



# 110-2 地圖與地理資訊系統

## LAB 06 網格資料處理

## Raster Data Processing

### QGIS部分

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# 今日實習

## 網格資料處理

1

網格資料讀取與呈現

2

網格資料分析

3

向量資料網格化

# 網格資料操作實習使用圖資

1. 臺灣縣市地圖 : taiwan.shp
2. 臺北市分區地圖 : taipei.shp
3. 臺北市藥局資料 : pharmacy.shp
4. 臺灣島20公尺數值地形圖 ( DEM ) :  
dem\_20m.tif
5. 2021/06/01 24小時累積雨量 :  
rain\_20210601.csv
6. 臺灣自動雨量站點位 : rain\_station.csv

資料來源：  
臺灣中央氣象局的open data;  
臺北市政府的open data

**TWD 97 TM2**

**EPSG: 3826**

**WGS84**

**EPSG: 4326**

檔案連結：<https://drive.google.com/drive/folders/1FsXnYaQn-ZXtg5Af0NGRclS6osU4ZaAy?usp=sharing>  
( NTU COOL 上面也有了 )

# 網格資料讀取與呈現

## 第一部分

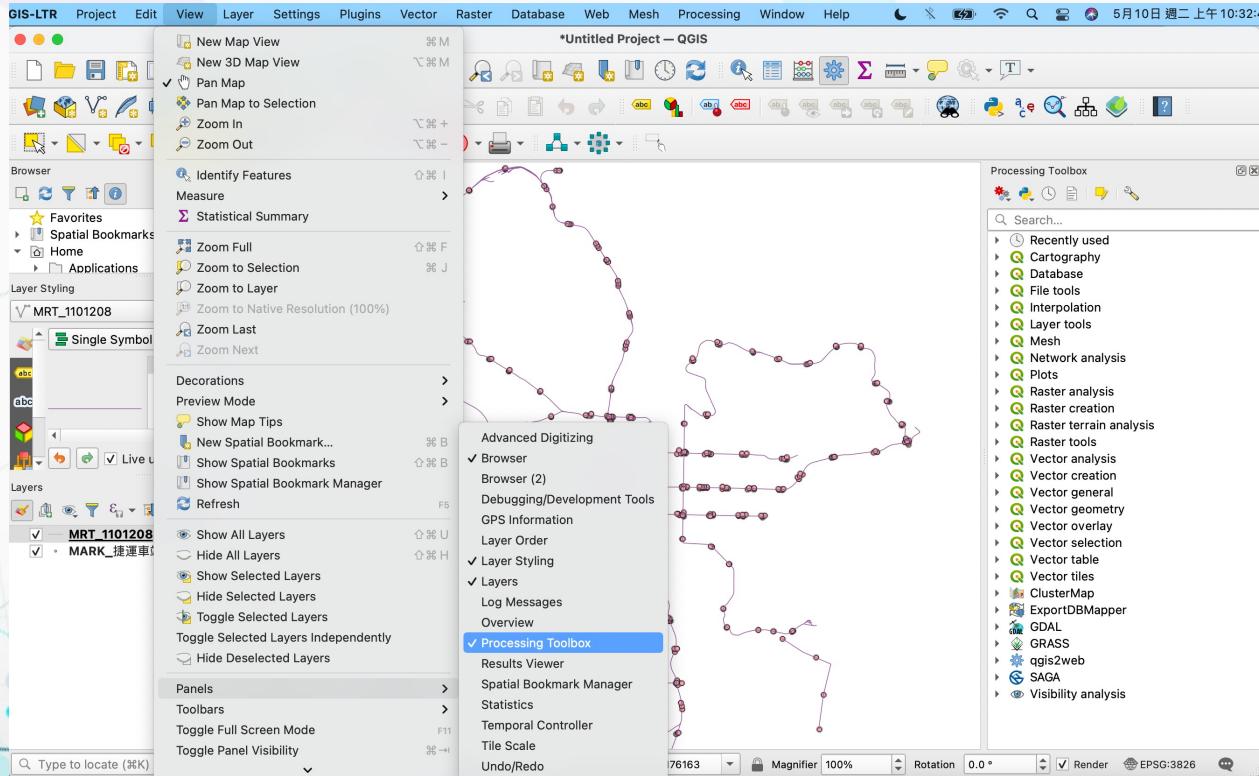
Load, Extract, Property

再次前情提要

如果工具箱不見掉 . . .

