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# How can you work with maps while using Smart Tether?

There are two basic ways to work with maps in Smart Tether

1. As a Base Map overlay while you operate the ROV, and its path is displayed in real time over the map.
2. By exporting your position tracking data onto Google Earth for viewing on a map where the ROV has been.

## 1 Base Maps in Real Time

This feature allows a nautical chart or other image to be placed in the background of the Smart Tether Navigation Window, making it possible to continually geo-reference the Smart Tether's position and tether shape data in real time. There are two sources general of base maps.

a)    Charts from NOAA or other organizations

b)    Using Google Earth to create your own map

## a) Charts from NOAA or other organizations

Smart Tether software can read most raster based charts and images. These are normal images that have been geo-referenced and contain information regarding their geographic location.

Depending on the image format, sometimes the geographic information is contained within the image file itself, or sometimes additional, companion files will be required.

Raster based charts may be obtained or created from several sources. In the United States raster-based navigational charts are freely available for all navigable waters. These may be downloaded, free of charge from the NOAA website at:  http://www.charts.noaa.gov/RNCs/RNCs.shtml.  These charts may be downloaded for individual regions, states, or the entire country.

Raster based satellite imagery may also be purchased from commercial vendors. There are several reputable vendors which can be found on the internet.

Once downloaded, these chart files should be copied to "KCF Technologies\Maps" in the "Documents" folder ("My Documents" in Windows XP).

In the Smart Tether software, select Tools->Base Maps. Smart Tether software will scan the folder "KCF Technologies\Maps" in the  "Documents" folder ("My Documents" in Windows XP) for raster based imagery. While scanning, a progress bar will be visible in the lower right-hand corner of the screen. Once scanning completes, any valid charts or images found will be displayed in the left side of the window order by distance from current location. If a map is visible from the current operating location, it will be marked with a star.

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Loading a base map:

1. Select the file name from the list by clicking on the desired map.
2. Click on the Load button.
3. The image will load within the Navigation Window.

Clearing the base map:

1. To clear the base map from the Navigation Window, press the Clear button from within the Base Maps window.

Tips:

1. Make sure the selected map has a star by its name. If there is no star, verify that the GPS has a fix or the correct Base point is entered into the Smart Tether software (See Section 10.4 of the user manual).
2. If a map doesn't show up in the list as expected, verify that it is properly located within the folder "KCF Technologies\Maps" in the "Documents" folder ("My Documents" in Windows XP). If it is in the correct location, it may be in a format incompatible with the Smart Tether software.

## b) Using Google Earth to create your own map

Raster based images may also be obtained from Google Earth using free third party software like Shape2Earth, a plug-in for the open source GIS software MapWindow. (http://shape2earth.com/default.aspx) These tools allow you to export images from Google Earth and save them in a geo-referenced, raster based format. Please make sure to check with Google Earth's terms of use as their satellite imagery may not be free to use for all purposes.

## Installation of required programs

1. Download and install Google Earth

   See Link on: http://www.google.com/earth/download/ge/agree.html

2. Download and install MapWindow GIS (must be the 32 bit version of MapWindow)

   See Link on: http://myshape2earth.appspot.com/

3. Download and install Shape2Earth for MapWindow GIS (if using 64 bit windows, change the install directory to C:\Program Files (x86)\MapWindow\Plugins)

   See Link on: http://myshape2earth.appspot.com/

## Using Shape2Earth to capture map images from Google Earth for use in KCF Smart Tether

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Note that the capture software will force the map image to be North Up even if you have rotated it, and the map will be in black and white.

1. Start Google Earth and Navigate to the area where you want to create the map image.

2. Start MapWindow GIS (The installer may not create a Start Menu shortcut.  If not, navigate to C:\Program Files\MapWindow\ (or C:\Program Files (x86)\MapWindow for Windows 64 bit) and double click on MapWindow.exe.  To make it easier to run MapWindow, you can right click on it and select "Create Shortcut" in the pop up menu.  You can drag the shortcut created to the desktop or start menu.)

3. When MapWindow opens, click on the close "X" in the upper right of the window.  Optionally, you can uncheck the "Show this dialog at startup" option so this window does not show every time you start MapWindow.

4. If Shape2Earth is not one of the menu bar choices, Select "Plugins->Shape2Earth" from the menu bar.  This will add a "Shape2Earth" item to the menu bar.  If you do not see "Shape2Earth" in the "Plugins" menu, something has not been installed correctly.

5. Select "Shape2Earth->Get Image from GE" from the menu bar.  A "GE Image Capture" window will open.

6. Click on the "Capture" button.  "A Save As" window will open.

7. Navigate to folder "KCF Technologies\Maps" in the "Documents" folder ("My Documents" in Windows XP) and enter your desired name for the image you are capturing.

8.  To capture more images, you can navigate Google Earth to new views and the "Get Image form GE" window will update.  Click the "Capture" button when the Google Earth view is as desired.

9. Close the "Get Image from GE" window, and close MapWindow and Google Earth.

 Follow the steps 1-3 above for loading a base map in the Smart Tether software.

*Tip - Most aerial photos show the water as black. Using an image editing program, such as Gimp (which is open source and available for free from* http://www.gimp.org/*), create a negative of the saved map image.  The water will change to white and it will be easier to see ROV and its track on the base map.*


**2 Viewing the ROV/Smart Tether position history in Google Earth**

 After you have operated for a while, you can export your position history to Google Earth to overlay your route on a map.  This can be done while you are in the field in near real-time or in the office as a post process.  The process is simple, click on the View Map button in the lower right hand corner of the Smart Tether navigation area.

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If you do not have an Internet connection in the field, you can open Google Earth in the office and zoom into the area in which you expect to work.  This will cache the data so that you can view the details in the field without an Internet connection.

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