Coverage Map Calculator

User Manual

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Abstract

Short resume of document contents

In order to make a correct evaluation of a radar site, the real coverage volume has to be taken into account. This tool produces coverage files and relief files of a radar with predefined coordinates, height and range.

	Keywords		
CMC	Coverage Map	Screening File	Relief map

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The following table identifies all authorities who have successively approved the present issue of this document.

AUTHORITY	NAME AND SIGNATURE	DATE
Author	Glenn Bosmans	28/10/16
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DOCUMENT CHANGE RECORD

The following table records the complete history of the successive editions of the present document.

EDITION	DATE	REASON FOR CHANGE	SECTIONS PAGES AFFECTED
0.1		New document	All
2.0	14/05/07	Edited	All
2.1	26/06/07	Edited – spelling and layout	All
2.2	15/11/07	Changed to released (software version v1.0.1)	All
2.3	01/09/08	Manual updated to CMC version 1.0.2 Map name is the same as the destination path folder name (Section 3.3) Tip strips added	All
6	21/10/09	Filename changed; Manual up to date with CMC version 1.0.3	None
7	17/05/13	Manual updated to CMC version 1.0.4; New toolbox and CMC images added; Resolution is fixed now as explained in paragraph 3.3	9,11,12,13,14
8	27/11/15	Added about CMC window New radar coverage viewer function	12,18,19-25
9	28/10/16	Updated for Release 3.8.0 Chapter 4 Radar Coverage Viewer added	All
10	19/10/17	Update for Release 3.8.1 New outlook toolbox	10

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TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

CONVENTIONS USED IN THIS MANUAL

The following conventions are used in this manual:

Note: This icon to the left of bold italicized text denotes a note, which alerts you to important information.

Caution: This icon to the left of bold italicized text denotes a caution, which alerts you to the possibility of data loss or a system crash.

Warning: This icon to the left of bold italicized text denotes a warning, which alerts you to the possibility of damage to you or your equipment

1. Coverage Map Calculator

In order to make a correct radar performance evaluation, the radar coverage volume has to be taken into account.

The RASS-R radar evaluation tools require therefore **screening angle files** (.hrscr-file), as displayed in Figure 1 -1, that determine the theoretical radar coverage based on Digital terrain data.

 These files are generated by using the radar Coverage Map Calculator module and contain the ranges and elevation angles for terrain obstacles inside each azimuth resolution angle. It can be used in different RASS-R modules (see further). The CMC just needs the position on earth (longitude, latitude and antenna height) and the desired maximum range as input parameters and then generates a screening angle and/or a relief map file using high resolution digital terrain map data files or DEM's. (Digital Elevation Models are digital files consisting of points of elevations, sampled systematically at equally spaced intervals, during satellite observations of the earth.). Together with this input information the CMC tools uses the 4/3rd earth model to calculate the radar screening angles.

The CMC also generates, if desired, a **relief map file** for display purposes (e.g. Radar Comparator) as in displayed Figure 1 -2.
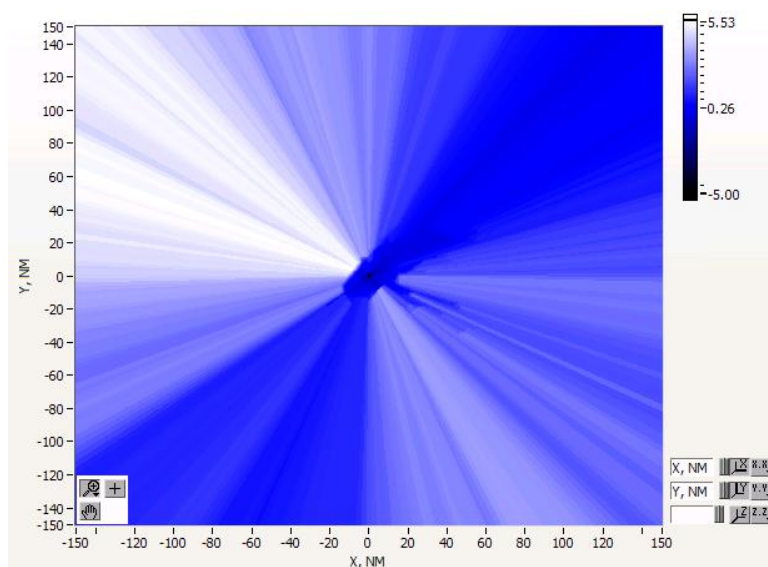

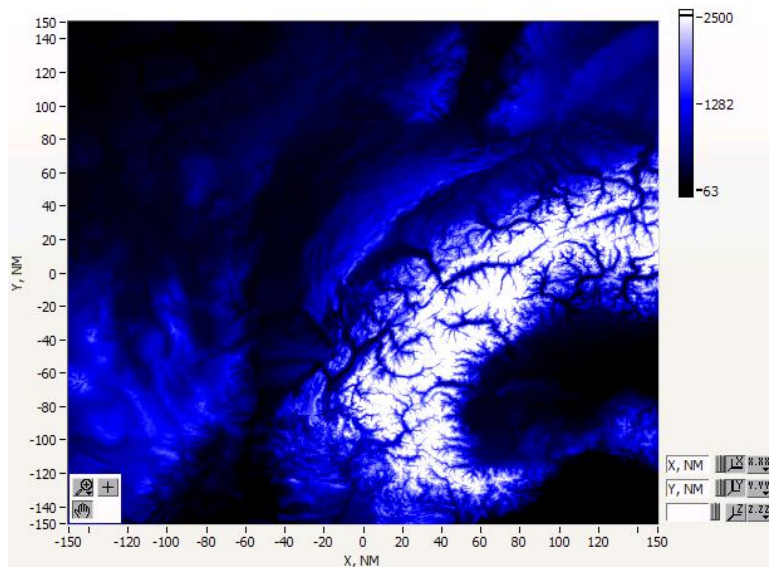*Figure 1- 1: Screening file (Geneva 46:14:17.53N, 006:06:00.90E)*

Figure 1- 2: Relief file (Geneva 46:14:17.53N, 006:06:00.90E)

2. RASS-R toolbox

The RASS-R toolbox is installed on every RASS-R pc. And can be opened by the desktop shortcut or via the Windows Start-menu. The toolbox is displayed in Figure 2 -3: RASS-R toolbox. The current version of the RASS-R toolbox is displayed in the right upper corner. The Coverage Map Calculator is part of this RASS-R toolbox and can be opened using the appropriate icon ![icon].