# Processing Toolbox 工具箱

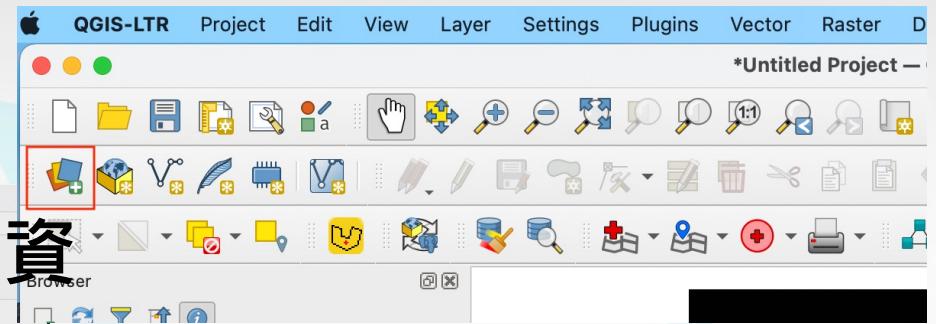
View > Panels > Processing  
Toolbox 勾起來



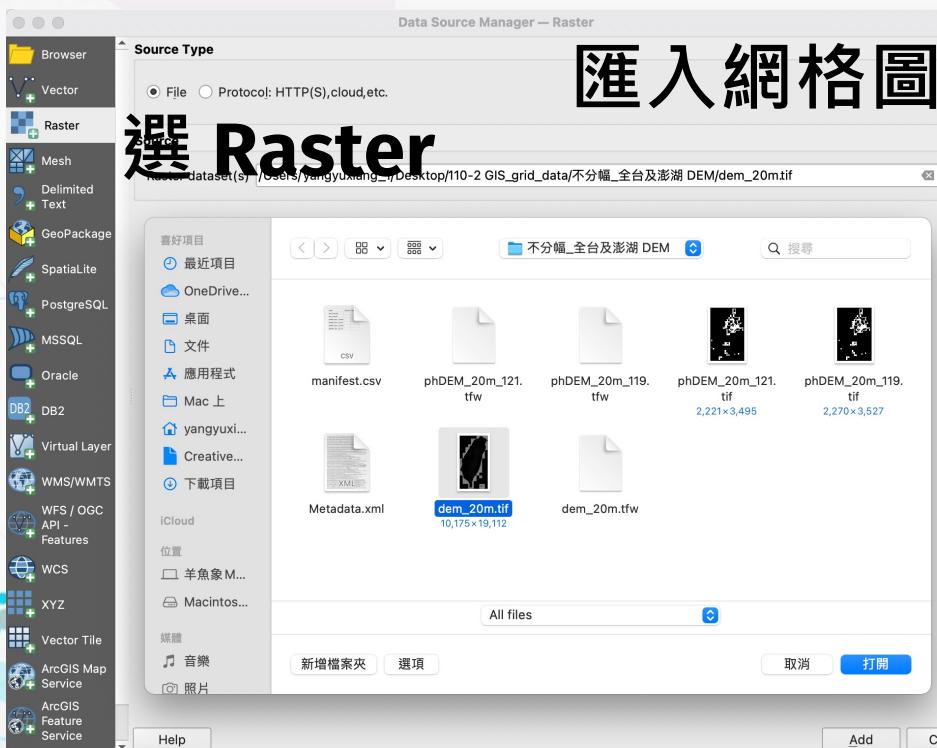
可以使用關鍵字搜尋

# Load Raster Data

1



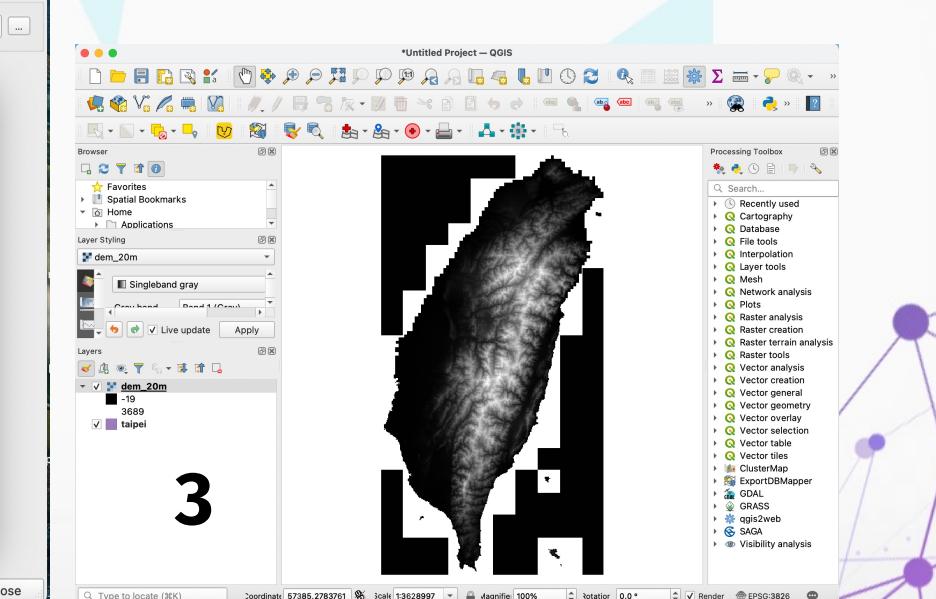
2



選 Raster

匯入網格圖資

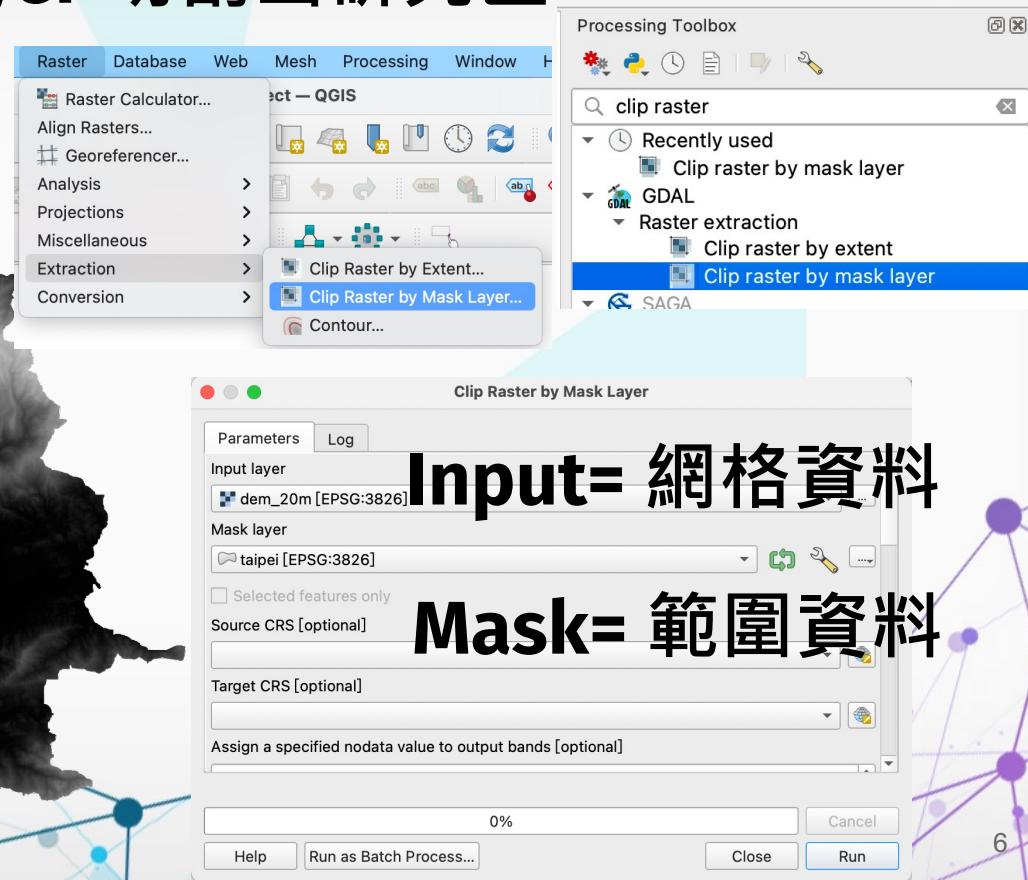
3



5

# Clip Raster by Mask Layer 切割出研究區

- 切割出台北市範圍的網格資料



# Symbology Change 1 – single band pseudocolor

對圖層點右鍵選properties 或是，左鍵雙擊圖層

The screenshot illustrates the process of changing symbology for a single band pseudocolor layer in QGIS. The interface shows the 'Layer Properties' dialog for the 'taipei dem' layer, specifically the 'Symbology' tab.

