



LAB10 地圖學與GIS

地形展示

助教：廖皓宇、劉怡慧、王崧阡
2018/5/25

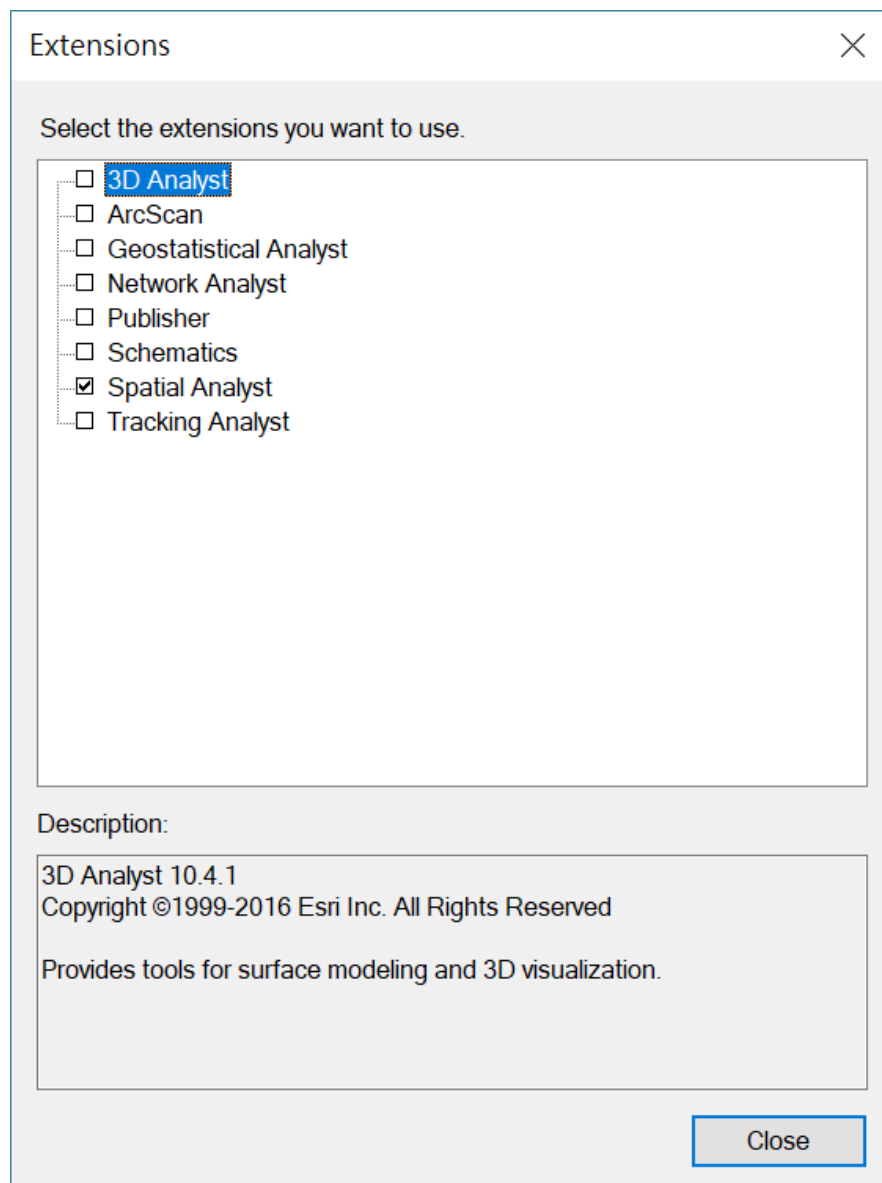
本週實習內容

- 等高線圖 (contour theme)
- 地形剖面圖 (terrain profile)
- 暈渲地圖 (hillshade)
- 視域分析 (viewshed)
- 坡度圖 (slope theme)
- 坡向圖 (aspect theme)
- 透視分析圖 (perspective view)

DATA

- plne (DEM)
- stream.shp (河流)

注意事項：上方工具列Customize → Extensions 打開Spatial Analyst



等高線圖 (CONTOUR THEME)

