# Creating Overlays

In this section we'll learn how to import overlays and place them on Google Earth. These are very handy to portray ocean conditions such as SST, SSH, chlorophyll, and other parameters while your drifter is on the water. They're also a great way to show maps of anything to students or other audiences because Google Earth provides immediate spatial reference and scale.

Google Earth supports three kinds of overlays.

Image Overlay: Sea Surface Temperatures over sea level

Screen Overlay: a legend pinned at lower right

Ground or Image Overlays (these are synonymous): These are maps or images that drape over the topography, or over sea level, in Google Earth. They could also be draped over the sea floor bathymetry.

Screen Overlays: These images are pinned to a certain part of the Google Earth 2D screen, like the upper left, lower right, or dead-on center. They are good for logos or legends that explain maps displayed as image overlays.
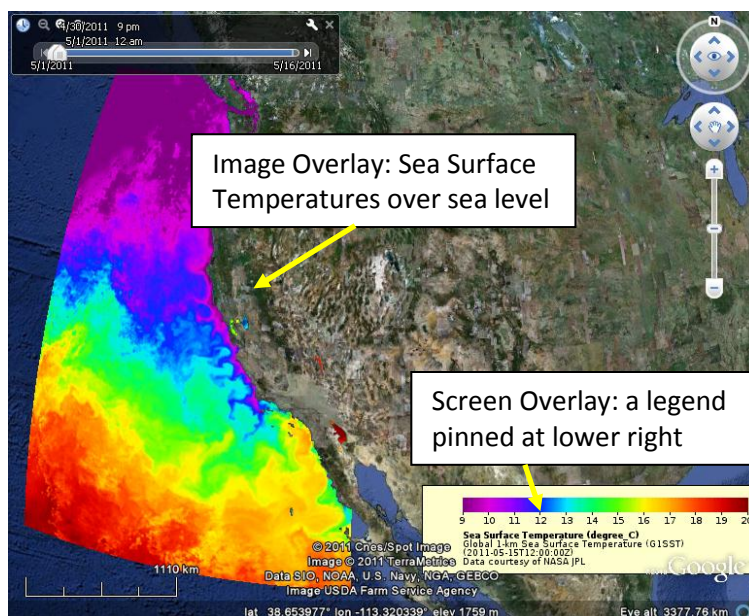
Photo Overlays: These are photographs that are geo-referenced and placed at the exact location and orientation that the photograph was taken. Viewers can then "fly into" the photographs. Gigapans are an example of Photo overlays. Unless time permits or interest demands, we will not dwell on photo overlays in this workshop.
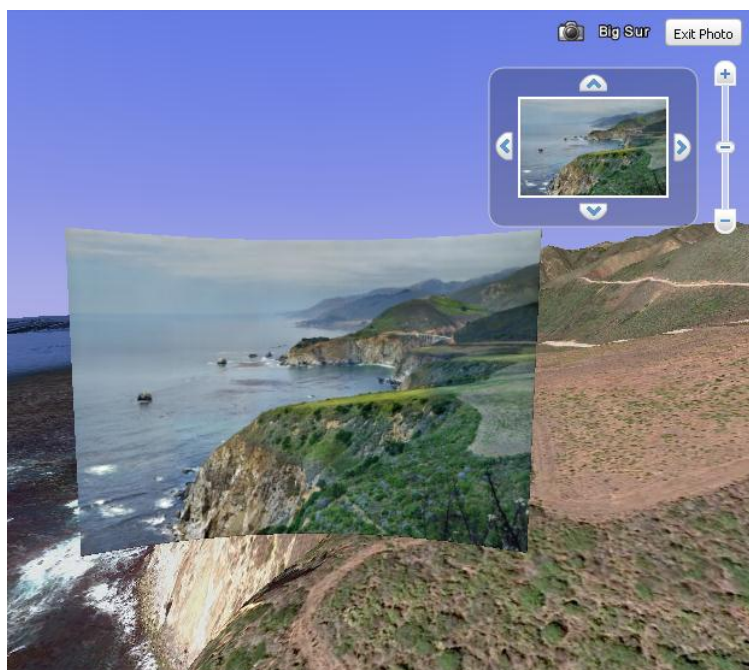
Adding an Image Overlay

The first step is to find a nice map or image to add to Google Earth. Here's one that's nice and simple and a good example to learn from (right). Note that it contains more information than just a map. Also, for later in the exercise, note that the green, red, and grey pie chart is perfectly circular.