**Left Panel (Symbology Tab):**

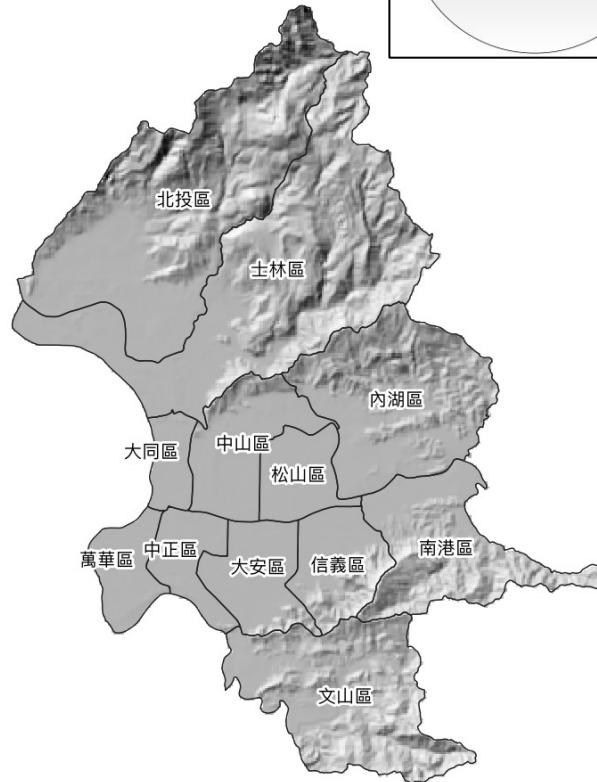
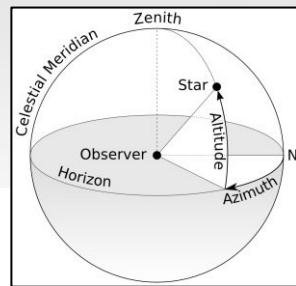
- Band Rendering:** Render type is set to 'Singleband pseudocolor'. The 'Band' dropdown shows 'Band 1 (Gray)'.
- Color ramp:** A color gradient bar is displayed, with the text '單波段偽彩色' (Single band pseudocolor) overlaid.
- Color ramp dropdown:** Shows options like 'Blues', 'Greens', 'Greys', 'Magma', 'RdGy', 'Reds', 'Spectral', 'Viridis', and 'Create New Color Ramp...'. The 'Create New Color Ramp...' option is highlighted with a black arrow.
- Color ramp type dialog:** A floating window titled 'Color ramp type' is open, showing options: 'Gradient', 'Color Presets', 'Random', 'Catalog: cpt-city' (which is selected and highlighted with a blue background), and 'Catalog: ColorBrewer'.
- Color ramp preview:** Shows a preview of the 'elevation' color ramp with a gradient from purple to yellow.
- Classification:** 'Mode' is set to 'Continuous'. Buttons for 'Classify', 'Edit', and 'Save' are present.
- Color rendering:** 'Blending mode' is 'Normal', 'Brightness' is 0, and 'Contrast' is 0.

**Right Panel (Map View):**

- Map content:** A map of Taipei, Taiwan, showing elevation using a pseudocolor gradient. District names are labeled in Chinese: 北投區, 士林區, 內湖區, 中山區, 松山區, 南港區, 大安區, 信義區, 文山區, 中正區, 仁愛區, 大同區, 中山區, 松山區, 南港區, 大安區, 信義區, 文山區, 中正區, 仁愛區.
- Classification legend:** A legend on the right shows the color gradient with labels: 0, 222, 444, 667, 889, 1111.
- Classification steps:** The text 'Classify -> Apply-> OK' is overlaid at the bottom of the map area.