Figure 2- 3: RASS-R toolbox

The Toolbox menu bar contains the following items:

Table 2- 1: RASS-R menu bar

Button	Usage
![help icon] Help window	When this button is clicked, the Help window will appear and show help information whenever you point over a button.
![campaign icon] Campaign change	Click this to make an appropriate campaign structure (see further)
![exit icon] Exit	Quit the application

When you click on the [icon] button, the toolbox will prompt the questions where to create a new or select an existing RASS-R campaign folder. Select the correct path. Upon completion, you should have the following directory structure created as in Figure 2 -4: Campaign directory structure.
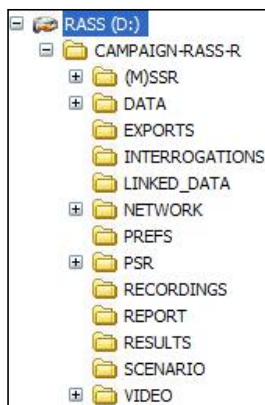

Figure 2- 4: Campaign directory structure

[icon] ***When a campaign folder is created with the RASS-R toolbox, it is preferred to make it on a separate drive than the drive where your operation system is on. For example, as in the figure above, a structure named "CAMPAIGN-RASS-R" is created on the D-drive.***

3. Software usage

3.1 Menu-bar

Table 3- 2: Menu bar items

Button	Usage
Online Reference	When this button is clicked, the Coverage Map Calculator userm manual will appear.
Help window	When this button is clicked, the Help window will appear and show help information whenever you point over a button.
Start	This starts the calculation
Stop	This button stops the calculation
Coverage Map Viewer	This button opens the Coverage Map Viewer tool
About	This button opens the About window
Exit	Quit the application

3.2 Data source and destination

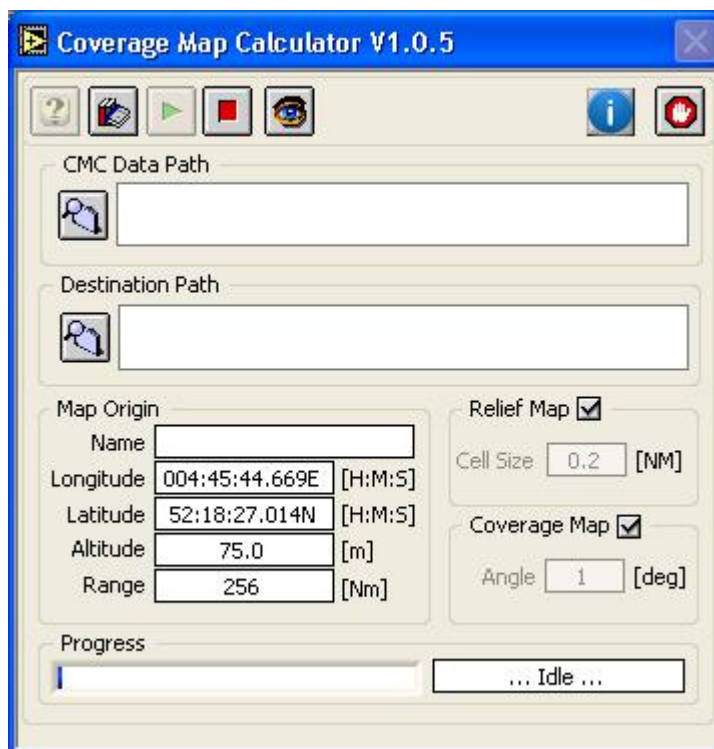To start creating the Coverage or Relief Map, select the correct CMC Data Path and Destination Path.

Figure 3- 5: CMC GUI

The source data comprises two folders. Click Select Cur Dir as in the figure below left. For the destination folder, browse to the MAPs-folder in the RASS-R campaign folder (See 2) and click Select Cur Dir as in the figure below right.
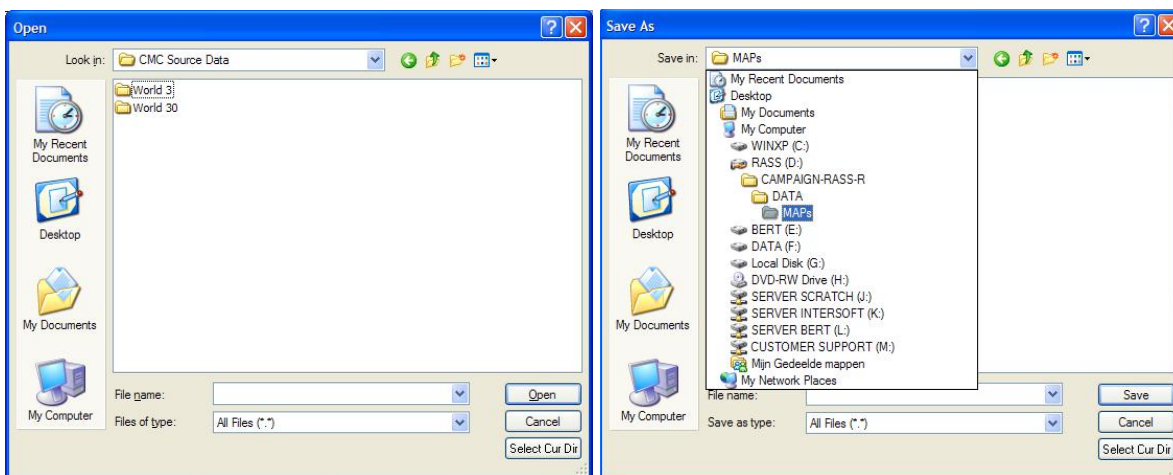
Figure 3- 6: CMC Source path – Destination path
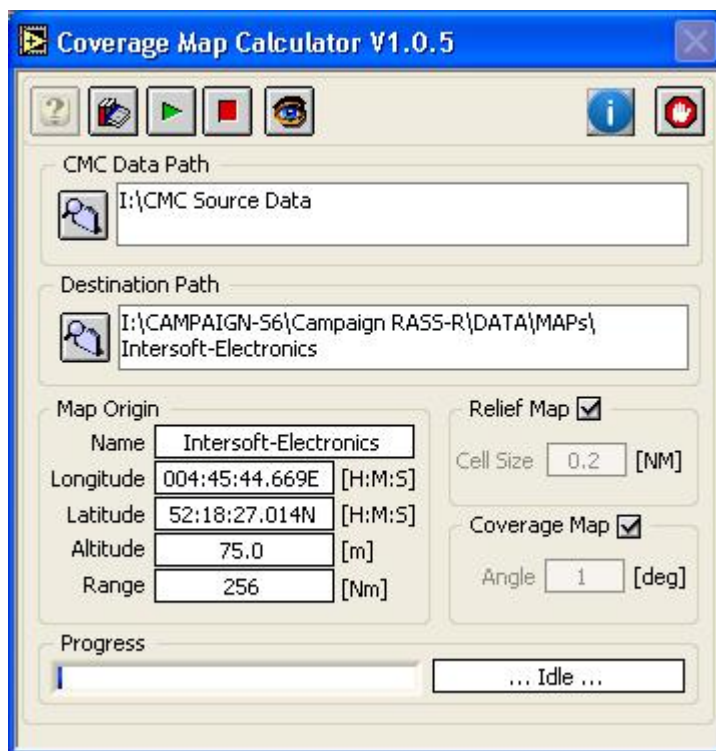
3.3   Parameter Input