- Toolbox → Spatial Analyst
→ Surface → **Contour**
- 加入標籤

等高線間距

等高線起始值

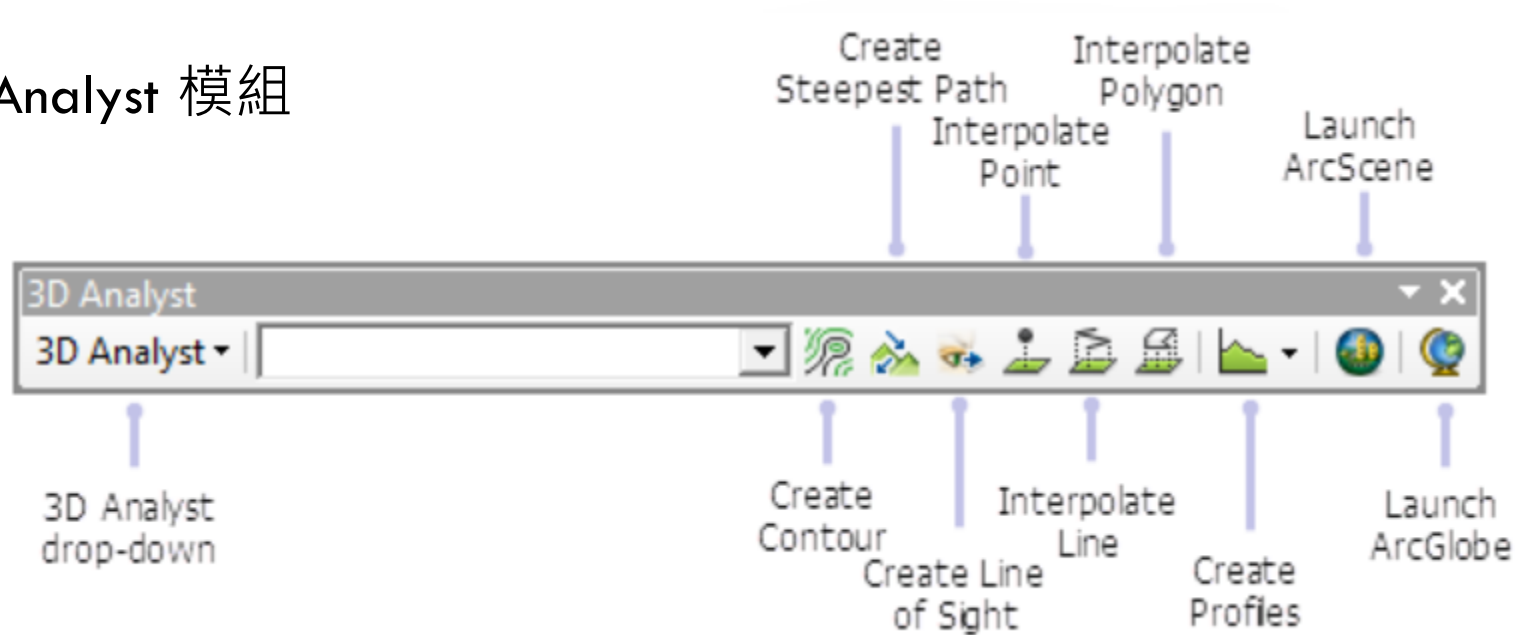
單位轉換因子，預設值為1。
如果DEM的單位是英尺，但想要
以公尺為單位產生等高線，則可
將z factor設為0.3048 (因為1英尺
= 0.3048公尺)。

The screenshot shows the 'Contour' tool dialog box in ArcGIS. It has a title bar with a hammer icon and the text 'Contour'. The dialog contains several input fields and buttons. At the bottom, there are four buttons: 'OK', 'Cancel', 'Environments...', and 'Show Help >>'. The 'Input raster' field is set to 'plne'. The 'Output polyline features' field is set to a file path: 'C:\Users\yihueiliu\Documents\106-2\cartography\以前GIS講義\Week11-Raster and Terrain Analysis\week11.r'. The 'Contour interval' field is set to '100'. The 'Base contour (optional)' field is set to '800'. The 'Z factor (optional)' field is set to '1'.