Here's the URL:
http://sanctuarysimon.org/monterey/images/build/b_overview_map_full.jpg
Download the jpg to a folder that you will remember. Note that those spaces are "_" characters in the file name. (In the browser, right click and choose "Save Picture As…")

The associated web site has lots of good information about the MBNMS:
http://sanctuarysimon.org/monterey/sections/beaches/maps_graphs.php
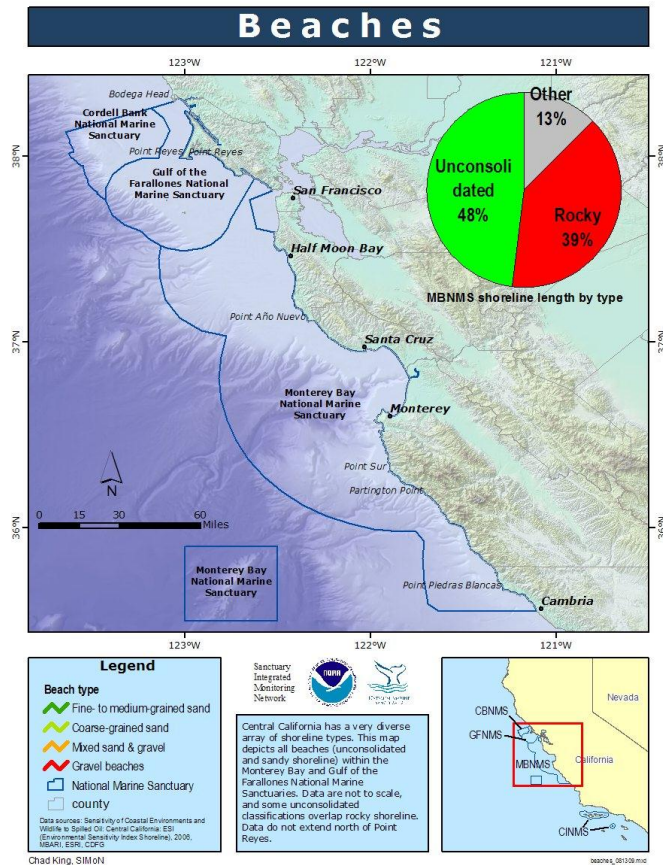
Open Google Earth and press Add > Image Overlay. A window will open.

