply time zone variation of sunlight. Here you can specify UTC time zone that forms the basis of the time settings in the file.

2.3.2 Unit of selected item

When reading the data the displayed values is scaled according to the selected unit.

2.3.3 Palette

You have to define a color palette to use for the coloring of the images.

Per default a fixed Rainbow color palette will be generated, however it is also possible to select an existing palette. The generation of a color palette is a functionality embedded in several MIKE Zero tools. For example, a color palette may be generated from within the Grid Editor when investigating the result values in a dfs2 file.

You have the option to embed the color palette in the Google Earth display window.

2.3.4 Image

Dimension

You have to define the size of the image in pixels. The number should at least be equal to the number of grid cells.
Note that when the image is visualised in Google Earth some blurring of the image is seen and it can be difficult to distinguish the individual pixel. Thus it is most optimal to define the images size as a multiplum of the grid cells, e.g. by factor 5 or 10.

Start time step

You have to define the time step for the first image to be generated.

Per default this is the first time step in the input file, but you can choose to start at a later time step. The number of defined time steps will be the total number of time steps in the input file minus the start time step plus one.

Max no. of frames

The maximum number of frames limits the number of images.

- In case the number of defined time steps is less than the maximum value, an image will be created for each defined time step in the data file.
- In case the number of defined time steps in the file is larger than the maximum value, the maximum number of images will be generated. The time step frequency between the images will be defined by the total time covered by the data divided by the maximum number of frames.

Transparency

You can also define the transparency. Note that the transparency can be modified within Google Earth at a later stage.

Remark

If an input file contains e.g. 101 time steps the Start time step and Max no. of frames defines the resulting output as follows:

- If you use default start time step and ask for 11 frames images will be generated for time step no. 0, 10, 20, 30, 40, 50, 60, 70, 80, 90 and 100.
- If you specify the start time step to 90 and ask for 11 frames images will be generated for time step no. 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 and 100.

2.4 Output Data

You have to define the path to an output folder in which the generated images and the .KML file can be placed.

2.5 Export Images and create KML-file

Once you have saved your input parameters in an input file, e.g. *flooding.mge*, you may create the images and .KML file to be used in Google Earth.

The individual image file will be named after the input data file and the time stamp, e.g. 'FloodingExample 1992-02-21-20-00.png'.

The .KML file will contain information about the images and time span for each to be displayed in Google Earth.

2.5.1 Batch command

It is possible to launch a MIKE to Google Earth setup from a command prompt by using the syntax:

```
ExportDfs2GE [inputfile.mge] -export
```

This will export the data to image(s) and create the .kml file but NOT launch Google Earth.

2.6 Launch Google Earth

Once you have generated the images and .KML file you can can Launch Google Earth. Automatically the images will be included in the display and Google Earth will zoom onto the focus area.