附圖

# Symbology Change 2 – Hillshade



# Symbology Change 3 – Contour

Layer Properties – Clipped (mask) – Symbology

**Band Rendering**

Render type: Contours

Input band: Band 1 (Gray)

Contour Interval: 100.00

Contour Symbol: (empty)

Index Contour Interval: 500.00

Index Contour Symbol: (empty)

Input Downscaling: 4.00

**Color Rendering**

Blending mode: Normal

Brightness: 0

Contrast: 0

Gamma: 1.00

Saturation: 0

Grayscale: Off

Hue: Colorize

Strength: 100%

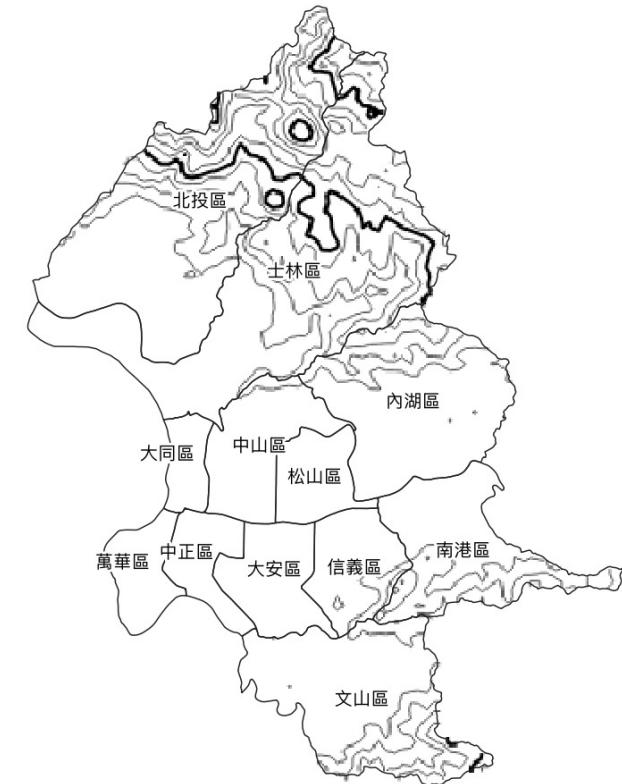
**Resampling**

Zoomed: in Nearest neighbour out Nearest neighbour

Oversampling: 2.00

Early resampling:

Help Style Apply Cancel OK



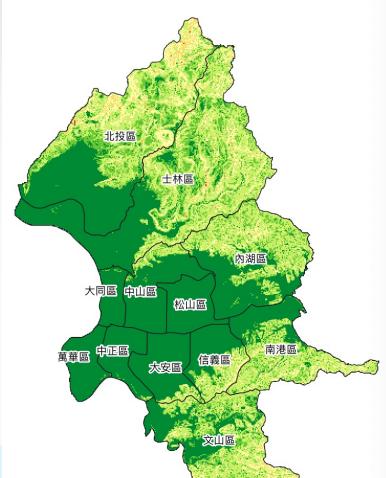
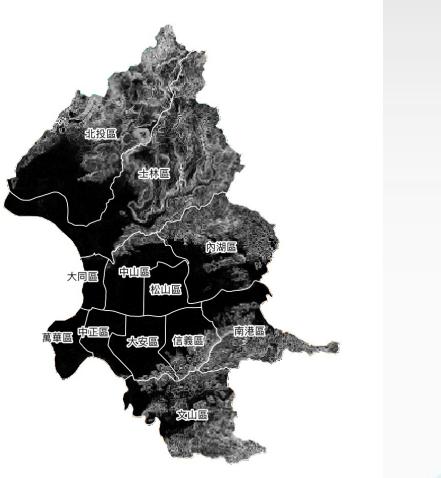
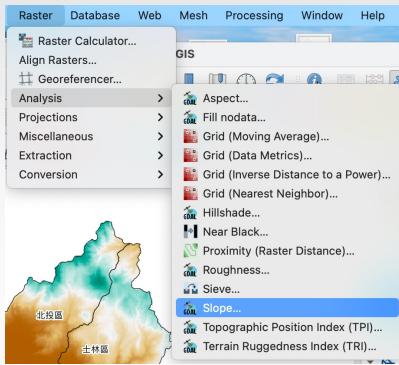
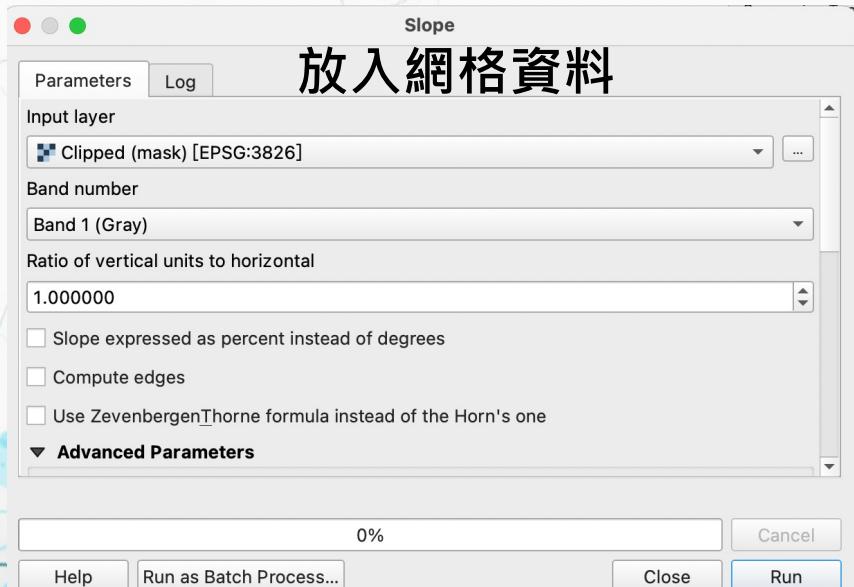
# 網格資料讀取與呈現