Field	Value
Input raster	plne
Output polyline features	C:\Users\yihueiliu\Documents\106-2\cartography\以前GIS講義\Week11-Raster and Terrain Analysis\week11.r
Contour interval	100
Base contour (optional)	800
Z factor (optional)	1

地形剖面圖 (TERRAIN PROFILE)

- 打開 3D Analyst 模組



- Arcgis Help: <http://desktop.arcgis.com/en/arcmap/latest/extensions/3d-analyst/fundamentals-of-the-interactive-3d-analyst-tools.htm>

地形剖面圖 (TERRAIN PROFILE)

- 選擇 3D Analyst 工具列的 Interpolate Line Tool 選項。



- 描繪圖面上的USGH_ID = 167

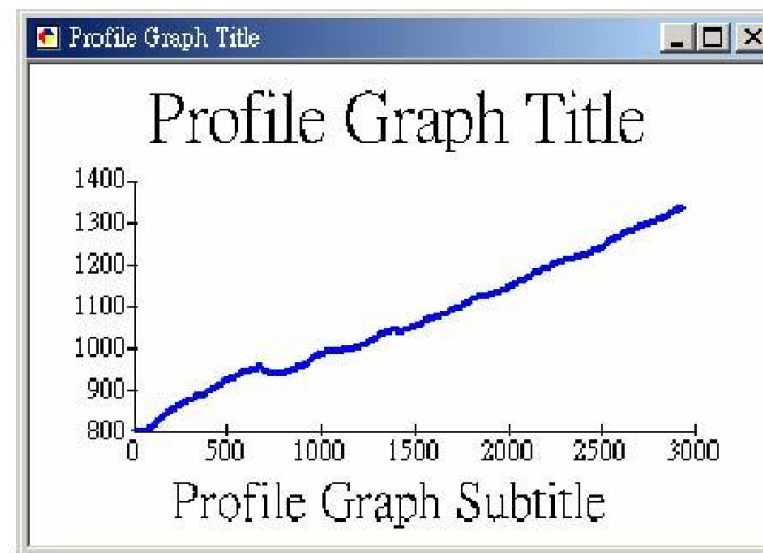


地形剖面圖 (TERRAIN PROFILE)

- 按下 3D Analyst 工具列的 Create Profile Graph 選項。



- 可以針對此圖形視窗按下滑鼠右鍵，來更改標題與圖例的位置。



暈渲地圖 (HILLSHADE)