In the "New Image Overlay" window that opens, press the browse button and search for the jpg that you just saved (this is a test). Open the image and leave the New Image Dialog box open (don't click OK just yet.)
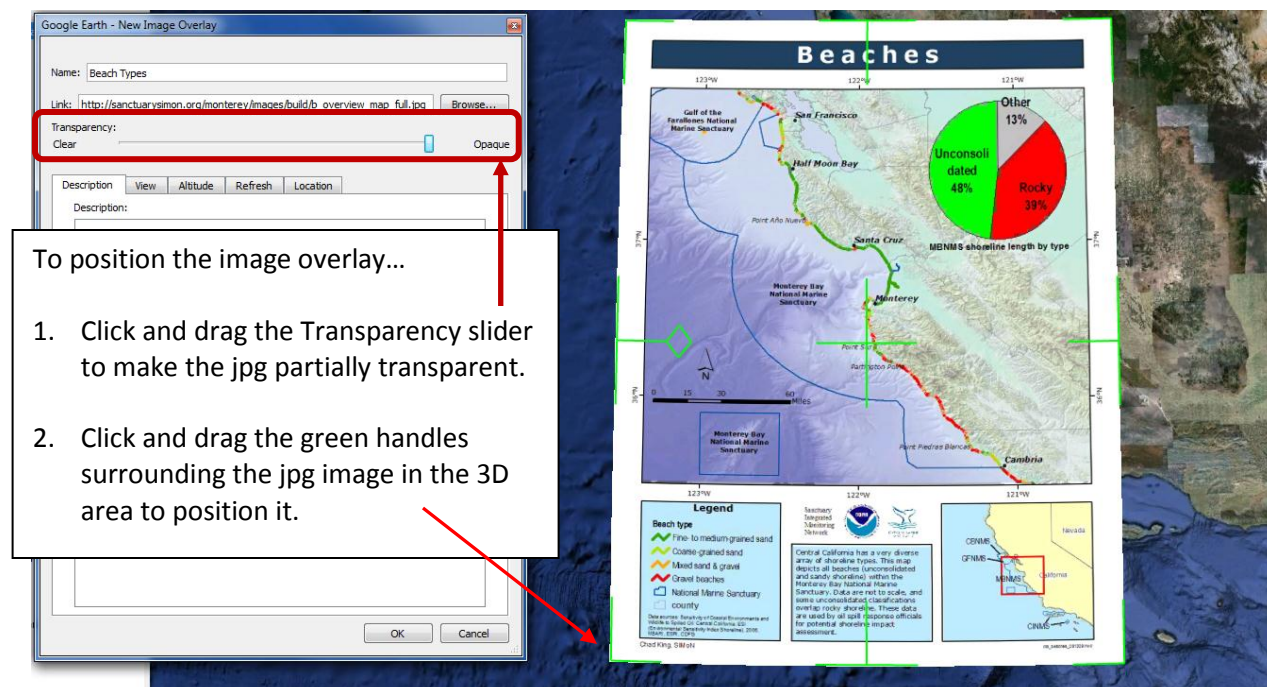
> **Note: you could enter the URL for this image so that Google Earth would download this image from the Internet rather than your hard drive. There are advantages and disadvantages to this approach.
> - The advantage is that your resulting KML file will be much smaller and easier to save, send, open, and otherwise manipulate.
> - The disadvantage is that the owners of this website could take the image down at any time, or the external server could become very slow at inopportune times.

Once you've have either an address from your hard drive or a URL from the Internet in the "Link:" box, and you put the curser anywhere else, you should see the image in the 3D viewer of Google Earth. The image should have green lines on the sides and at the corners.

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You can give the image a name in the "Name:" box. This will identify the image in the Places panel (like a table of contents.)

To position the image overlay…

1. Click and drag the Transparency slider to make the jpg partially transparent.

2. Click and drag the green handles surrounding the jpg image in the 3D area to position it.

In this screen shot, the jpg image has just been added and given a name, "Beach Types". Note that I've used the URL in this example. You can also write in a description of this map.

To help position this particular jpg, you may want to turn on the coordinate grid in Google Earth to see the latitude and longitude lines (View > Grid). [You will need to click OK in the New ImageOverlay window to access the View menu.]

It is an iterative process. You can press OK to get out of the "New Image Overlay" window. To return to the positioning process, right click the overlay in the Google Earth list view and press "Properties". When finished, remember to leave the Transparency slider all the way on "Opaque".

