

GOOGLE EARTH KML劇本編輯

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認識KML

101年度臺北市GIS教育訓練專用

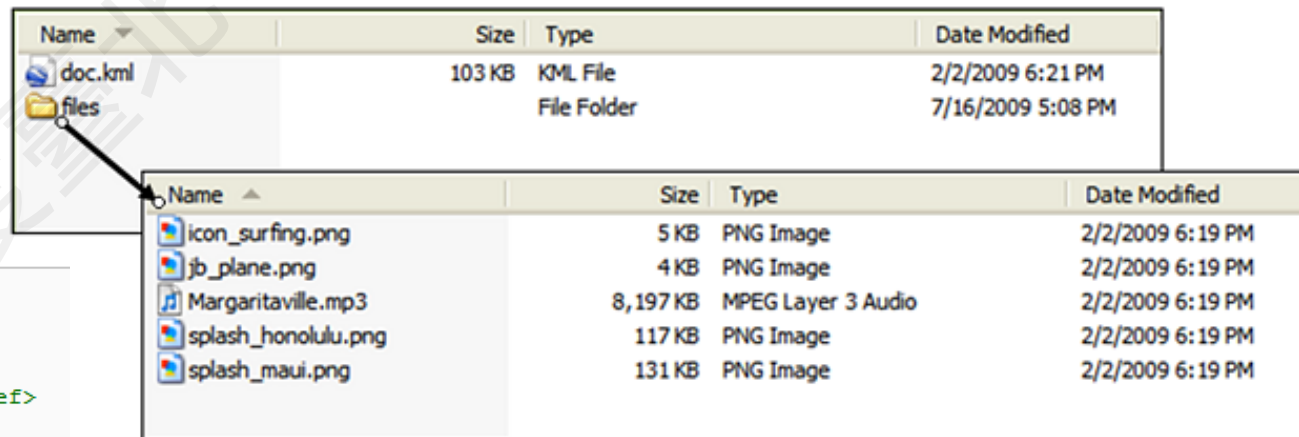
關於KML

KML2.2

- KML是一種XML語法和文件格式，並符合XML標準。
- OGC通過之國際標準。
- 所有標籤名稱區分大小寫。
- 物件導向層次式架構。

KML v.s. KMZ

- KMZ 為一種壓縮檔。
- KMZ的運用時機：
 - ▣ 你的KML檔較大，需要壓縮減少資料量(壓縮比約10:1)
 - ▣ KML 檔內有連結到一些放在本機的檔案(影像、模型、材質、聲音等)，將整個壓縮打包成單一KMZ檔作傳遞。



The screenshot shows a file explorer window with two panes. The top pane shows a file named 'doc.kml' (103 KB, KML File) and a folder named 'files' (File Folder). The bottom pane shows the contents of the 'files' folder, which includes five files: 'icon_surfing.png' (5 KB, PNG Image), 'jb_plane.png' (4 KB, PNG Image), 'Margaritaville.mp3' (8,197 KB, MPEG Layer 3 Audio), 'splash_honolulu.png' (117 KB, PNG Image), and 'splash_maui.png' (131 KB, PNG Image). An arrow points from the 'files' folder in the top pane to the bottom pane.

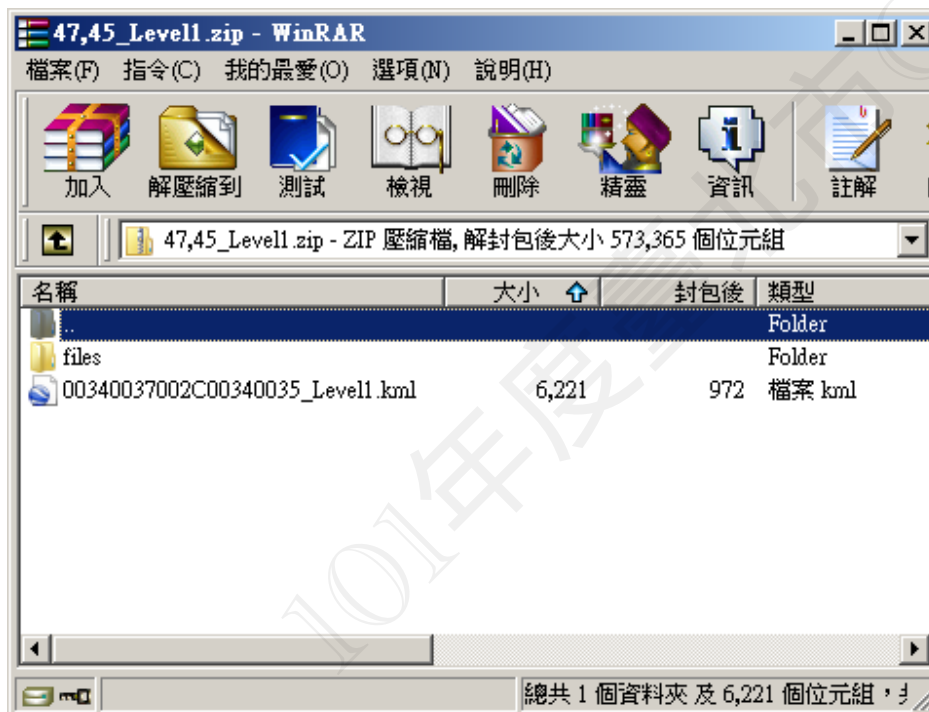
Name	Size	Type	Date Modified
doc.kml	103 KB	KML File	2/2/2009 6:21 PM
files		File Folder	7/16/2009 5:08 PM

Name	Size	Type	Date Modified
icon_surfing.png	5 KB	PNG Image	2/2/2009 6:19 PM
jb_plane.png	4 KB	PNG Image	2/2/2009 6:19 PM
Margaritaville.mp3	8,197 KB	MPEG Layer 3 Audio	2/2/2009 6:19 PM
splash_honolulu.png	117 KB	PNG Image	2/2/2009 6:19 PM
splash_maui.png	131 KB	PNG Image	2/2/2009 6:19 PM

```
<IconStyle>  
  <scale>1.1</scale>  
  <Icon>  
    <href>files/icon_surfing.png</href>  
  </Icon>  
</IconStyle>
```

KMZ v.s. ZIP

- KMZ 即為ZIP格式壓縮檔
- 將xxx.KMZ 副檔名改為xxx.ZIP 後即可以 WinZIP(WinRAR)解壓縮。



KML 教程

第一部分：基礎KML文件

第二部分：進階KML文件

第三部分：KML MIME類型

第一部份：基礎KML

說明

- 最簡單的KML檔案類型，無需在文件編輯器中編輯或創建任何KML。
- 包括Placemark、GroundOverlay、Path和Polygon都可以直接在Google Earth界面中實作。

範例檔案：https://developers.google.com/kml/documentation/KML_Samples.kml

(一)基礎KML : Placemarks

範例 1 : Placemarks (地標)

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<kml xmlns="http://www.opengis.net/kml/2.2">
```

XML標頭：每個KML文件的第1行，該行前面不能有空格或其他文字或符號。

KML 名稱空間聲明：每個KML 2.2 文件的第2行。