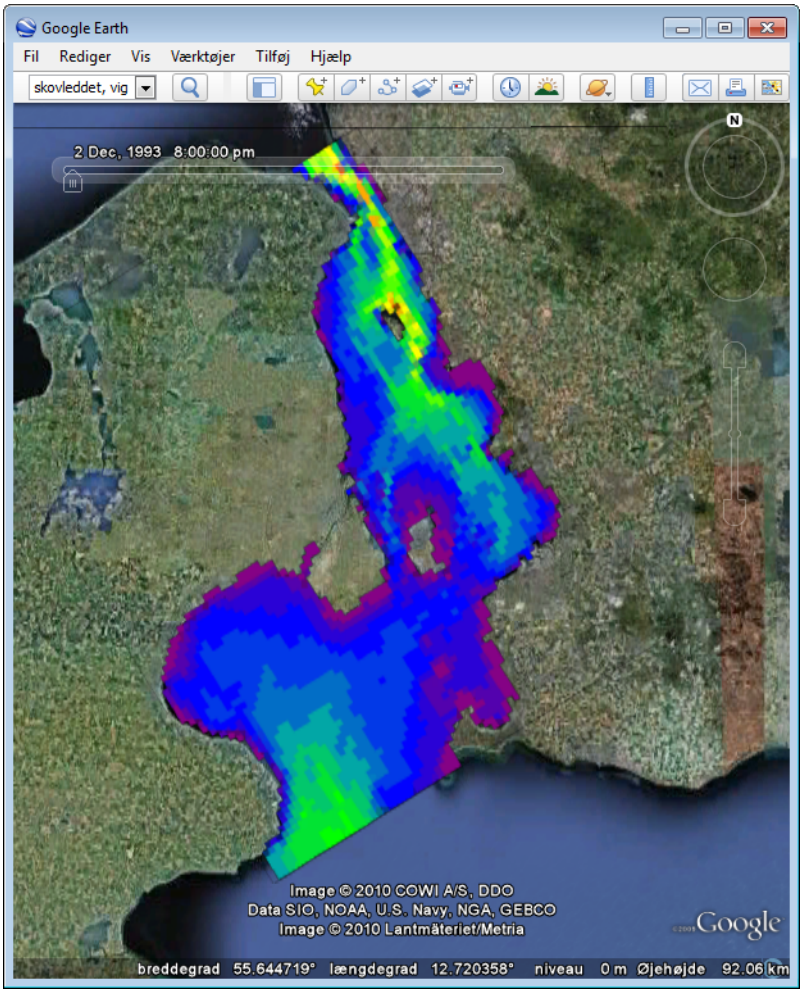


Figure 2.2 Example of dfs2 display in Google Earth

NOTE:
Google Earth is using the WGS 1984 ellipsoid to define geo-positions on the earth. If the dfs2 file uses a projection that is based on another ellipsoid the area may not be displayed correctly compared to the satellite images. In this

case it may be necessary to apply a Datum Shift conversion before generating the images.

2.7 Visualising animation

Once the generated images have been imported to Google Earth, you can animate the inundation by using the build-in Timeline facility in Google Earth.

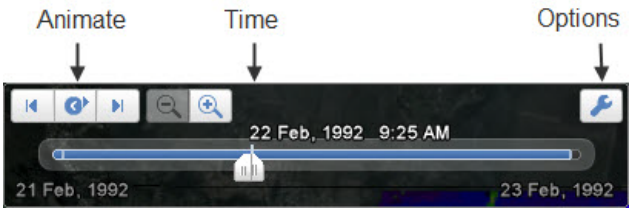


Figure 2.3 Timeline facility in Google Earth
Press Animate icon to start animation
Press Options to define display time zone and animation speed