Figure 3- 7: CMC GUI

The following selections can be made:

Radar parameters:

- Name: the name will automatically be the same as the folder name from the destination path. This is because when you want to load the screening file in the MRD3, the MRD3 needs the folder name to be similar to the name of the screening file!
- Longitude: position of the radar
- Latitude: position of the radar
- Altitude: this is the total altitude of the antenna above mean sea level. (so the tower height must be taken into account)
- Range: this is the maximum range of the radar

Take care when filling in the radar parameters. The position should be precise, as well as the height. Make sure you type in E,W, S or N and use a point as digital separator.

Relief map:

- Enable: select the checkbox if you want to generate a relief map.
- Cell size: The range cell size for the relief map generation is fixed at 0.2NM.

Coverage map:

- Enable: select the checkbox if you want to generate a coverage map
- Angle: The azimuth resolution is fixed at 1deg.

3.4 Calculation

Click ![play] to start the calculation. If you want to stop the calculation for any reason, press ![stop]. First, the relief map will be computed, then the coverage map. The status of the processing will be displayed in the progress bar. In case of the relief map, the window might show: fixing gaps. This algorithm corrects the gaps that might be in the source data.
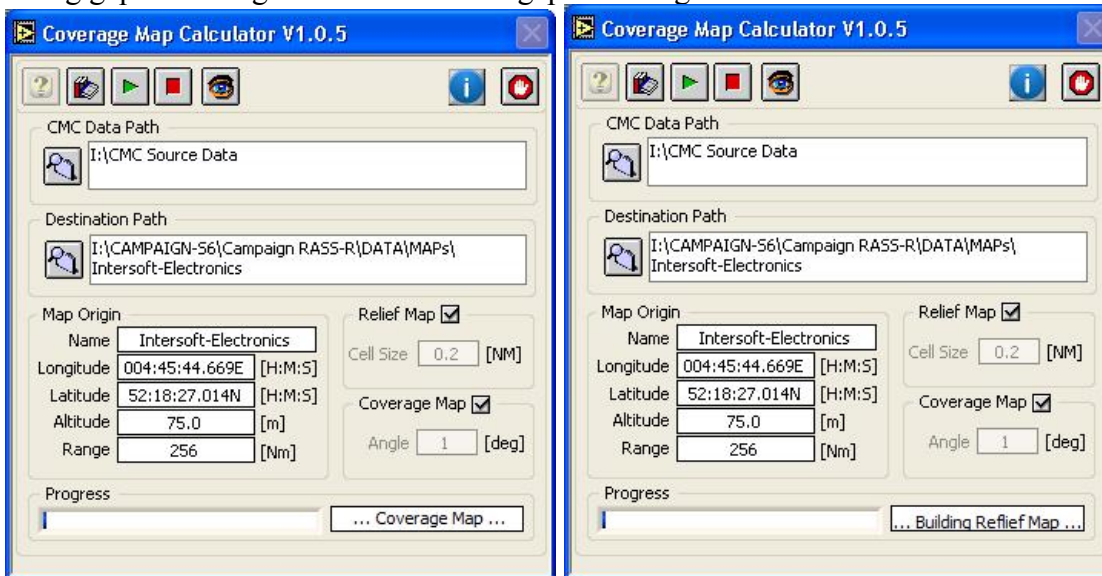

Figure 3- 8: Building Relief Map and Coverage Map

3.5 Results

After completion, the following files should be visible.
- Intersoft-Electronics.hrscr: Coverage map file
- Intersoft-Electronics.rlf: Relief map file
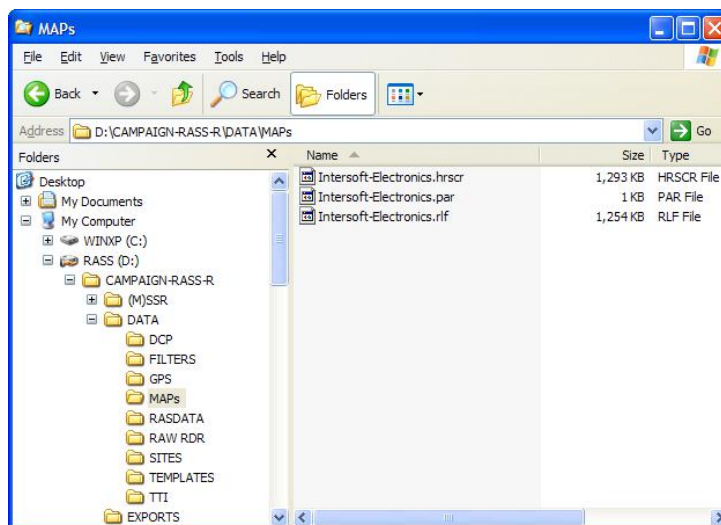- Intersoft-Electronics.par: parameters used for the calculation

Figure 3- 9: Different files

3.6   Use of the files

The usage of the screening or coverage file is twofold: to be taken into account when performing analysis or just used to be displayed in the software.