```
<Placemark>
```

```
<name>臺北市政府</name>
```

```
<description>臺北市政府成立於民國34年10月。
```

```
</description>
```

```
<Point>
```

```
<coordinates>121.5637393641262,25.03760744514288
```

```
,0 </coordinates>
```

```
</Point>
```

```
</Placemark>
```

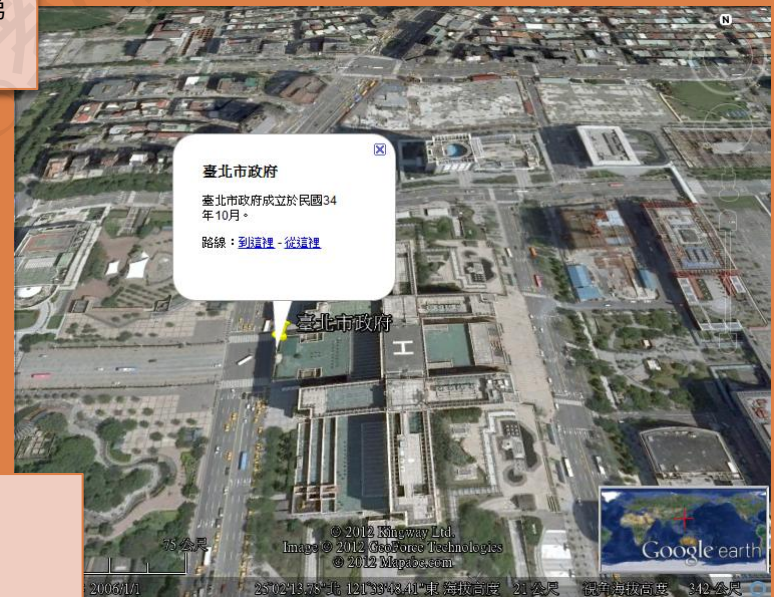
```
</kml>
```

Placemark元素：

<name>：標識地標的名稱

<description>：地標氣泡框中顯示的說明，可添加HTML語法

<Point>：指定地標在地球表面位置的座標（經度、緯度及高度）

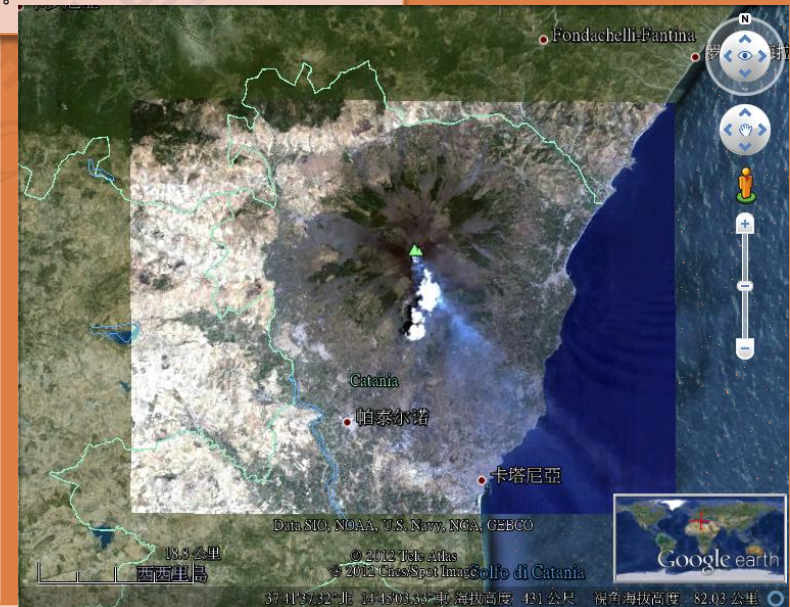


(一)基礎KML : Ground Overlays

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://www.opengis.net/kml/2.2">
  <Folder>
    <name> [ 新增資料匣名稱 ] </name>
    <GroundOverlay>
      <name> [ 地面疊加層名稱 ] </name>
      <description> [ 疊加層圖片描述 ] .</description>
      <Icon>
        <href>http://code.google.com/apis/kml/documentatio
n/etna.jpg</href> </Icon>
      <LatLonBox>
        <north>37.91904192681665 </north>
        <south>37.46543388598137</south>
        <east>15.35832653742206</east>
        <west>14.60128369746704</west>
        <rotation>-0.1556640799496235</rotation>
      </LatLonBox>
    </GroundOverlay>
  </Folder>
</kml>
```

文件開始兩行與第一個示例相同，都是XML 標頭和 KML 名稱空間聲明。

範例 2 : Ground Overlays (地面疊加層)



GroundOverlay 元素 :

<icon> : 疊加層圖像 (支援 JPEG 、 BMP 、 GIF 、 TIFF 、 TGA 、 PNG)

<LatLonBox> : 指定定位之邊框值及旋轉值

(一)基礎KML : Paths

範例3 : Paths (路徑)

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://www.opengis.net/kml/2.2">
<Document>
<name>[新增文件名稱]</name> <description>[可在此新增文件描述]</description>
<Style id="yellowLineGreenPoly">
  <LineStyle>
    <color>7f00ffff</color>
    <width>4</width>
  </LineStyle>
  <PolyStyle>
    <color>7f00ff00</color>
  </PolyStyle>
</Style>
<Placemark>
<name>[新增路徑名稱]</name>
<description>[新增一個綠色牆黃色線並有絕對高度之路徑]</description>
<styleUrl>#yellowLineGreenPoly</styleUrl>
<LineString> <extrude>1</extrude> <tessellate>1</tessellate>
<altitudeMode>absolute</altitudeMode>
<coordinates> -112.2550785337791,36.07954952145647,2357 -112.2549277039738,36.08117083492122,2357 -
112.2552505069063,36.08260761307279,2357 -112.2564540158376,36.08395660588506,2357 -
112.2580238976449,36.08511401044813,2357 -112.2595218489022,36.08584355239394,2357 -
112.2608216347552,36.08612634548589,2357 -112.262073428656,36.08626019085147,2357 -
112.2633204928495,36.08621519860091,2357 -112.2644963846444,36.08627897945274,2357 -
</coordinates>
</LineString>
</Placemark>
</Document> </kml>
```

給予Style控制項指定id

指向Style id

<tessellate>標籤把線切成小段，而

<extrude>標籤將線向下延伸到地面。



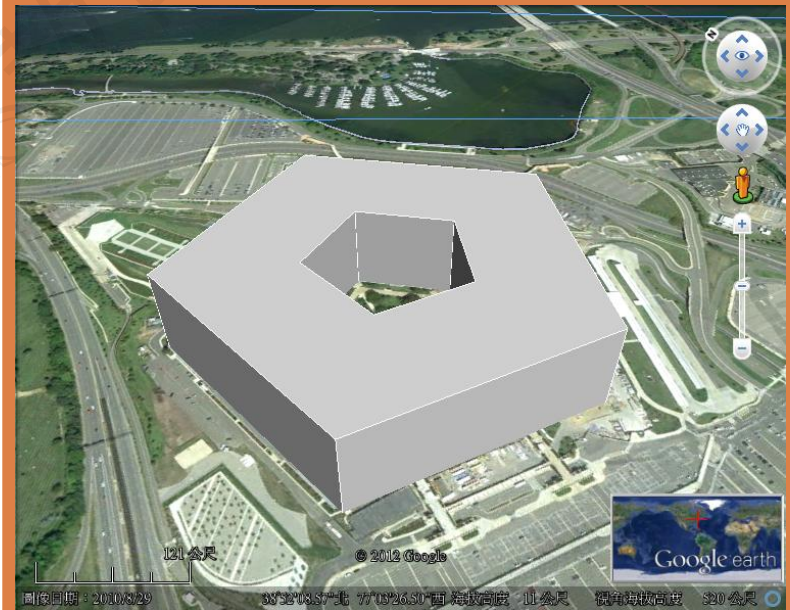
(一)基礎KML : Polygons

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://www.opengis.net/kml/2.2">
  <Placemark>
    <name>The Pentagon</name>
    <Polygon>
      <extrude>1</extrude>
      <altitudeMode>relativeToGround</altitudeMode>
      <outerBoundaryls>
        <LinearRing>
          <coordinates>
            -77.05788457660967,38.87253259892824,100
            -77.05465973756702,38.87291016281703,100
            -77.05315536854791,38.87053267794386,100
            -77.05552622493516,38.868757801256,100
            -77.05844056290393,38.86996206506943,100
            -77.05788457660967,38.87253259892824,100
          </coordinates>
        </LinearRing>
      </outerBoundaryls>
      <innerBoundaryls>
        <LinearRing>
          <coordinates>
            -77.05668055019126,38.87154239798456,100
            -77.05542625960818,38.87167890344077,100
            -77.05485125901024,38.87076535397792,100
            -77.05577677433152,38.87008686581446,100
            -77.05691162017543,38.87054446963351,100
            -77.05668055019126,38.87154239798456,100
          </coordinates>
        </LinearRing>
      </innerBoundaryls>
    </Polygon>
  </Placemark> </kml>
```