To change the transparency of the overlay when viewing normally in Google Earth, highlight the overlay in the list view and then move the slider at the bottom of the Places panel.
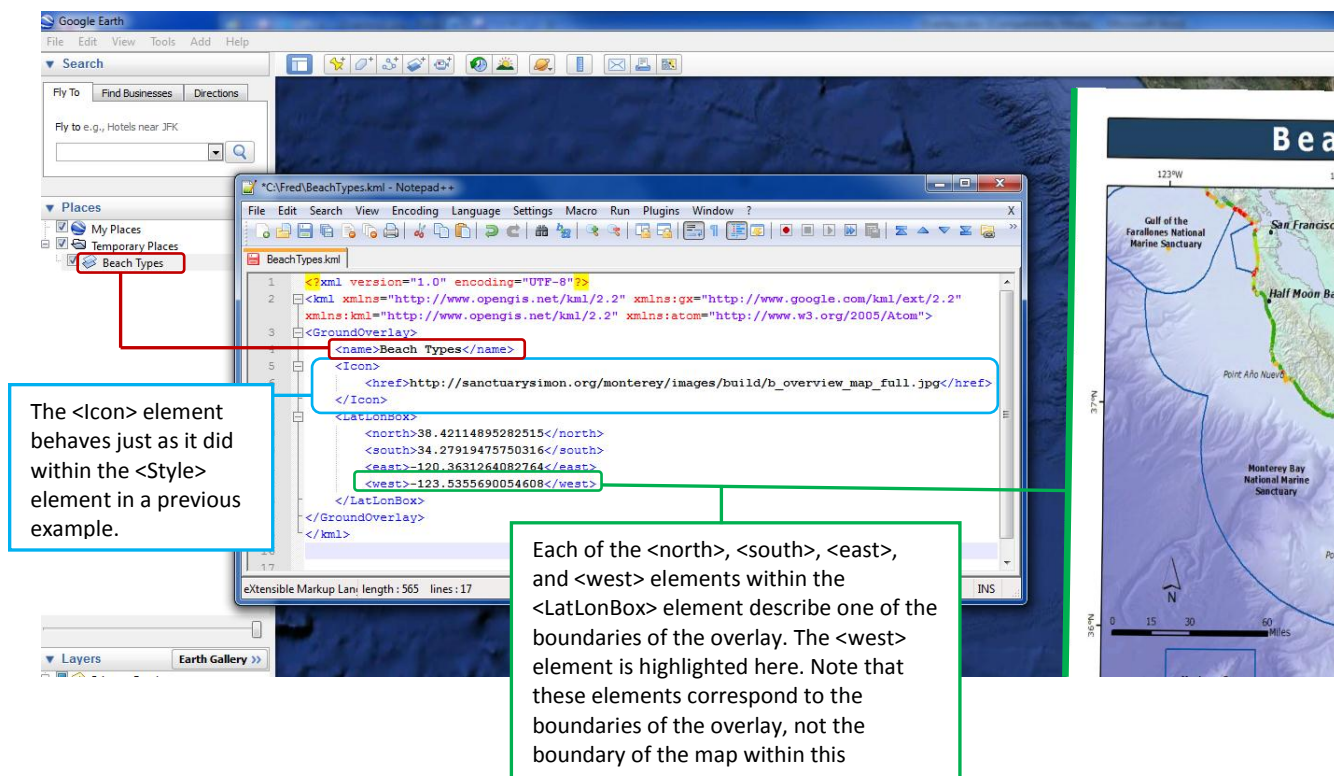
On the right is the jpg in the final stages of positioning, while still in a semi-transparent state. Don't forget to increase the opacity before pressing "OK" for the final time.

Now let's take a look at the KML that describes our overlay. Use the copy-and-paste trick to copy the KML into

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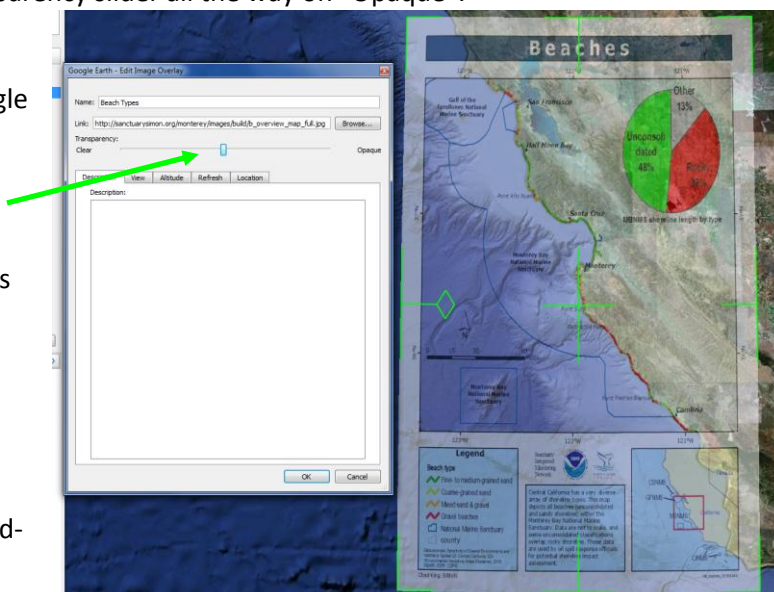
Notepad++. [Right click on the name in the Places panel and select copy, open up Notepad++ and select paste.] The image below is a screenshot that shows the Notepad++ window on top of the Google Earth window. Admire the simplicity and efficiency of the script.