The next table shows for which tasks the screening file is used, per RASS-R module:

Table 3- 3: File usage

Button	Analysis purposes	Display purposes
Radar Comparator (Mono/Dual)	☑	☑
TRACKAN	☑	☒
Multi Radar Display 3	☒	☑
Technical Maintenance Display 3	☒	☑

The relief map is only used in the advanced display functionalities of the Radar Comparator and the Radar Comparator Mono.

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3.7   About window

The about window of the Coverage Map Calculator shows the license information and contact information.
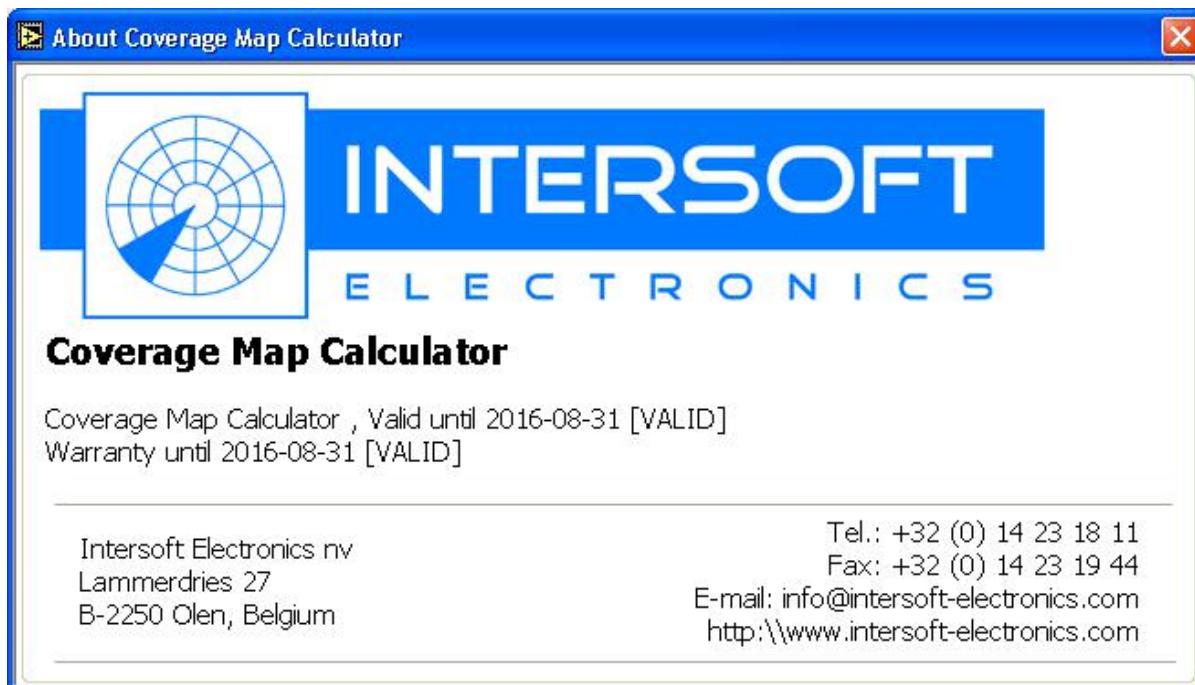
3- 10About window

4. Radar Coverage Viewer

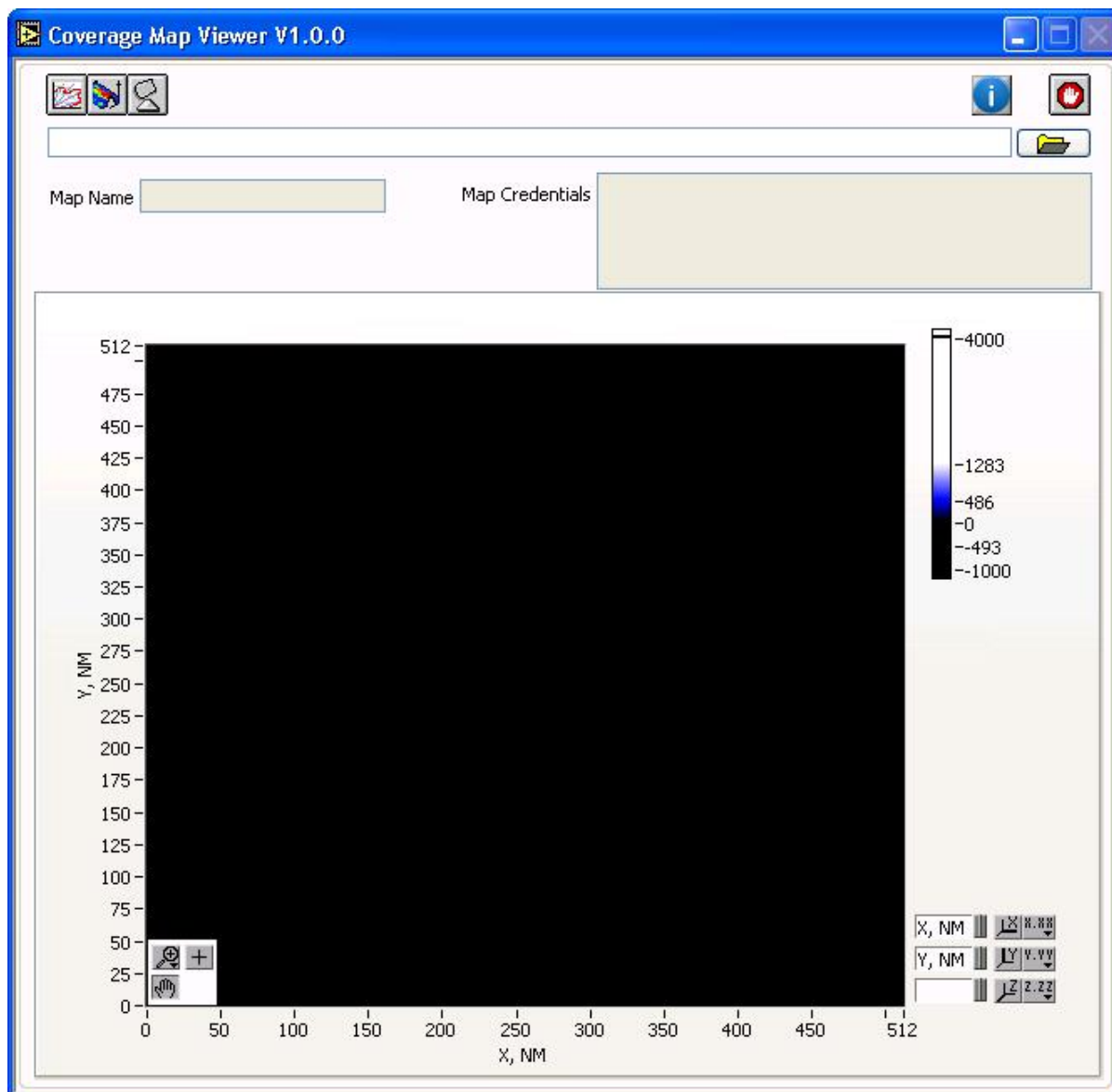The Radar Coverage Viewer is a tool that makes is possible to display the generated screening and relief maps.