<extrude>允許標籤將線向下延伸到地面

透過簡單繪製內外殼，以及設定高程延伸至地面長成。

範例4 : Polygon (多邊形)

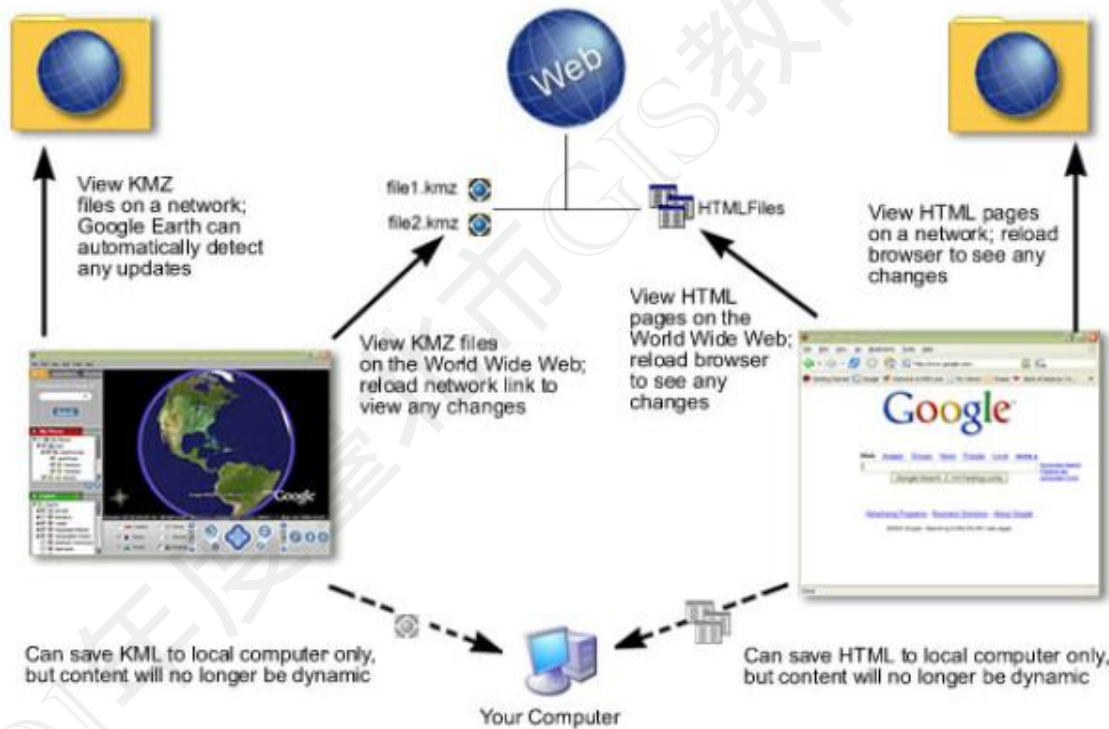


Network Links

- **GE** 裡很重要的功能，簡單但功能強。
- 使用時機：
 - ▣ 如果你的主題KMZ裡放了很多資料，如果這些資料都放在KMZ裡，則檔案會相當大，**GE**載入時會相當耗時!而且此主題的應用可能是不需要同時展現所有資料。此時可以將主題切割成數個KMZ檔，以**NetworkLink**來連結他們。

Network Links

- ▣ 你的KMZ裡的資料來源是來自其他單位，而且需要對應的更新以隨時掌握最新的資訊。



Network Links
with Google Earth

Web Page Connection
with Web Browser

Network Links的使用時機

Network Link to Remote URL:

- KML data is updated frequently by the author
- KML data is less than 2-3 megabytes
- KML data is not accessed very often

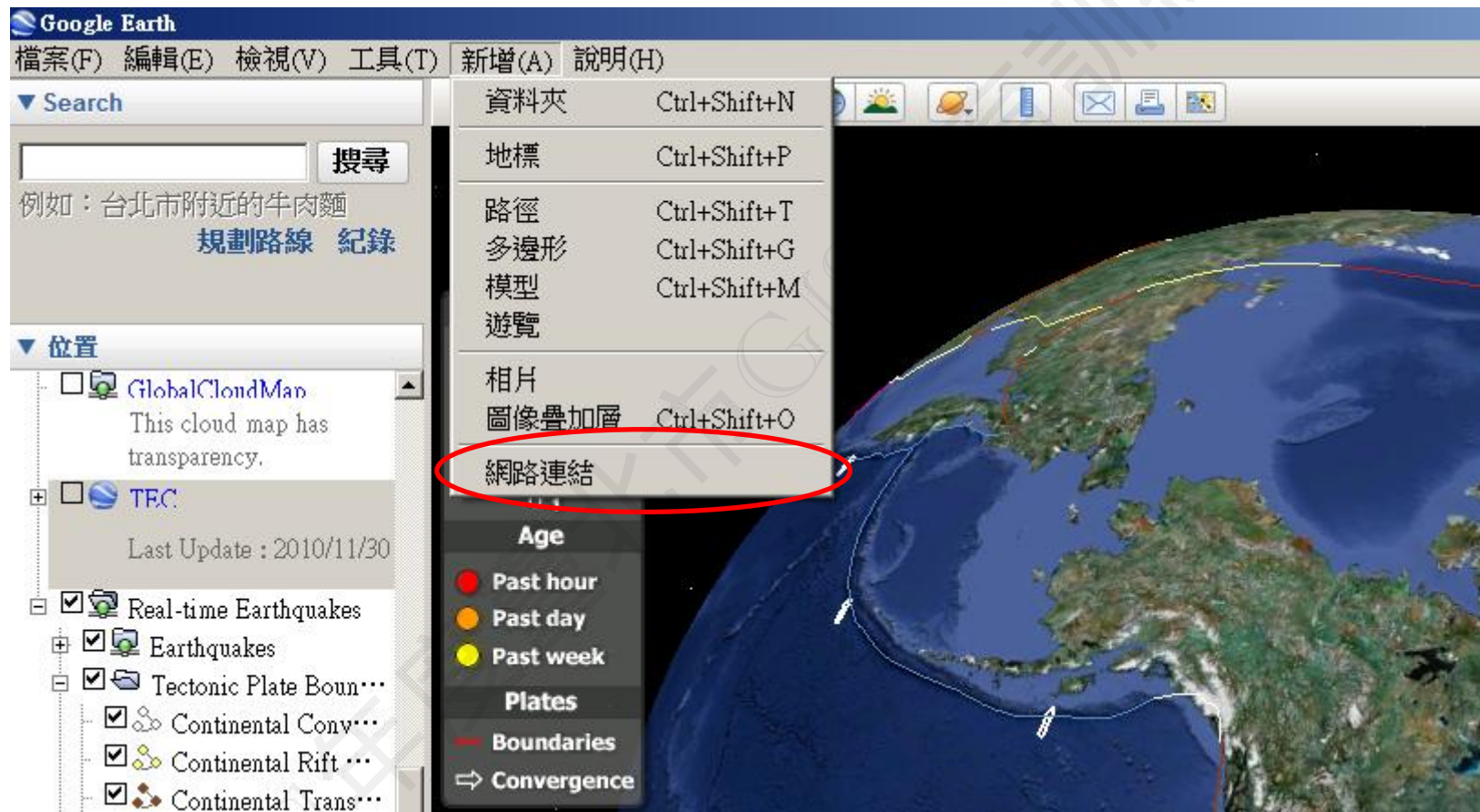
Network Link to local file on hard drive:

- KML data is rarely updated
- KML data is larger than 2-3 megabytes
- KML data is frequently accessed

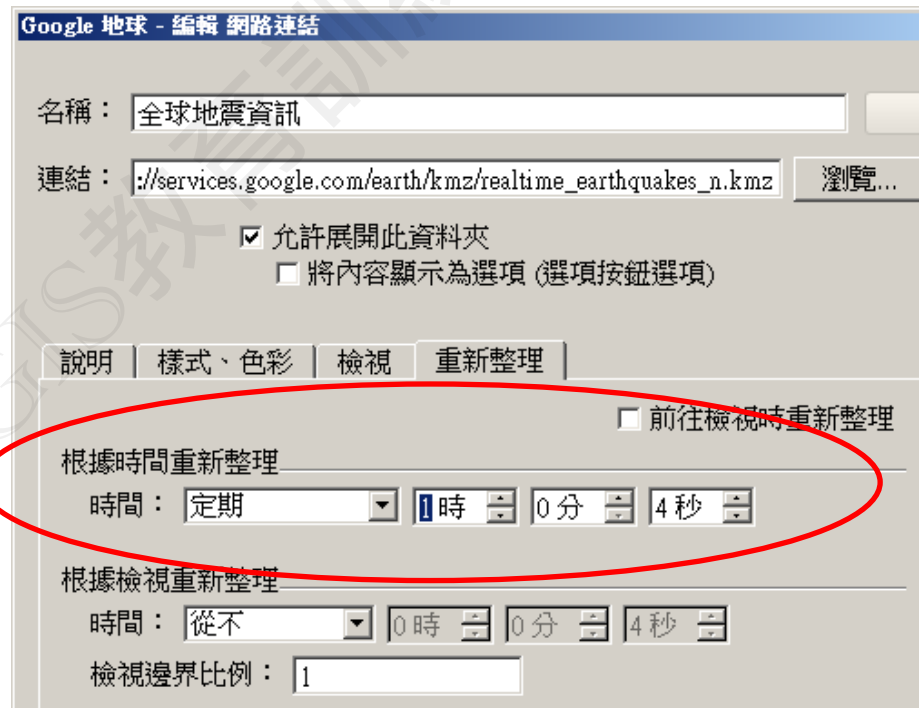
Network Link Not Necessary:

- KML data is very small (less than 100K)

建立GE的NetworkLink



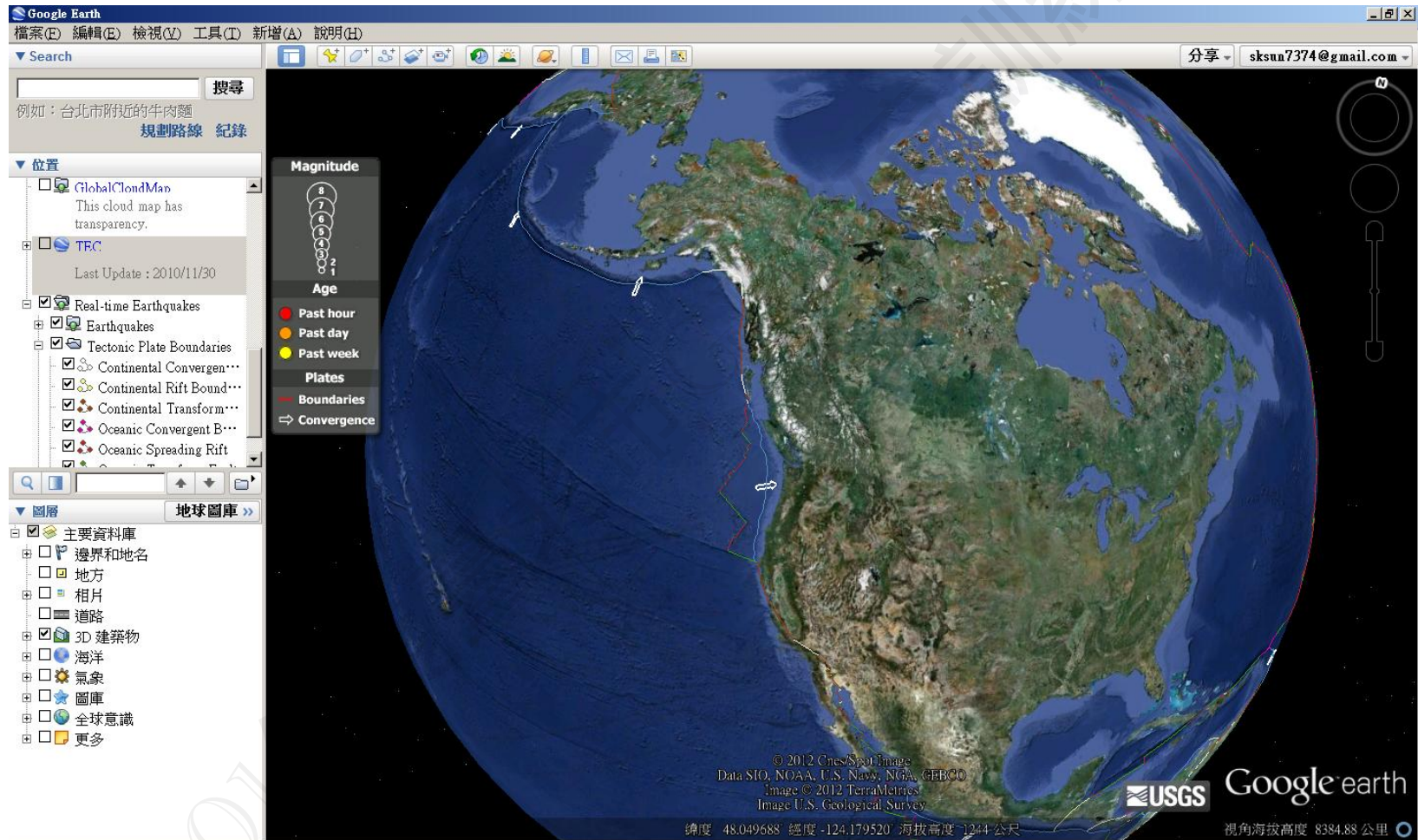
NetworkLink設定



NetworkLink 之 KML 編碼

- `<?xml version="1.0" encoding="UTF-8">`
- `<kml xmlns="http://www.opengis.net/kml/2.2"
xmlns:gx="http://www.google.com/kml/ext/2.2"
xmlns:kml="http://www.opengis.net/kml/2.2"
xmlns:atom="http://www.w3.org/2005/Atom">`
- `<NetworkLink>`
- `<name>全球地震資訊</name>`
- `<open>1</open>`
- `<Link>`
- `<href>http://services.google.com/earth/kmz/realtime_earthquakes_n.kmz</href>`
- `<refreshMode>onInterval</refreshMode>`
- `<refreshInterval>3604</refreshInterval>`
- `</Link>`
- `</NetworkLink>`
- `</kml>`