Save this KML file to your hard disk, calling it "ImageOverlaySimple.kml". We'll use this file later.

The <Icon> element behaves just as it did within the <Style> element in a previous example.

Each of the <north>, <south>, <east>, and <west> elements within the <LatLonBox> element describe one of the boundaries of the overlay. The <west> element is highlighted here. Note that these elements correspond to the boundaries of the overlay, not the boundary of the map within this

A note on Projections. Note that the pie diagram on the overlay is deformed. This is because the projection of the original map was different than the projection used by Google Earth. Google Earth changed the projection of the overlay during the fitting process. I believe that Google Earth can deal with any projection where the lines of latitude and longitude are perpendicular, as in the geographic projections.

Now let's go back to our image overlay in Google Earth and add some complexity.

First change the view in the 3D viewer by zooming in or out, rotating the view, tilting the view, or whatever.

Right click on the overlay in the Places panel and select "Properties".

Write a description in the box that is longer than two lines.

Press the View tab, and then press the "Snapshot Current View" button.

Press "OK".

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Note what has happened in the Places panel. The first couple of lines of your description should now be visible.

Single left-click on the overlay in the list view and a balloon should appear with your entire description.

Double left-click on the overlay in the list view and the 3D view should move to the position that you entered when you pressed "Snapshot Current View".