Figure 4- 11 Radar Coverage Viewer:

4.1   Menu-bar

Table 4- 4: Menu bar items

Button	Usage
Show relief map	When this button is clicked, the relief map is displayed in the map
Show screening map	When this button is clicked, the screening map is displayed in the map.
Show coverage map	When this button is clicked, the user can select the different Flight Levels he want to see.
Browse button	Browse to CMC maps
About	This button opens the About window
Exit	Quit the application

4.2   Display generated maps

In order to display the calculated/generated maps use the browse button to locate the generated CMC maps. Browse to the MAPs-folder in the RASS-R campaign folder, select the correct radar CMC map folder and click Select Cur Dir as in the figure below.
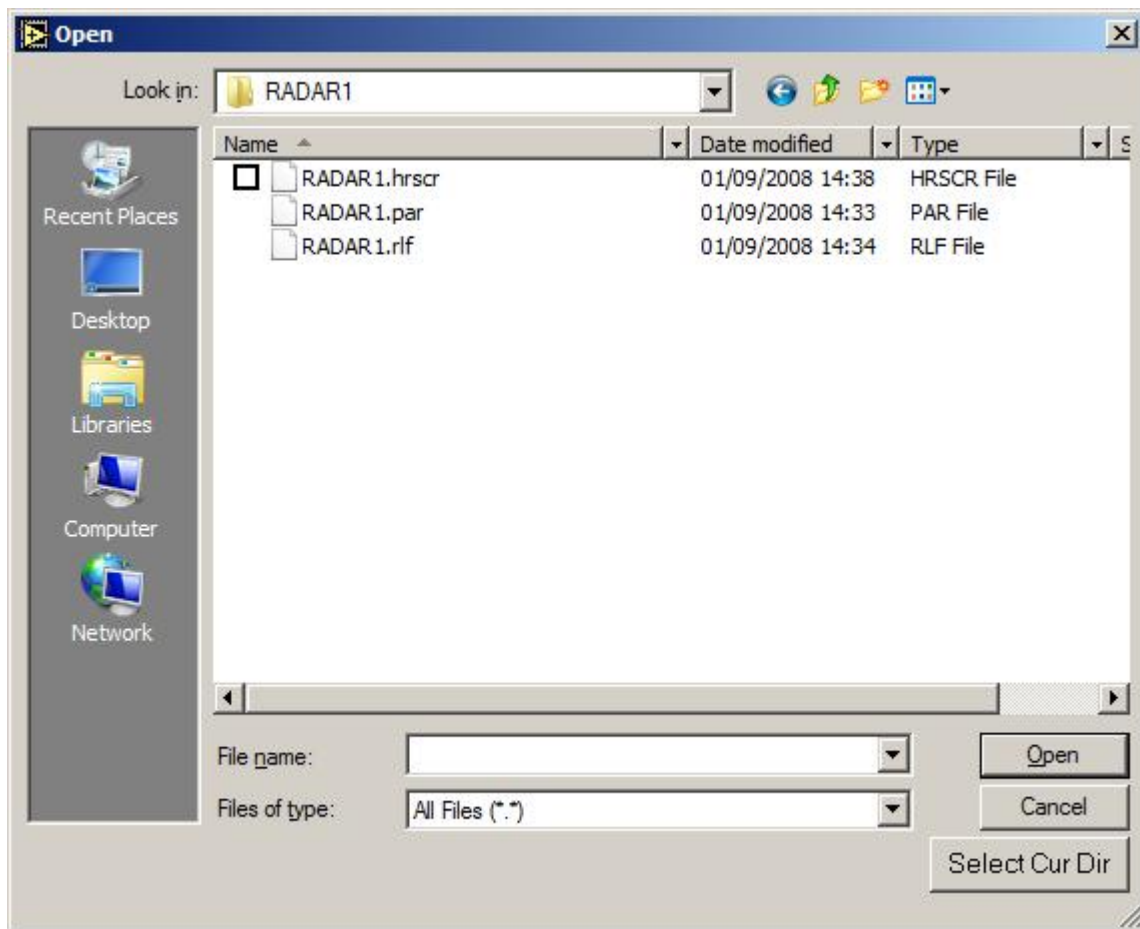