範例



http://services.google.com/earth/kmz/realtime_earthquakes_n.kmz

<http://tecdc.earth.sinica.edu.tw/SIS/ge/TEC.kmz>

臺北市圖資中心共通平台資源

No.	名稱 (點選可下載檔案)	更新日期	檔案大小
1	臺北市土石流潛勢溪流位置圖.kml	2011/6/4	62KB
2	臺北市觀光景點.kml	2011/6/21	22KB
3	臺北市衛生掩埋場.kml	2011/6/21	2KB
4	臺北市溫泉監測井.kml	2011/6/21	11KB
5	臺北市溫泉業者點位.kml	2011/6/21	19KB
6	臺北市給水系統開關圖.kml	2011/6/21	49,383KB
7	臺北市健康服務中心.kml	2011/6/21	8KB
8	臺北市計程車招呼站位置圖.kml	2011/6/21	32KB
9	臺北市政府文化局所轄藝文空間.kml	2011/6/21	14KB
10	臺北市供氣系統場站.kml	2011/6/21	12KB
11	臺北市行人專用時相路口.kml	2011/6/21	10KB

內容

一般

臺北市土石流潛勢溪流位置圖.kml

通訊協定: HyperText Transfer Protocol

類型: KML 檔案

網址: (URL) http://gis.tpgos.taipei.gov.tw/tp98_6_demo/kml/臺北市土石流潛勢溪流位置圖.kml

「Google 地球」- 新功能 網路連結

名稱: 臺北市土石流潛勢溪流位置圖

連結: .tw/tp98_6_demo/kml/臺北市土石流潛勢溪流位置圖.kml 瀏覽...

允許展開此資料夾
 將內容顯示為選項 (選項按鈕選項)

說明 檢視 重新整理

新增連結 新增圖片...

http://gis.tpgos.taipei.gov.tw/tp98_6_demo/
(開放各單位使用)

[http://adm3d.taipei.gov.tw/tcg/kml/圖資共通平台\(分類\).kmz](http://adm3d.taipei.gov.tw/tcg/kml/圖資共通平台(分類).kmz)

府內其他資源(需經局處授權同意使用)

- 即時交通速率
 - <http://210.241.67.141/web/xml/kml/vd1.kml>
- 大地工程處親山步道
 - <http://210.69.61.29/hiking/>
- 台北好好看
 - http://163.29.36.21/images/105/990810_dbo_show_good1.kml
- ...

練習

- 參考以下網站，選定主題(如地震、氣象、交通、...等)以 NetworkLink 方式包裝成 KMZ
 - ▣ http://www.google.com/gadgets/directory?synd=earth&hl=zh-TW&gl=TW&preview=on&cat=all&sort=rank_score&sort-order=desc
 - ▣ <http://www.gearthhacks.com/dlcat1/Network-Links.htm>

第二部份：進階KML

說明

- 必須用文件編輯器編寫的KML 元素。
- “手動” 編寫KML 比用Google Earth界面創建和修改地圖項略微難一些，但只需稍加練習，多數用戶都能自如地編輯KML 文件以增添這些效果。

KML Interactive Sampler

<http://kml-samples.googlecode.com/svn/trunk/interactive/index.html>

The screenshot shows a web browser window displaying the KML Interactive Sampler. The browser's address bar shows the URL: `kml-samples.googlecode.com/svn/trunk/interactive/index.html`. The page title is "KML Interactive Sampler". Below the title, there is a brief description: "Explore the samples below or enter your own KML to get started. You can then make changes and see them in action by clicking 'Update Earth!'". A note states: "This sampler requires the [Google Earth Plug-in](#)."

The interface is divided into several sections:

- Placemarks and Geometries:** A tree view containing categories like "Placemarks (Points)", "Lines and Paths", "Polygons", "Models", "Multi-Geometries", "Other Features", "Other Basic Topics", "Advanced Topics", and "Google's KML Extensions". Each category lists specific KML samples with icons.
- Instructions and useful links will appear here if available.** A section for displaying instructions and links.
- Useful links:** A section containing a link to "<Document>".
- Update Earth** and **Download** buttons.
- Code Editor:** A text area showing KML XML code. The visible code is:

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <kml xmlns="http://www.opengis.net/kml/2.2"
3   xmlns:gx="http://www.google.com/kml/ext/2.2">
4   <Document>
5
6   </Document>
7 </kml>
```
- Map View:** A large window on the right showing a 3D globe of Earth with a yellow outline of the continents. The map includes navigation controls such as a compass, a directional pad, and a vertical zoom slider.

(二) 進階KML : Styles for Highlighted Icons

設定Style樣式

```
<name>Highlighted Icon</name>
<description>Place your mouse over the icon to see it display the new
icon</description>
<Style id="highlightPlacemark">
  <IconStyle>
  <Icon>
  <href>http://maps.google.com/mapfiles/kml/paddle/red-stars.png</href>
  </Icon>
  </IconStyle>
</Style>
<Style id="normalPlacemark">
  <IconStyle>
  <Icon>
  <href>http://maps.google.com/mapfiles/kml/paddle/wht-blank.png</href>
  </Icon>
  </IconStyle>
</Style>
<StyleMap id="exampleStyleMap">
  <Pair>
  <key>normal</key>
  <styleUrl>#normalPlacemark</styleUrl>
  </Pair>
  <Pair>
  <key>highlight</key>
  <styleUrl>#highlightPlacemark</styleUrl>
  </Pair>
</StyleMap>
```

游標移動到圖示上時顯示

創建 <StyleMap> 元素

指定Style ID

```
<Placemark>
  <name>Roll over this icon</name>
  <styleUrl>#exampleStyleMap</styleUrl>
  <Point>
  <coordinates>-
  122.0856545755255,37.42243077405461,0</coordinates>
  </Point>
</Placemark>
```

在地標中添加指向
"#exampleStyleMap"
的 <styleUrl> 元素



Free Google Map Icons:

<http://mapicons.nicolasmollet.com/>

(二) 進階KML : Styles for Highlighted Polygon

設定Style樣式

```
<name>KmlFile</name>
<Style id="sn_style">
  <PolyStyle>
    <color>00ff8080</color>
    <fill>0</fill>
  </PolyStyle>
</Style>
<Style id="sh_style">
  <PolyStyle>
    <color>7fff8080</color>
  </PolyStyle>
</Style>
<StyleMap id="msn_style">
  <Pair>
    <key>normal</key>
    <styleUrl>#sn_style</styleUrl>
  </Pair>
  <Pair>
    <key>highlight</key>
    <styleUrl>#sh_style</styleUrl>
  </Pair>
</StyleMap>
```

游標移動到圖示上時顯示

創建 <StyleMap> 元素

指定Style ID

```
<Placemark>
  <name>多邊形1</name>
  <styleUrl>#msn_style</styleUrl>
  <Polygon>
    <outerBoundaryIs>
      <LinearRing>
        <coordinates>
          121.4600102378658,25.05975650536085,0
          121.486087646157,25.07018971372706,0
          121.4702565169204,25.09046096302361,0
          121.4600102378658,25.05975650536085,0
        </coordinates>
      </LinearRing>
    </outerBoundaryIs>
  </Polygon>
</Placemark>
```

在地標中添加指向 "#msn_style" 的 <styleUrl> 元素

步驟

- Step 1: 在GE上畫一個多邊形 – Polygon 1
- Step 2: 複製此多邊形– Polygon 2
- Step 3: 更改Polygon 2之顏色
- Step 4: 複製Polygon 1到文字編輯器
- Step 5: 更改<StyleMap id> <Style id>
- Step 6: 複製回GE

範例