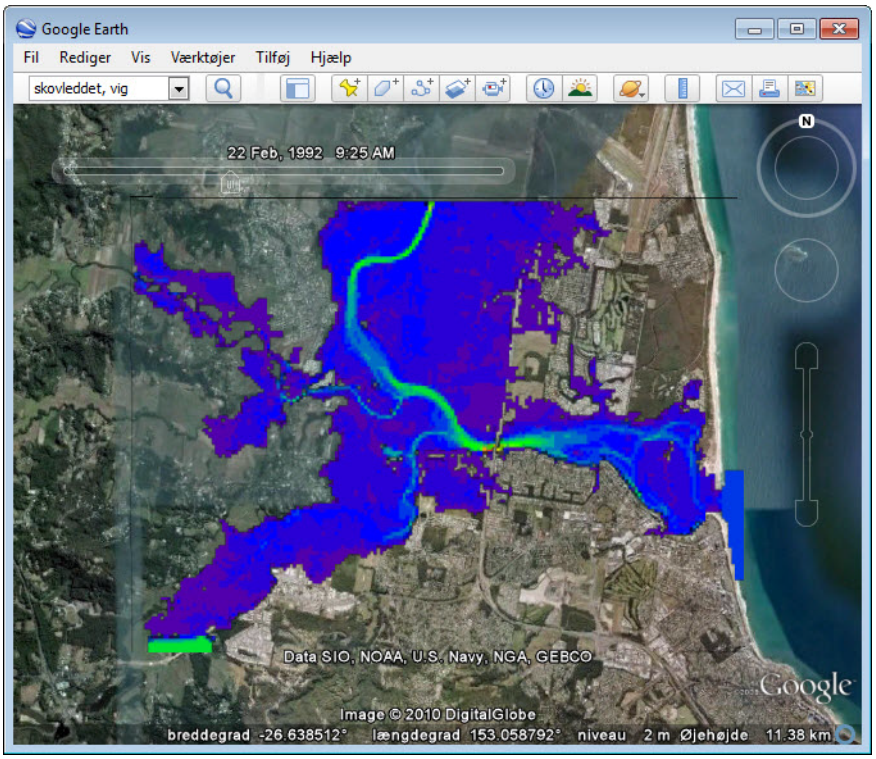


Figure 2.4 Visualising dfs2 time series data in Google Earth

NOTE:
Movie making features are available to users of the Google Earth Pro and Google Earth EC products.
(Learn more at http://earth.google.com/product_comparison.html)

3 Examples

The following examples describe the use of the MIKE to Google Earth utility based on 2D data files (dfs2, dfsu) that are supplied with the installation.

3.1 Basic display - dfs2

The sceenshots in the following sections show how a dfs2 file item can be displayed in Grid Editor and Google Earth, respectively.

The examples are based on data from the file 'ItemExample.dfs2' that is supplied with the installation. The items in the file are shown in Figure 3.1.

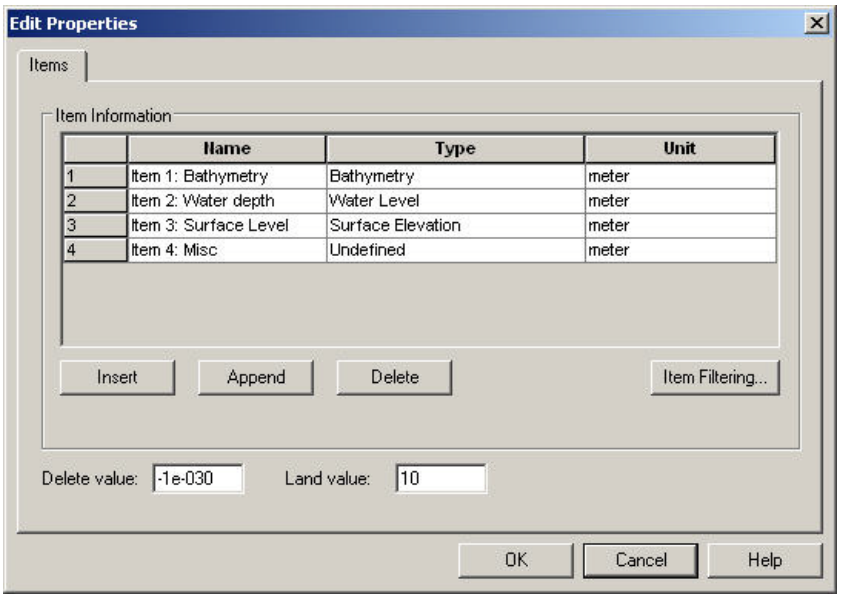
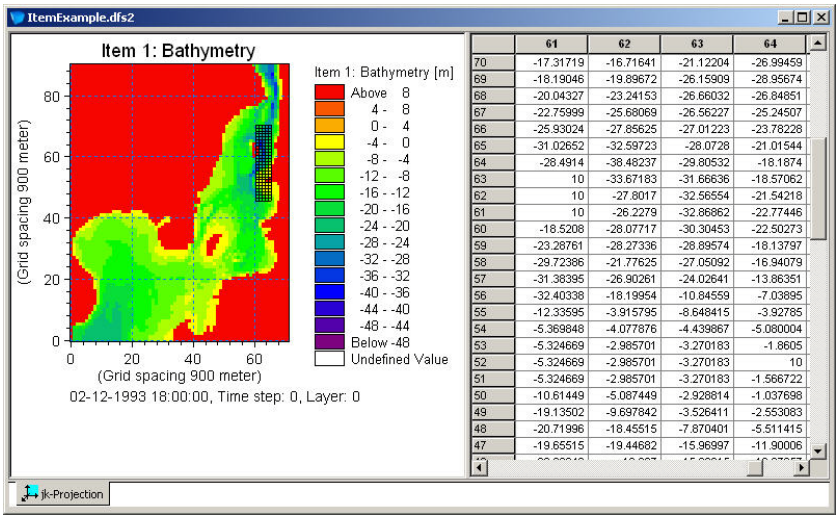