- Toolbox → Spatial Analyst
→ Surface → **hillshade**

太陽光線的方位角

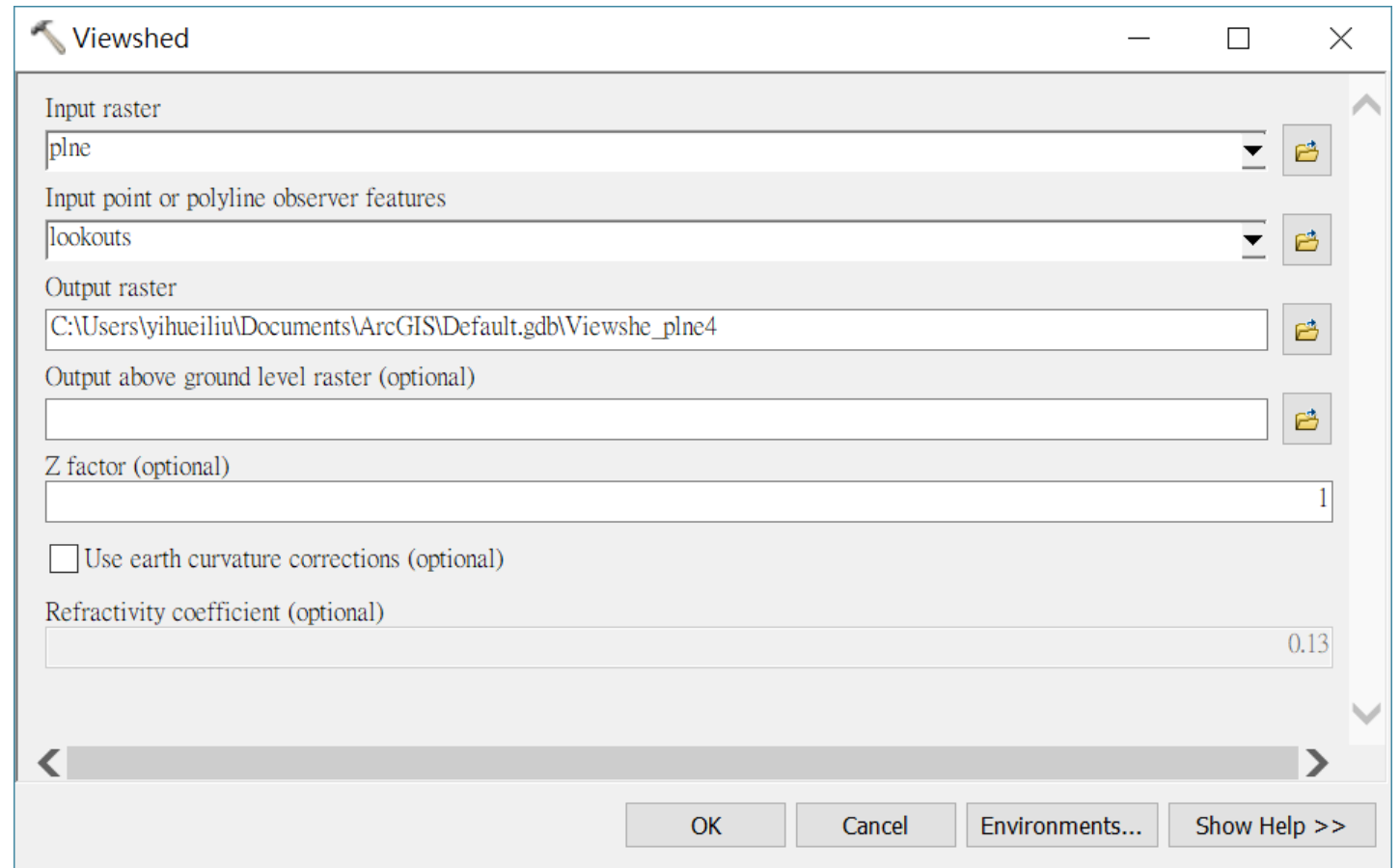
太陽光線的入射角度

The screenshot shows the 'Hillshade' tool dialog box. It has a title bar with a hammer icon and the text 'Hillshade'. The dialog contains several input fields and checkboxes. The 'Input raster' field is set to 'plne'. The 'Output raster' field is set to 'C:\Users\yihueiliu\Documents\106-2\cartography\以前GIS講義\Week11-Raster and Terrain Analysis\week11.r'. The 'Azimuth (optional)' field is set to '315'. The 'Altitude (optional)' field is set to '45'. There is an unchecked checkbox for 'Model shadows (optional)'. The 'Z factor (optional)' field is set to '1'. At the bottom, there are four buttons: 'OK', 'Cancel', 'Environments...', and 'Show Help >>'. There are also scroll bars on the right and bottom of the dialog.

Parameter	Value
Input raster	plne
Output raster	C:\Users\yihueiliu\Documents\106-2\cartography\以前GIS講義\Week11-Raster and Terrain Analysis\week11.r
Azimuth (optional)	315
Altitude (optional)	45
Model shadows (optional)	☐
Z factor (optional)	1

視域分析 (VIEWSHED)

- Toolbox → Spatial Analyst
→ Surface → **Viewshed**



The screenshot shows the 'Viewshed' tool dialog box. It has a title bar with a hammer icon and the text 'Viewshed'. The dialog contains several input fields and checkboxes. The 'Input raster' field is set to 'plne'. The 'Input point or polyline observer features' field is set to 'lookouts'. The 'Output raster' field is set to 'C:\Users\yihueiliu\Documents\ArcGIS\Default.gdb\Viewshe_plne4'. The 'Output above ground level raster (optional)' field is empty. The 'Z factor (optional)' field is set to '1'. There is an unchecked checkbox for 'Use earth curvature corrections (optional)'. The 'Refractivity coefficient (optional)' field is set to '0.13'. At the bottom, there are four buttons: 'OK', 'Cancel', 'Environments...', and 'Show Help >>'. A scrollbar is visible on the right side of the dialog.

Viewshed

Input raster
plne

Input point or polyline observer features
lookouts

Output raster
C:\Users\yihueiliu\Documents\ArcGIS\Default.gdb\Viewshe_plne4

Output above ground level raster (optional)

Z factor (optional)
1

☐ Use earth curvature corrections (optional)

Refractivity coefficient (optional)
0.13

OK Cancel Environments... Show Help >>

視域分析 (VIEWSHED)

Table			
Viewshe_plne1			
	OBJECTID *	Value	Count
▶	1	0	100571
	2	1	41379
	3	2	55

Viewshe_plne1

沒有地方看得到的地方有 100,571 個 (粉紅色部分)
有一個點看得到的地方有 41,379 個
有兩個點看得到的地方有 55 個



視域分析 (VIEWSHED)