Figure 4- 12: CMC Map path

INTERSOFT
E L E C T R O N I C S

After loading the CMC map, the Radar Coverage viewer displays the relief map by default. The radar name, the map credentials (parameters how the CMC map was calculated) are displayed in the corresponding fields.
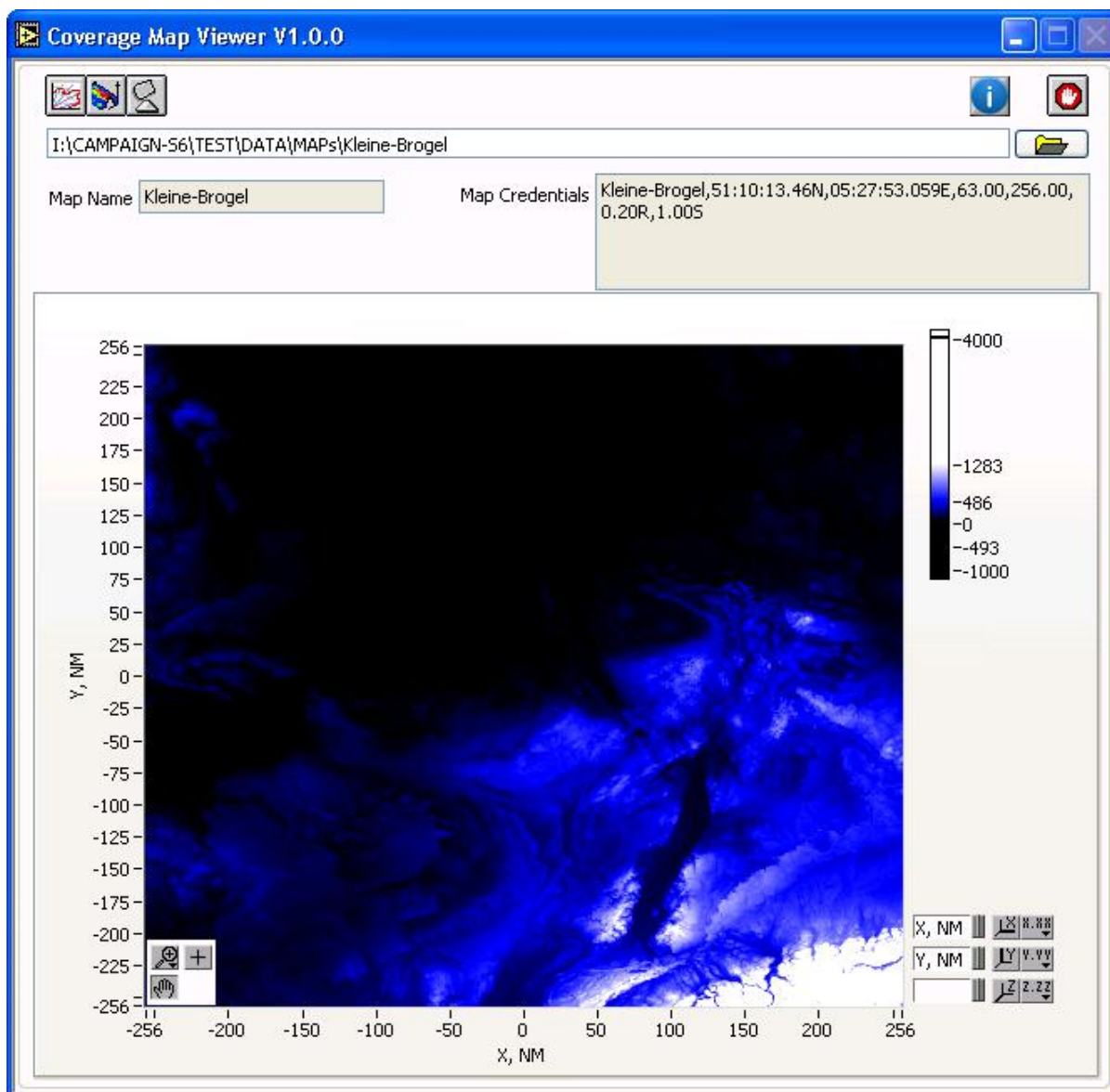

Figure 4- 13: Radar Coverage Viewer - Relief map

With the screening map button the Radar Coverage Viewer jumps to the screening map page and displays the different screening angles.
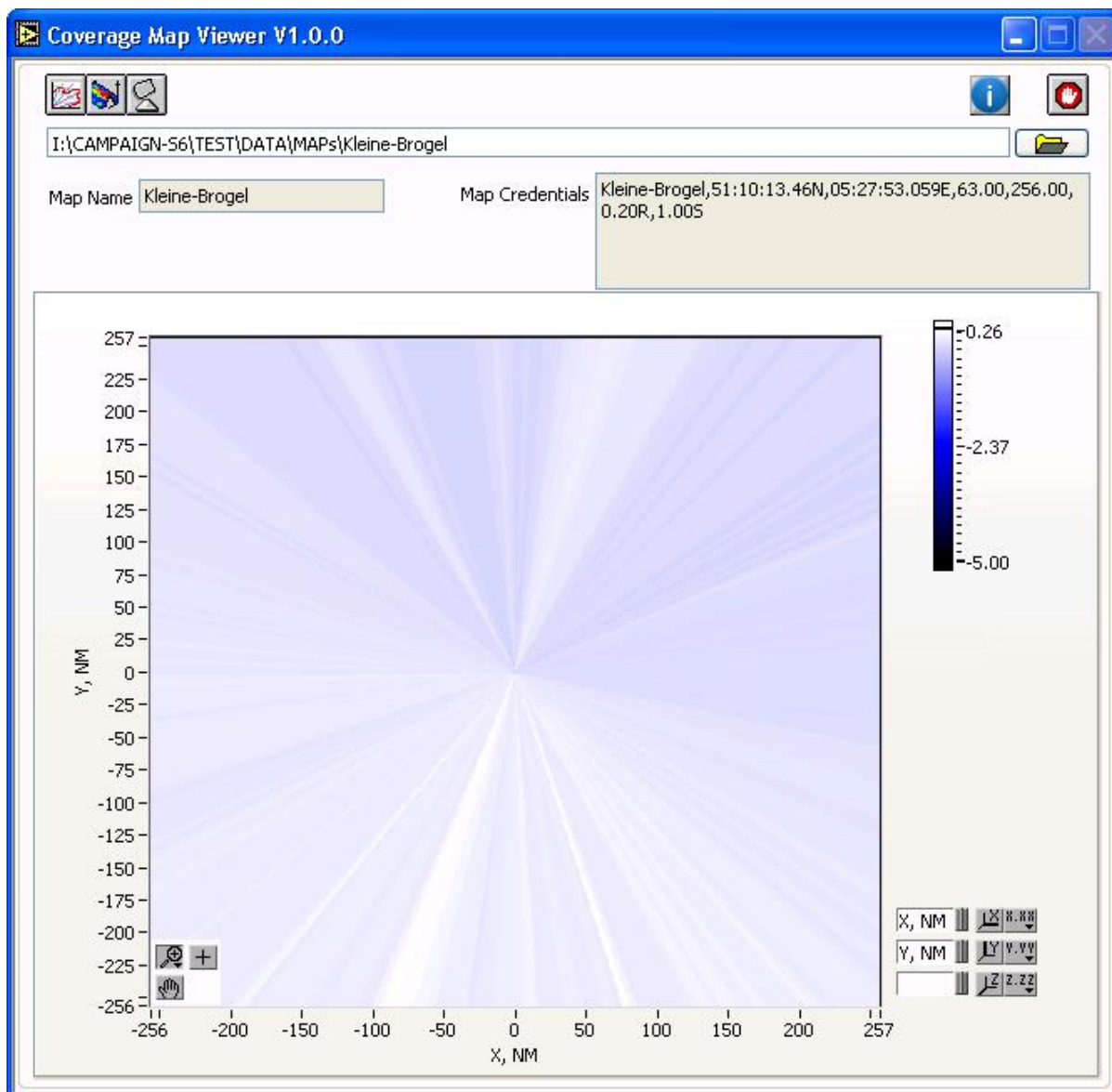