Figure 3.1 Item definition in file 'ItemExample.dfs2'

3.1.1 Bathymetry

Per default all values are displayed in Google Earth. Thus bathymetry data will typically be displayed by a rectangular color image in Google Earth.



	61	62	63	64
70	-17.31719	-16.71641	-21.12204	-26.99459
69	-18.19046	-19.89672	-26.15909	-28.95674
68	-20.04327	-23.24153	-26.66032	-26.84851
67	-22.75999	-25.68069	-26.56227	-25.24507
66	-25.93024	-27.85625	-27.01223	-23.78228
65	-31.02652	-32.59723	-28.0728	-21.01544
64	-28.4914	-38.48237	-29.80532	-18.1874
63	10	-33.67183	-31.66636	-18.57062
62	10	-27.8017	-32.56554	-21.54218
61	10	-26.2279	-32.86862	-22.77446
60	-18.5208	-28.07717	-30.30453	-22.50273
59	-23.28761	-28.27336	-28.89574	-18.13797
58	-29.72386	-21.77625	-27.05092	-16.94079
57	-31.38395	-26.90261	-24.02641	-13.86351
56	-32.40338	-18.19954	-10.84559	-7.03895
55	-12.33595	-3.915795	-8.648415	-3.92785
54	-5.369848	-4.077876	-4.439867	-5.080004
53	-5.324669	-2.985701	-3.270183	-1.8605
52	-5.324669	-2.985701	-3.270183	10
51	-5.324669	-2.985701	-3.270183	-1.566722
50	-10.61449	-5.087449	-2.928814	-1.037698
49	-19.13502	-9.697842	-3.526411	-2.553083
48	-20.71996	-18.45515	-7.870401	-5.511415
47	-19.65515	-19.44682	-15.96997	-11.90006

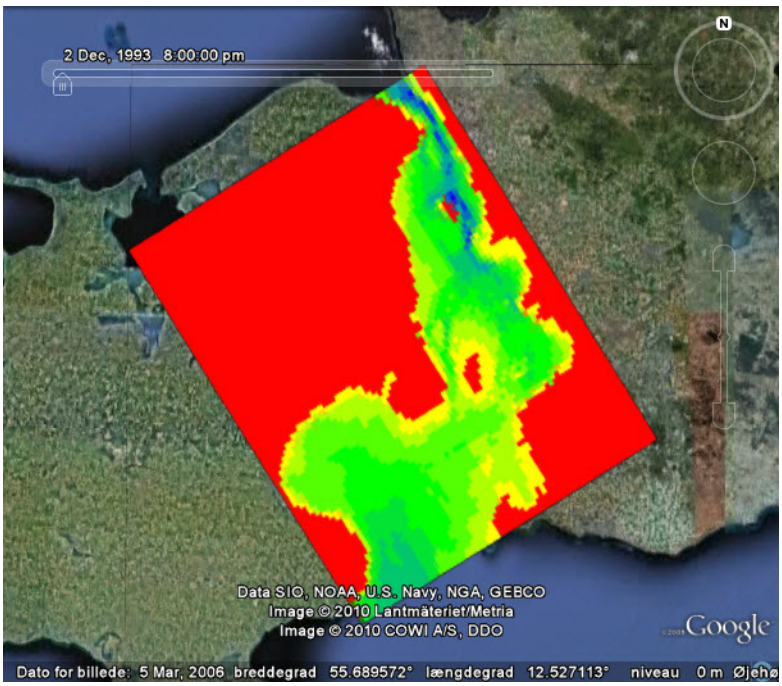
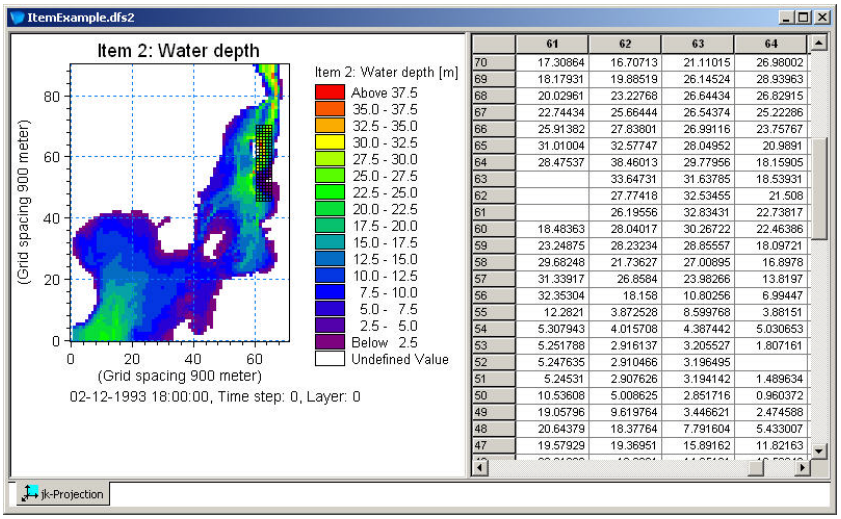