```
<StyleMap id="msn_ylw-pushpin">
  <Pair>
    <key>normal</key>
    <styleUrl>#sn_ylw-pushpin</styleUrl>
  </Pair>
  <Pair>
    <key>highlight</key>
    <styleUrl>#sh_ylw-pushpin2</styleUrl>
  </Pair>
</StyleMap>
<Style id="sn_ylw-pushpin">
  <PolyStyle>
    <color>7ffffff</color>
  </PolyStyle>
</Style>
<Style id="sh_ylw-pushpin2">
  <PolyStyle>
    <color>7ff1111</color>
  </PolyStyle>
</Style>
```

練習

- 請參考上述作法，製作：
 - 滑鼠變換圖示
 - 數化建物，製作滑鼠變換多邊形。
 - 參考點及多邊形作法，製作Highlighted Line (蓋一作圍牆，滑鼠移過去後，圍牆會變色及變大)。

(二) 進階KML：Screen Overlays

- 放一張影像在Google Earth上當前景，位置固定，不會隨著GE球地理位置的移動而改變位置。

- Ground Overlays 是放在GE球上，Screen Overlays 則當前景。

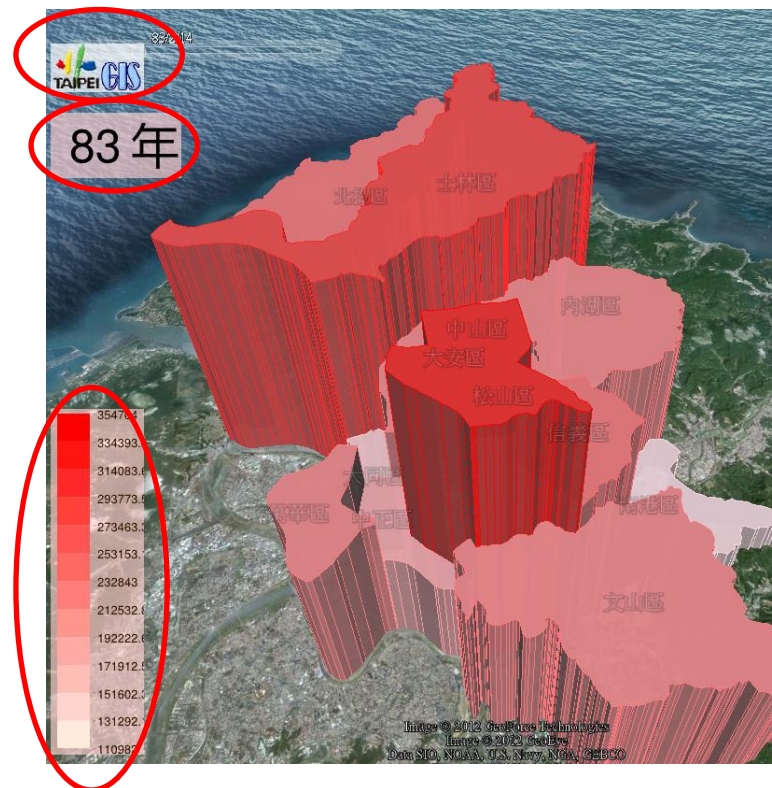
- Screen Overlays

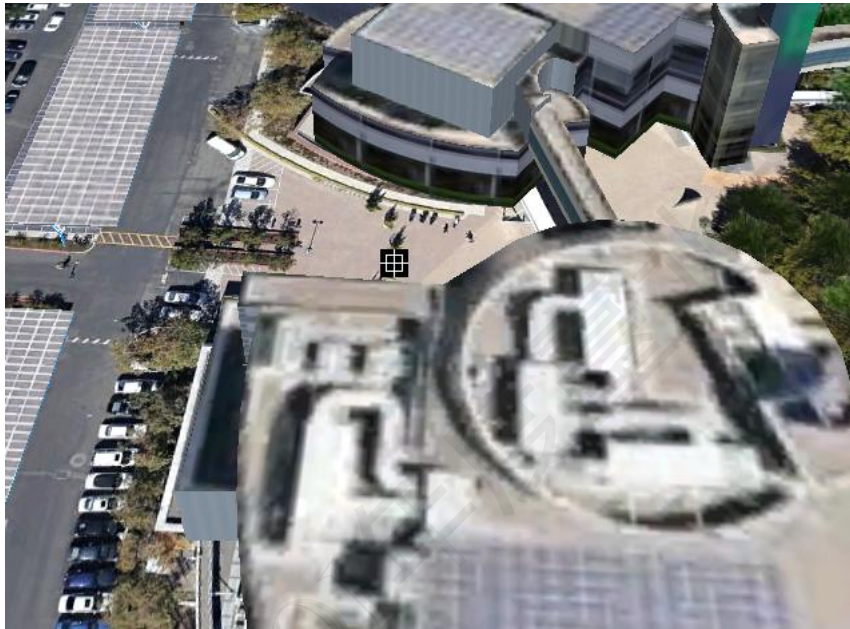
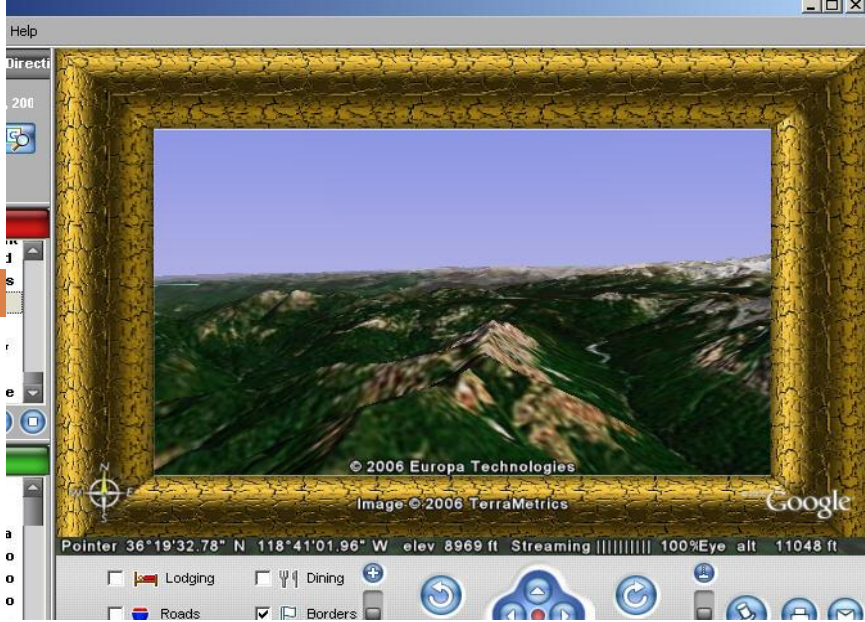
- 用途：

- 單位Logo

- 圖例

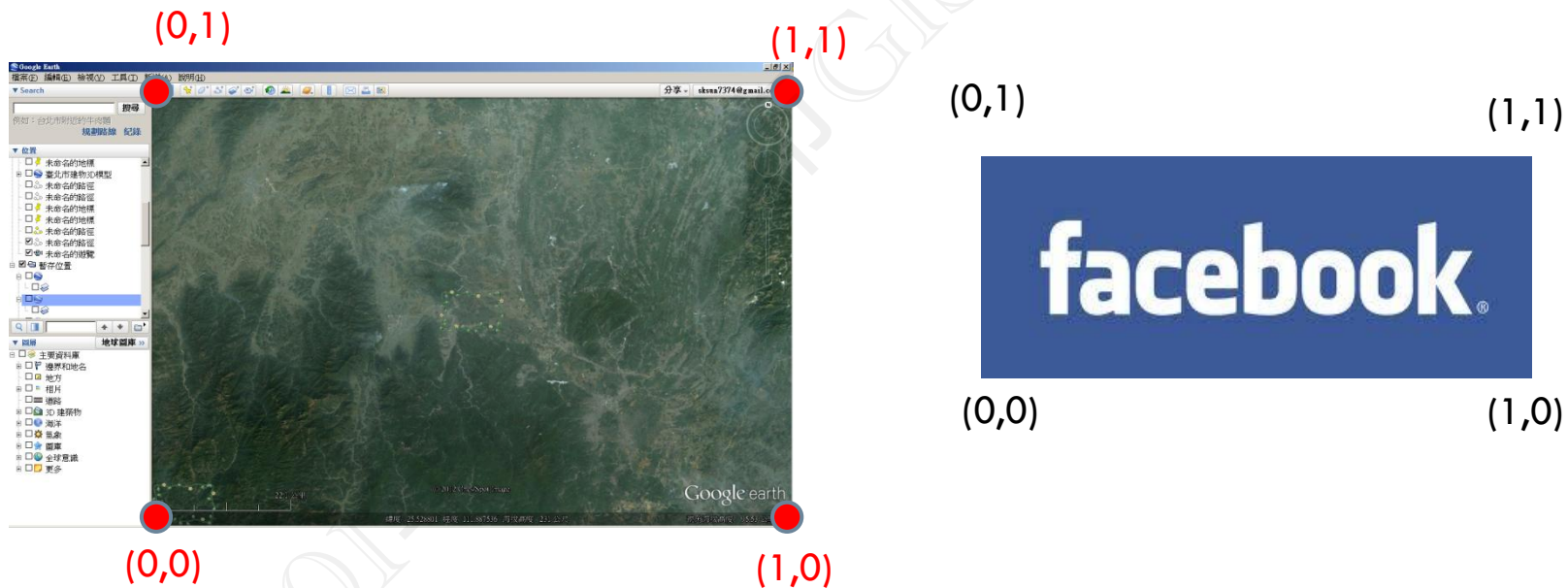
- ...





Screen Overlays 參數

- 二種坐標系統：
 - 螢幕坐標系統："screenXY"
 - 影像坐標系統："overlayXY"



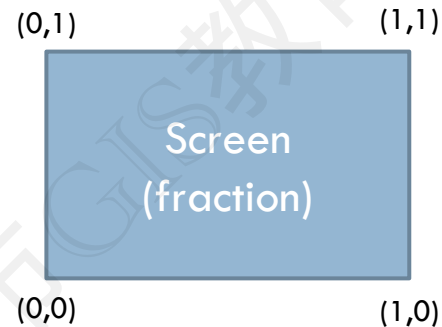
```