Now use the copy-and-paste trick to view the KML for the newly enhanced overlay in Notepad++.
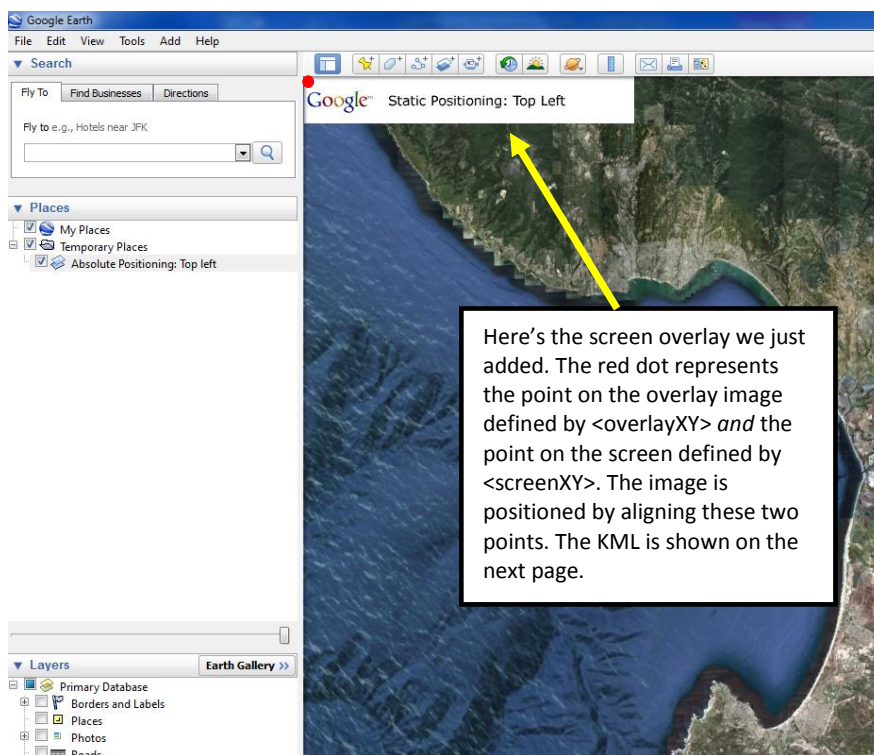
What's new?
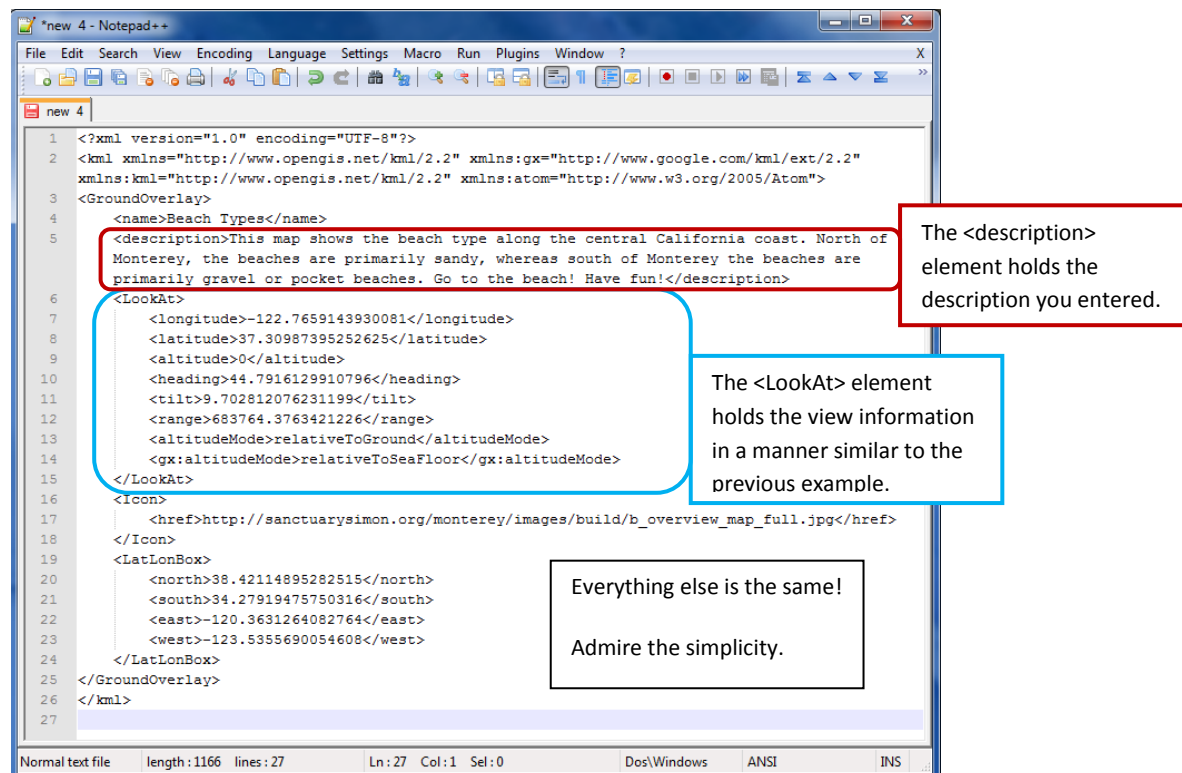
Save this KML file to your hard disk, calling it "ImageOverlayComplex.kml".

Screen Overlays

Screen overlays cannot be authored from within Google Earth; we must use a text editor to create their KML code. They are used to "glue" an image to a fixed part of the 3D screen, like upper left, lower right, etc… Screen overlays are used to display logos, legends, or other images that you don't want to disappear out of view as you move around the map in Google Earth.

Page 130 in "The KML Handbook" has a good graphic illustrating some of the important terms for screen overlays.