Figure 3.2 Display of item ‘Bathymetry’

3.1.2 Water level

The resulting values are generally only saved in the data file for the grid cells that are actually flooded. The remaining cells contain delete values which are not displayed in Google Earth.



	61	62	63	64
70	17.30864	16.70713	21.11015	26.98002
69	18.17931	19.88519	26.14524	28.93963
68	20.02961	23.22768	26.64434	26.82915
67	22.74434	25.66444	26.54374	25.22286
66	25.91382	27.83801	26.99116	23.75767
65	31.01004	32.57747	28.04952	20.9891
64	28.47537	38.46013	29.77956	18.15905
63		33.64731	31.63785	18.53931
62		27.77418	32.53455	21.508
61		26.19556	32.83431	22.73817
60	18.48363	28.04017	30.26722	22.46386
59	23.24875	28.23234	28.85557	18.09721
58	29.68248	21.73627	27.00895	16.8978
57	31.33917	26.8584	23.98266	13.8197
56	32.35304	18.158	10.80256	6.99447
55	12.2821	3.872528	8.599768	3.88151
54	5.307943	4.015708	4.387442	5.030653
53	5.251788	2.916137	3.205527	1.807161
52	5.247635	2.910466	3.196495	
51	5.24531	2.907626	3.194142	1.489634
50	10.53608	5.008625	2.851716	0.960372
49	19.05796	9.619764	3.446621	2.474588
48	20.64379	18.37764	7.791604	5.433007
47	19.57929	19.36951	15.89162	11.82163