<overlayXY x="0" y="1" xunits="fraction" yunits="fraction"/>  
<screenXY x="0" y="1" xunits="fraction" yunits="fraction"/>
```

Screen Overlays 參數

□ 坐標單位

□ Fraction Units:

(0,0) = lower left corner
(0,1) = upper left corner
(1,0) = lower right corner
(1,1) = upper right corner

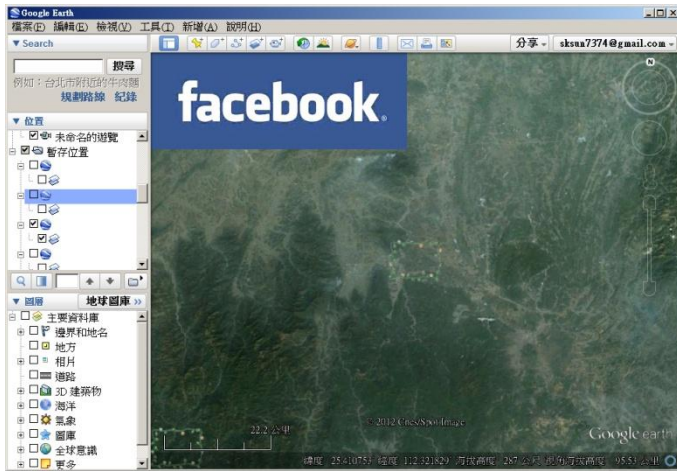


□ Pixels/insetPixels:

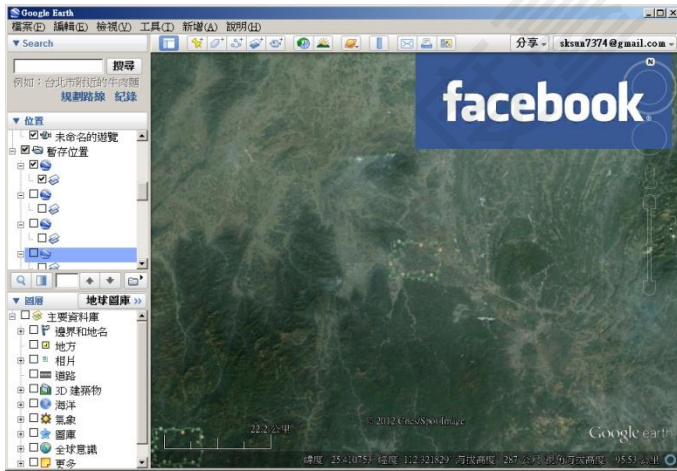
(pixel, pixel) -> (0,0) is in the lower left, positive right & up
(pixel, insetPixel) -> (0,0) is in the upper left, positive right & down
(insetPixel, pixel) -> (0,0) is in the lower right, positive left & up
(insetPixel, insetPixel) -> (0,0) is in the upper right, positive left & down.

範例

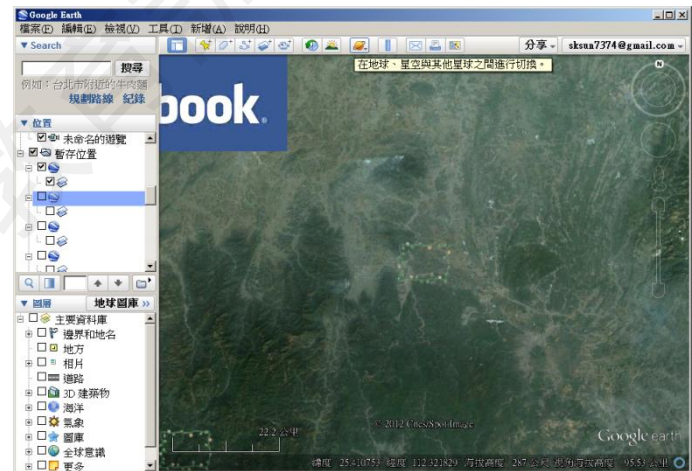
```
<overlayXY x="0" y="1" xunits="fraction" yunits="fraction"/>  
<screenXY x="0" y="1" xunits="fraction" yunits="fraction"/>
```



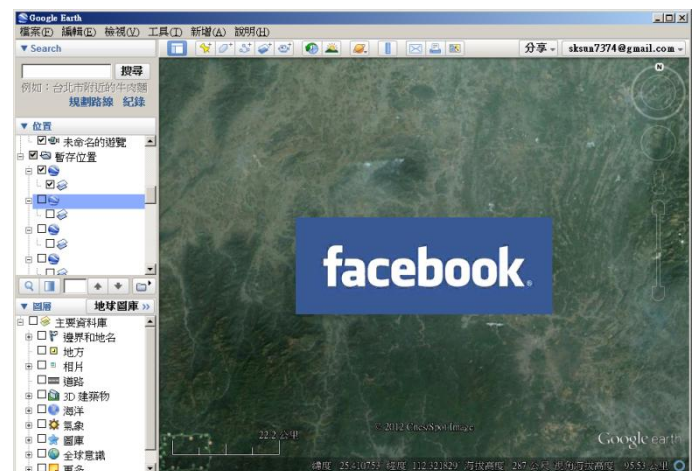
```
<overlayXY x="0" y="1" xunits="fraction" yunits="fraction"/>  
<screenXY x="0.5" y="1" xunits="fraction" yunits="fraction"/>
```