- 如果觀察點不在地表：須在屬性表內新增「OFFSETA」、「OFFSETB」欄位
- OFFSETA：觀察點與地表之間的垂直距離。OFFSETA 值必須為正。如果屬性表內不存在OFFSETA 項，則默認值為1。
- OFFSETB：目標點與地表之間的垂直距離。如果未在要素屬性表中找到任何OFFSETB 項，則將默認為0。



Table					
lookouts					
	FID	Shape	ID	OFFSETA	OFFSETB
▶	0	Point	0	150	100
	1	Point	0	150	100

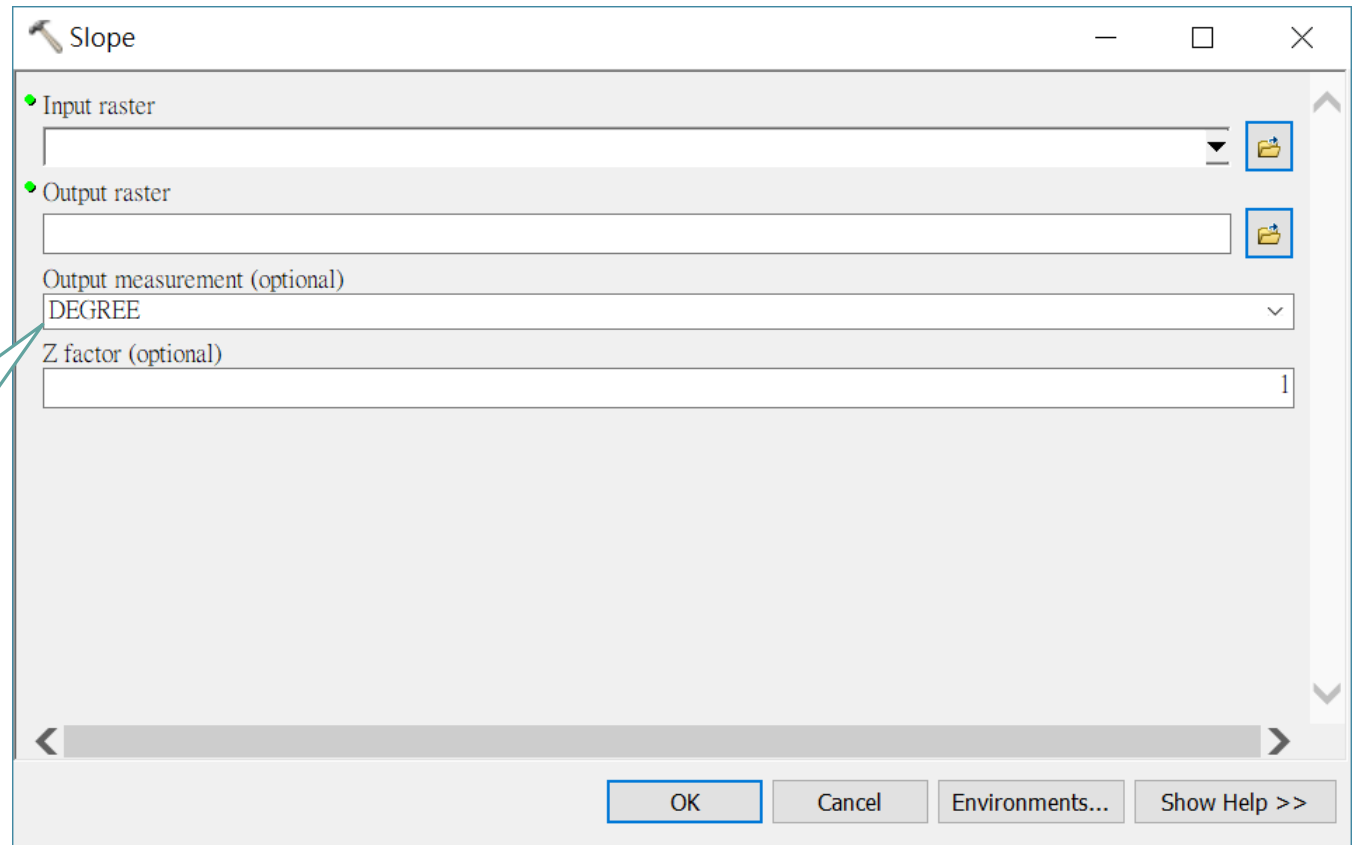
« ◀ 1 ▶ » (0 out of 2 Selected)

lookouts

坡度圖 (SLOPE THEME)