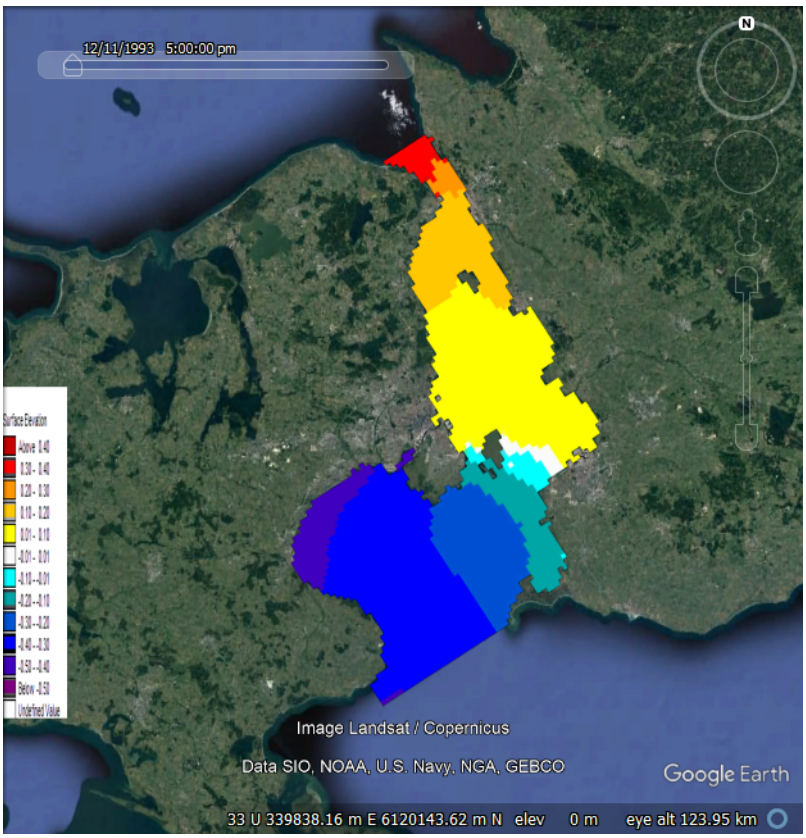


Figure 3.3 Display of 'Surface Elevation' from dfs2 file'

3.2 Basic display - dfsu

Similar to data from a dfs2 file, a dfsu file item can be displayed in Google Earth.

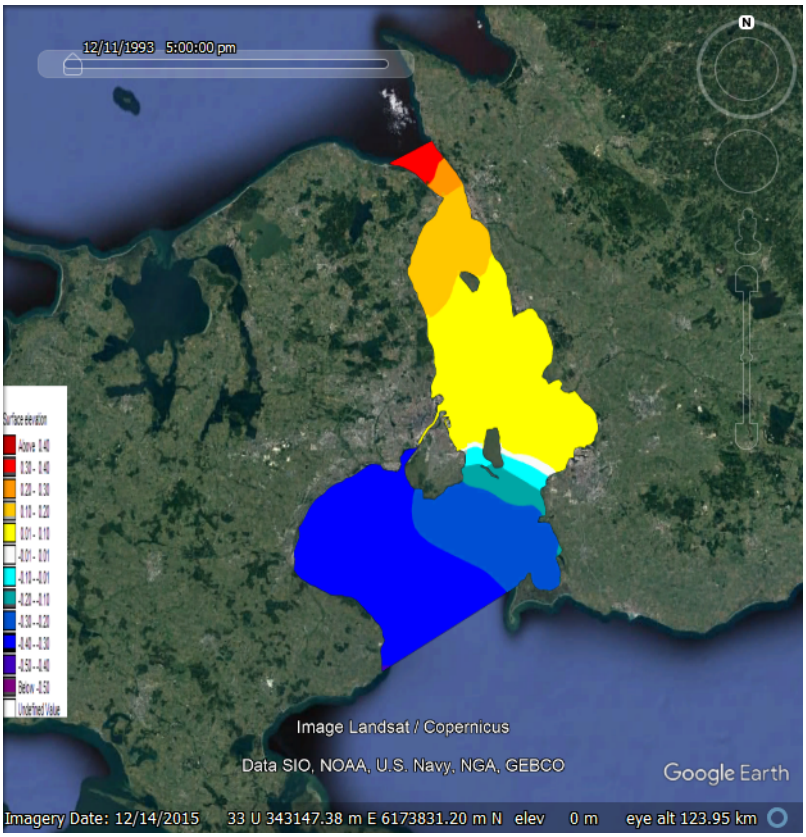


Figure 3.4 Display of 'Surface Elevation' from dfsu file'

3.3 River flooding

If the dfs2 file contains several time steps, images for a selected number of time steps will be generated and imported into Google Earth. Per default the first time step will be displayed. By using the built-in timeline facility you can display the images as an animation in Google Earth.