Figure 4- 14: Radar Coverage Viewer - Screening map

On the coverage page the user can select which coverage Flight levels he wants to display. Every displayed Flight level can be exported to a separate KML per Flight level or one big KML file.

Select the correct radio button [KML/FL / One KML] and push the Export to KML button.

Extra export function is an export to S4 file, so the coverage file can be displayed in the RASS-S Inventory tool. Use the buttons to switch between the 2 coverage pages. The second coverage page also gives the possibility to display range rings.
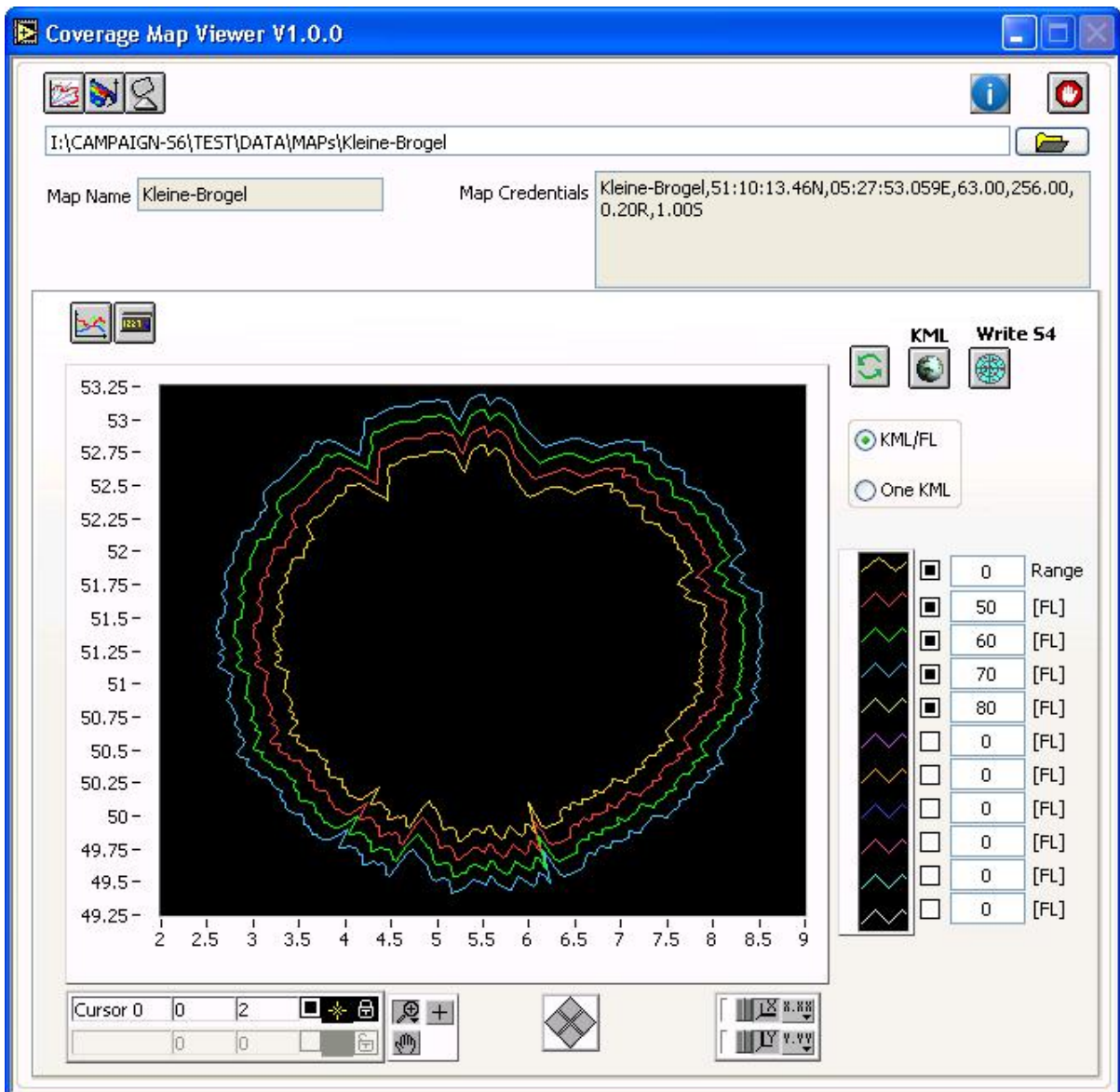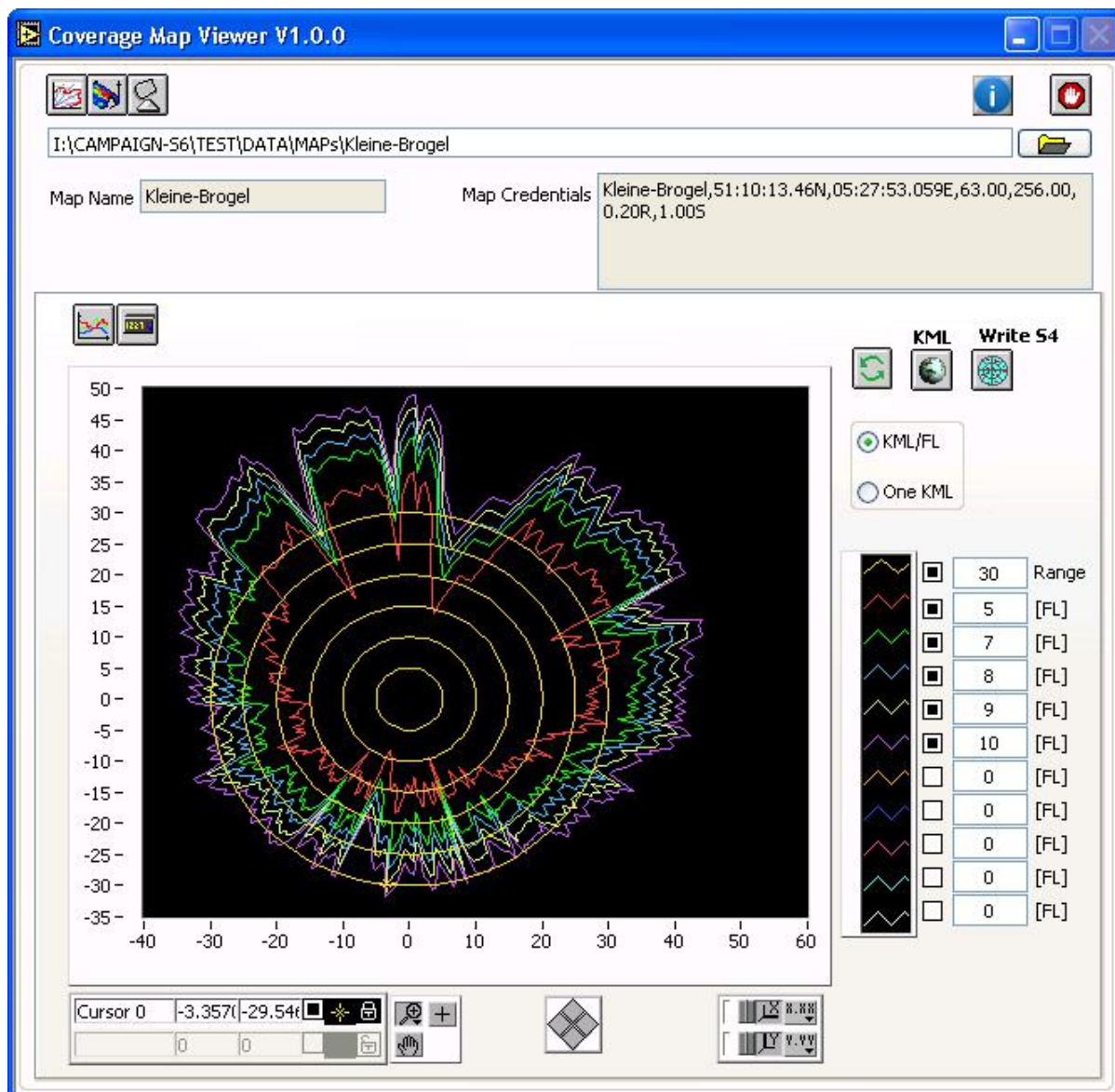