```
<overlayXY x="0.5" y="1" xunits="fraction" yunits="fraction"/>  
<screenXY x="0" y="1" xunits="fraction" yunits="fraction"/>
```

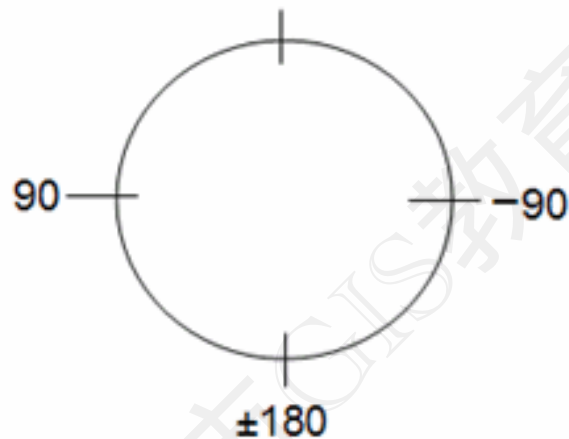


```
<overlayXY x="0.5" y="0.5" xunits="fraction" yunits="fraction"/>  
<screenXY x="0.5" y="0.5" xunits="fraction" yunits="fraction"/>
```



Screen Overlays 參數

旋轉：



rotation=0



rotation=90



rotation= -45

尺寸及半透明效果

尺寸：

`<size x="0" y="0" xunits="fraction" yunits="fraction"/>`

- `x="0" y="0"`: 原尺寸
- `x="1" y="1"`: 佔滿整個螢幕
- `x="0.1" y="0.2"`: X方向縮小0.1倍，Y方向縮小0.2倍

半透明效果： `<color>55ffffff</color>`

oobbggrr

where **oo** is an 8-bit opacity (00-FF)

bb is an 8-bit blue code (00-FF)

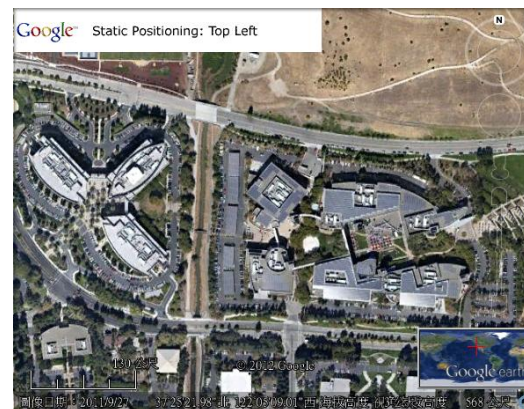
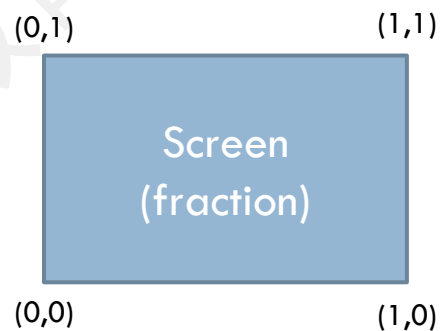
gg is an 8-bit green code (00-FF)

rr is an 8-bit red code (00-FF)

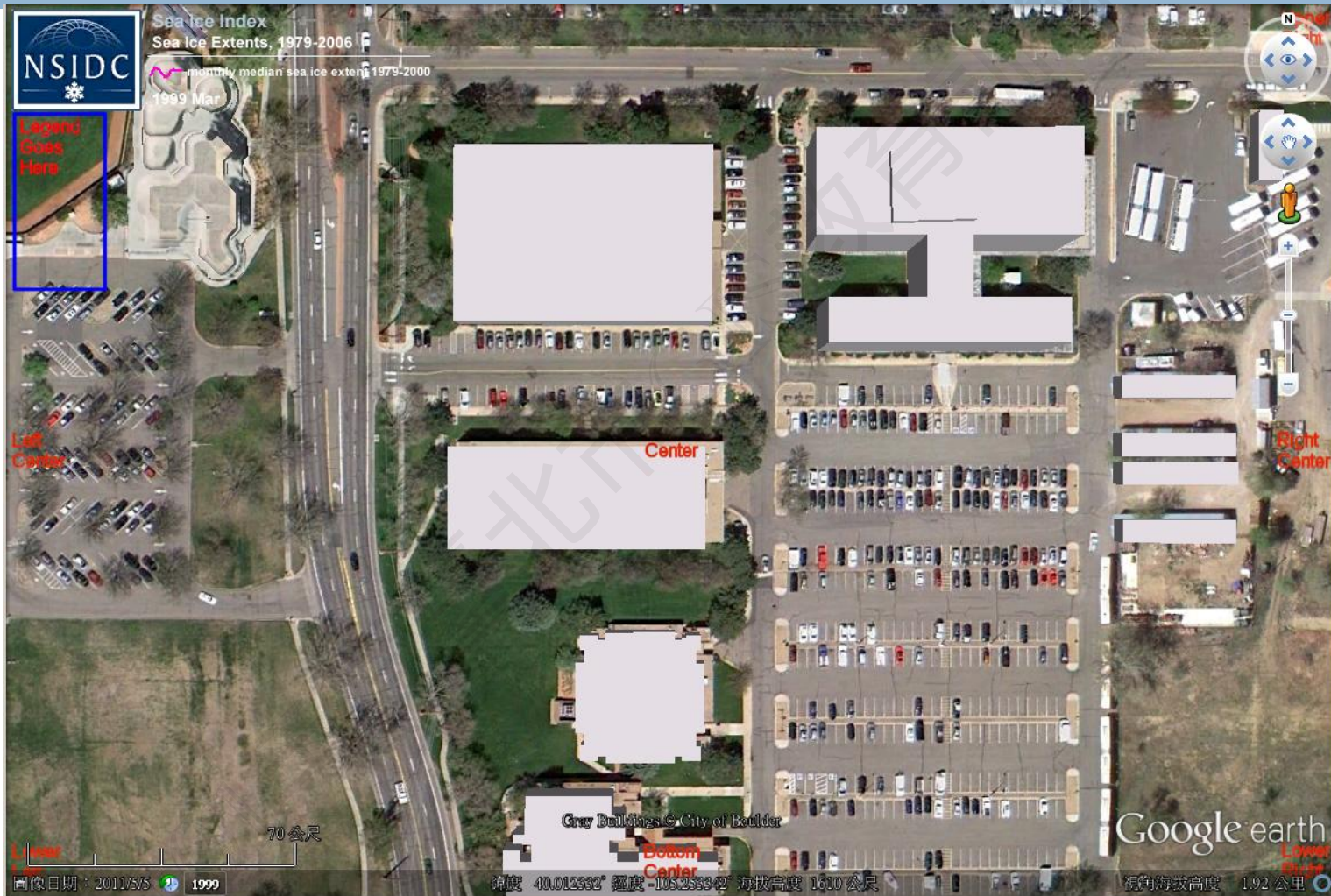
Screen Overlays 範例

屏幕層加疊

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://www.opengis.net/kml/2.2">
<ScreenOverlay>
<name>Absolute Positioning: Top left</name>
<Icon>
<href>http://developers.google.com/kml/documentation/images/top\_left.jpg</href>
</Icon>
<overlayXY x="0" y="1" xunits="fraction" yunits="fraction"/>
<screenXY x="0" y="1" xunits="fraction" yunits="fraction"/>
<rotation>0</rotation>
<size x="0.5" y="0.1" xunits="fraction" yunits="fraction"/>
</ScreenOverlay>
</kml>
```



Screen Overlays 範例



http://nsidc.org/data/virtual_globes/misc/NSIDC_screen_overlays.kml

練習

- 請製作三種screen overlay：
 - 放Logo在螢幕右上角。
 - 十字標放在螢幕中央。
 - 相框放在螢幕四週。