The following example displayed in Figure 3.5 and Figure 3.6 shows a flooding event simulated over 36 hours. The file used is 'FloodingExample.dfs2' that is supplied with the installation. The resulting flooding depth data has been modified to only contain the flooding depth for areas that are usually dry and saved as item 2 in the file. By using a pre-defined color template this resulting flooding depth can be used to display a more descriptive impact of

the flooding event. This is shown in Figure 3.5 for the time at the end of the simulation. Figure 3.6 shows the temporal development of the flooding event.

NOTE:
The example file contains artificial values generated for the mere purpose of demonstrating the MIKE to Google Earth functionality. The results can not be related to reality.

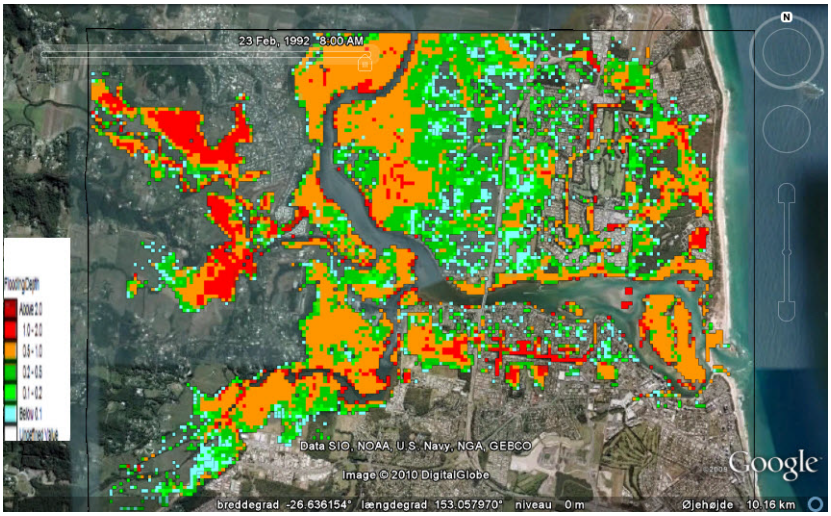


Figure 3.5 Resulting flooding depth in otherwise dry areas after 36 hours. Note non-linear intervals in user defined color template.