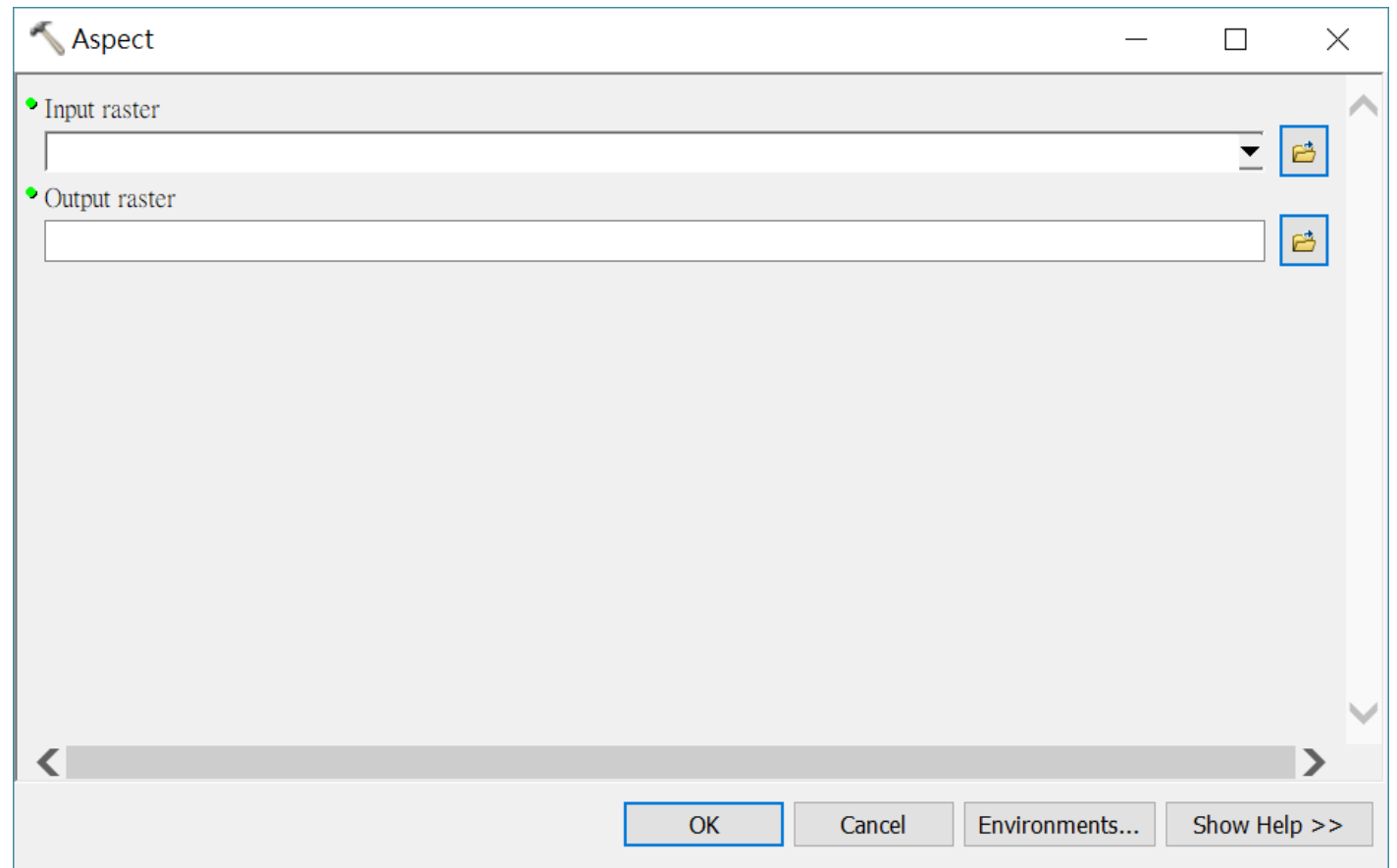
- Toolbox → Spatial Analyst
→ Surface → **slope**
- 更改分類