- Go to the KML Tutorial at http://code.google.com/apis/kml/documentation/kml_tut.html
- Scroll down to the table of contents, find Screen Overlays, and click on it.
- Highlight the green example code and copy it.
- Go to Notepad++ and paste it in.
  - Note: the code may paste in all as one line, making it difficult to read.
  - If this happens, keep following these directions anyway; the issue should rectify itself in a few steps.
- Save the file as a .kml file called ScreenOverlay.kml in a folder that you will remember. We will return to this file in a later tutorial.
- Go to Google Earth and open your ScreenOverlay.kml file. You should see a very simple little graphic in the upper left corner.
  - If the code pasted badly in only one line last time, use the copy-and-paste trick to copy the ScreenOverlay.kml file and paste it back into Notepad++. This time, you should see the KML in a more digestible format.

Here's the screen overlay we just added. The red dot represents the point on the overlay image defined by <overlayXY> *and* the point on the screen defined by <screenXY>. The image is positioned by aligning these two points. The KML is shown on the next page.

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Now let's look at the KML to see what it's doing.

Basically, a screen overlay is a jpg or other graphic file located either on your hard drive or on an Internet server. The KML references this image, assigns a reference point to the image and matches it to a reference point on the 3D view area (see the image on page 130 of "The KML Handbook").

- The <overlayXY> element assigns a reference point to the graphic image file. The point is measured in pixels or fractions of the entire image as measured from the bottom left corner.
- The <screenXY> element assigns a reference point on the screen, again measured in either pixels or fraction of the entire screen as measured from the bottom left corner.

You can think of a nail attaching the image to the screen; the nail goes through both <overlayXY> and <screenXY>.

- The <size> element controls the size of the image used in the screen overlay. There are various options to use for both the x and y dimensions (see the Handbook, p 131), but I think using either -1, which specifies to use the image as is, or n, representing any number, is the safest. As with all the other child elements, the units can be in either pixels or fractions of the original image size.

In this case, the <overlayXY> element sets the reference point at the upper left corner of the image file. Note that the units are fractions. So a fraction of "1" means the entire distance across the image. Remember that the origin is at the lower left corner. So y="1" means all the way across the image in the y direction (up). This reference point on the image will be aligned with the point defined by <screenXY> on the screen.

In this case, the <screenXY> element sets the reference point at the upper left corner of the screen. Note that the units are fractions. So a fraction of "1" means the entire distance across the screen. Remember that the origin is at the lower left corner. This reference point on the screen will be aligned with the point defined by <overlayXY> on the image.

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Using What You've Learned

The point of this section is to alter and play with the KML files you've created to gain familiarity with controlling how KML scripts control the overlays.

Some beginning ideas:

Open one of the KML files that we've worked with in your text editor. Alter one or two of the values in the various elements. Save the KML file. Open the KML file in Google Earth (or use Revert). Repeat until you're comfortable with the concepts/elements we've covered and maybe even a few more.

Some intermediate ideas:

Go to the KML tutorial http://code.google.com/apis/kml/documentation/kml_tut.html
Scroll down to the screen overlay section and download the KML Samples file, downloading it to a place you'll remember.
Open this KML file in Google Earth.
Open the Screen Overlays and Ground Overlays sections and look at the various examples.
Use the copy-and-paste trick to copy the KML to Notepad++ and look at the KML code.
Analyze the KML to see if you can tell why the overlays are behaving differently.

Find your favorite map on the Internet or from your collection, that is saved as a jpg or png file.
Place your map into Google Earth using Add > Image Overlay and the techniques we covered in this section.

Some advanced ideas:

Read the "KML Handbook" or the on-line KML tutorial referenced above to figure out how to rotate a screen overlay.
Determine the difference between <rotationXY> and <rotation>.
Place a successfully rotated Screen Overlay on Google Earth and show it off to the rest of us.

Read the "KML Handbook" or the on-line tutorial referenced above to figure out how to insert a photo overlay into Google Earth.

Access one of your photographs, or one from the Internet, and insert it into Google Earth and show it off to the rest of us.

It helps if you know *exactly* where the photograph was taken.

A nice YouTube video explanation of how to do this is here:
http://www.gearthblog.com/blog/archives/2008/04/advanced_photo_placement_in_google.html

Have fun!