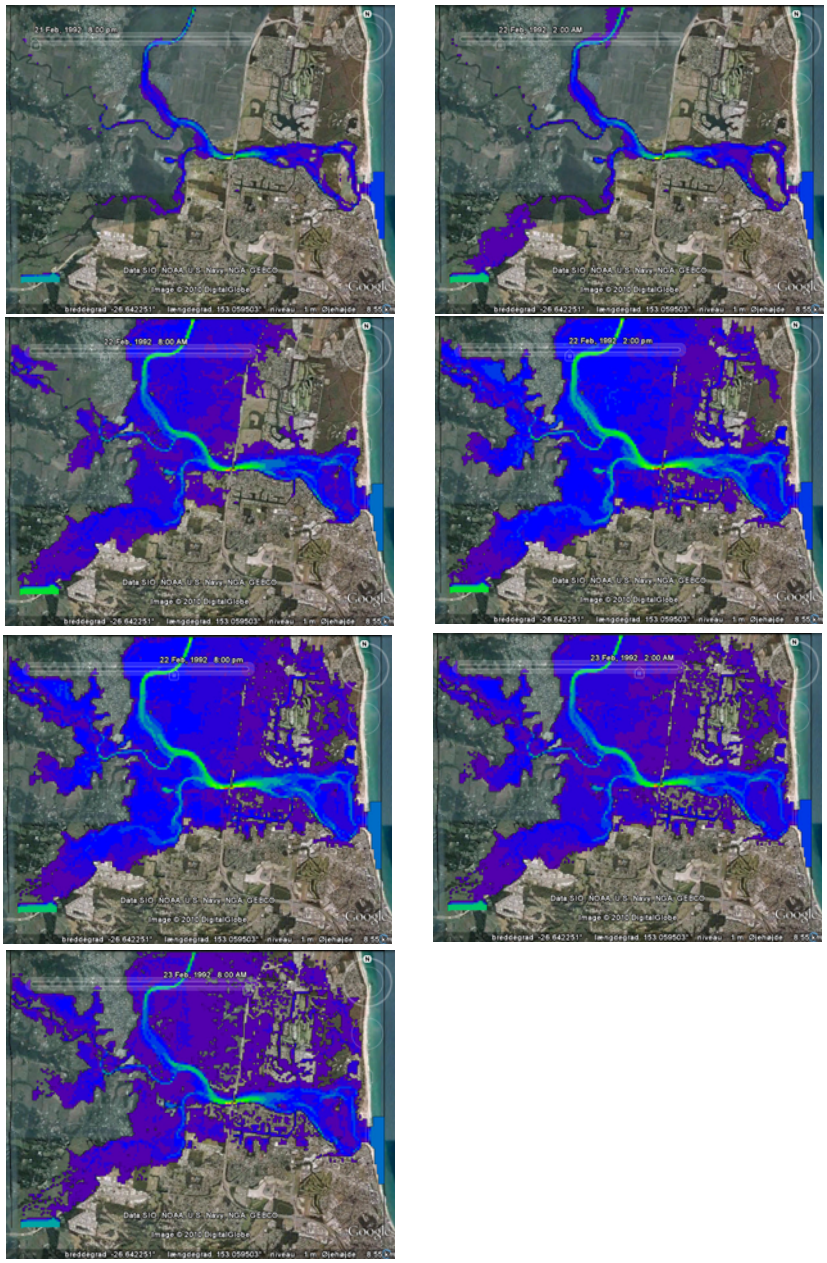


Figure 3.6 Animated flooding, total water depth
Upper left: time = 0 hours, upper right: time = 6 hours
Upper left: time = 12 hours, upper right: time = 18 hours
Upper left: time = 24 hours, upper right: time = 30 hours
Upper left: time = 36 hours

3.4 Derived item

In case the dfs2 file is a standard HPQ output file it is possible to select to display derived items. This will in general result in a zero value for grid cells that contains land but by applying a user defined color template land values can be displayed as transparent as shown in Figure 3.7. The files used are 'HPQoutput.dfs2' and 'Speed.pal' that is supplied with the installation.

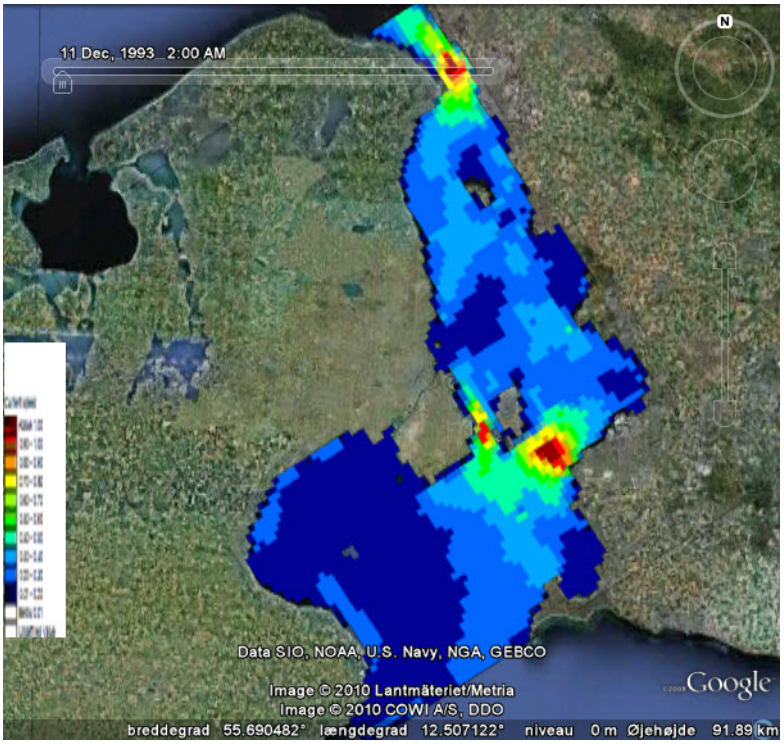


Figure 3.7 Derived current speed from standard HPQ output. A user defined color template has been applied.

INDEX