設定單位為角度或
百分比



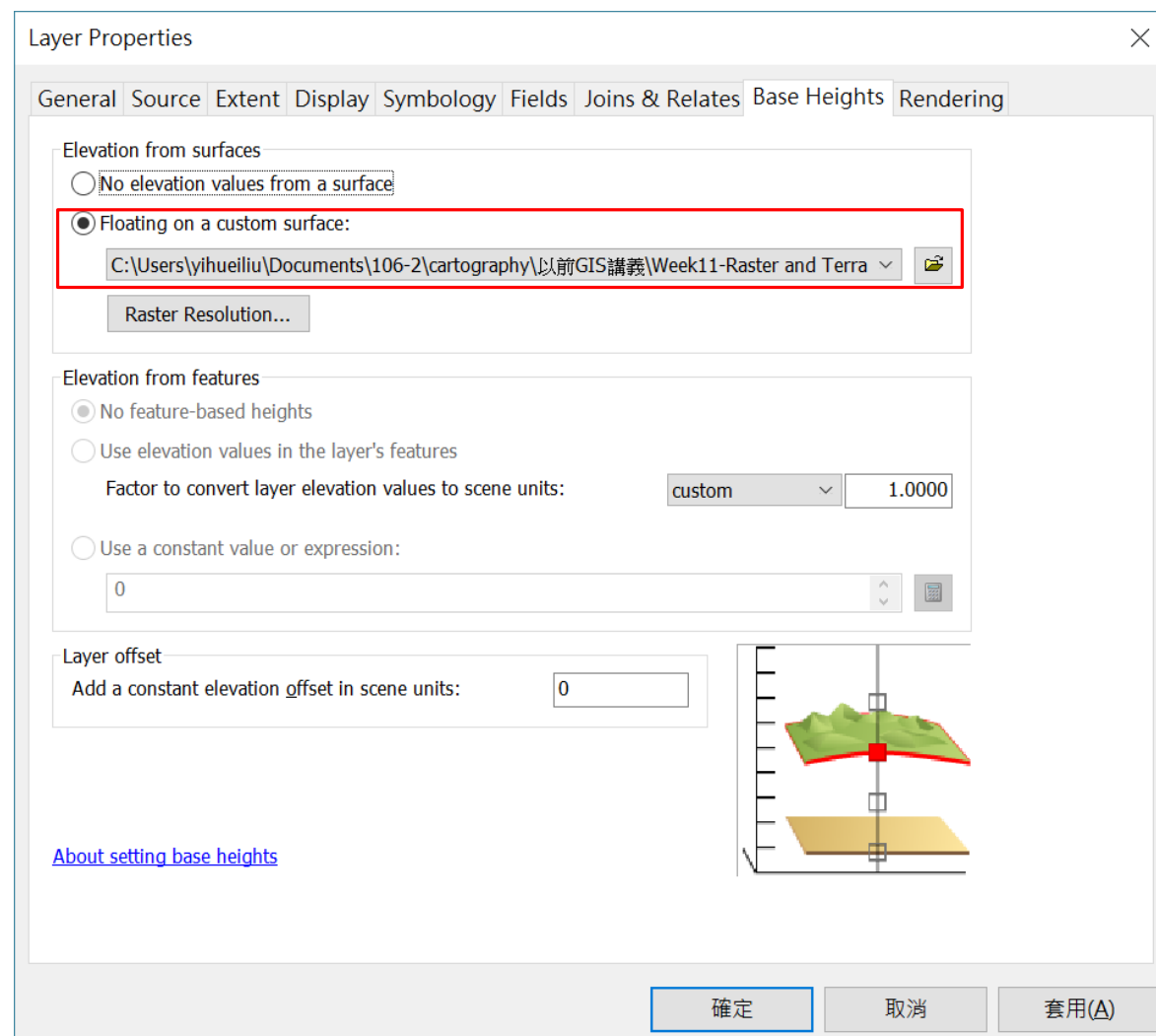
坡向圖 (ASPECT THEME)

- Toolbox → Spatial Analyst
→ Surface → **aspect**



透視分析圖 (PERSPECTIVE VIEW)

- 開啟 ArcScene，可用來模擬 3D 場景。
- 針對 plne、streams 屬性中的Base Height 頁籤，選擇 Obtain Heights for layer from surface、根據 plne 的圖層。
- 輸出：file → export scene



本週作業

- 繳交課堂上所教的地形展示方法，包括：
 - 等高線圖
 - 坡度圖
 - 地形剖面圖
 - 坡向圖
 - 暈渲地圖
 - 透視分析圖
 - 視域分析圖
- 以文字說明各種地圖的優缺點、適合使用時機。
- 繳交檔案：7 張地圖 (.jpg)、文字說明 (.pdf)
- 繳交期限：6/1 中午12:00