Figure 4- 15: Coverage page

Figure 4- 16: Coverage page with range rings

When a new flight level setting is not displayed after changing use the reload button to update the coverage graph.

4.3   About window
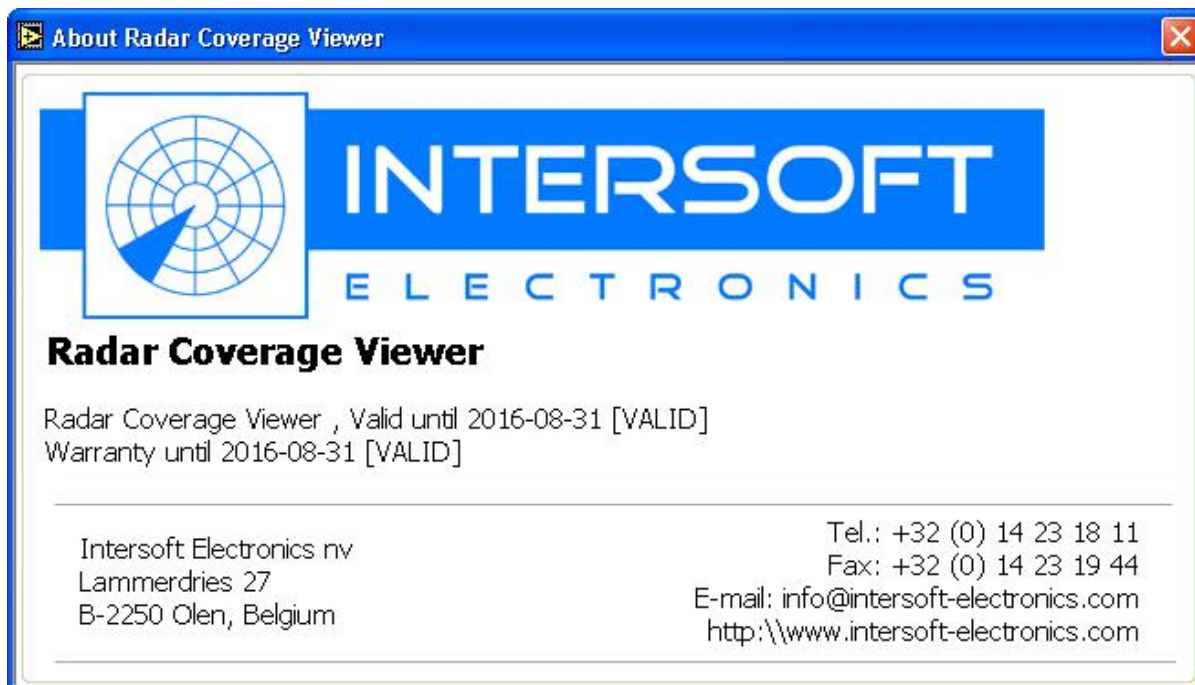
The about window of the Coverage Map Viewer shows the license information and contact information.

Figure 4- 7: About window