## 第二部分

坡度、坡向、視域分析、等高線繪製

# 坡度 Slope

Raster ->  
Analysis ->  
Slope



從symbology手動調整顏色



# 坡向 Aspect

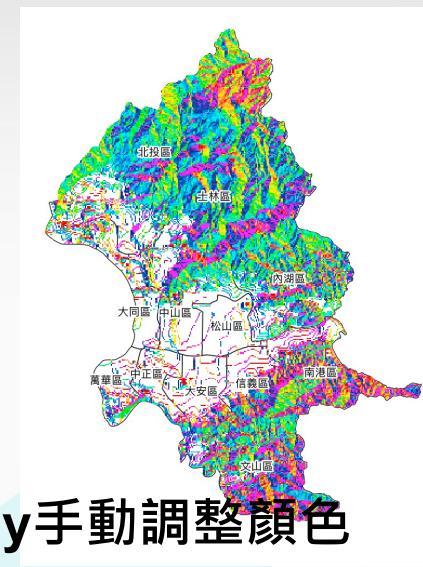
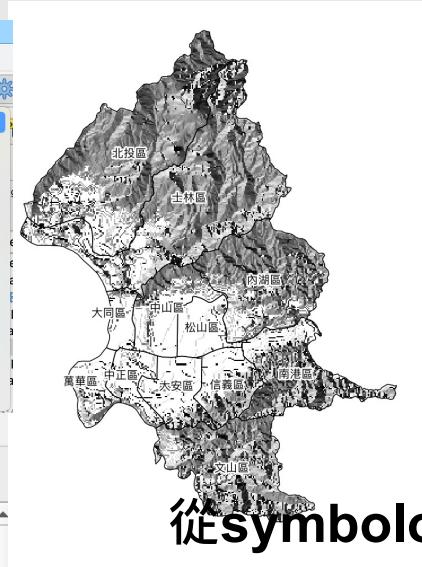
Raster >  
Analysis >  
Aspect



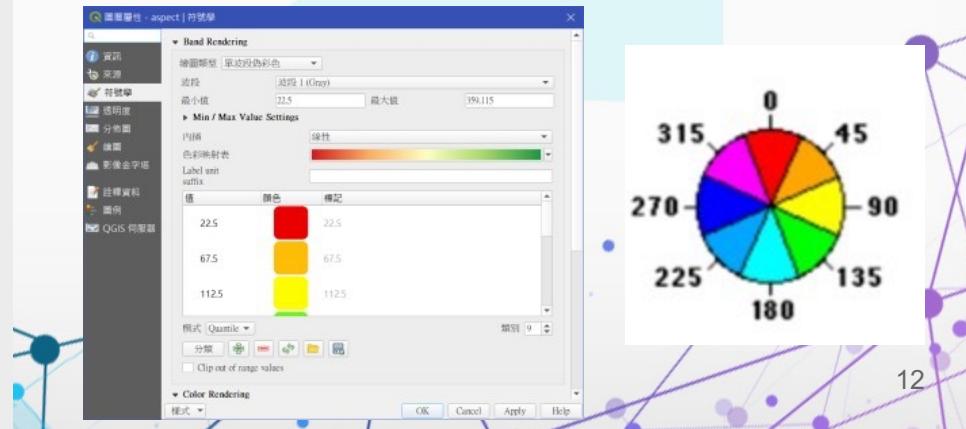
QGIS Raster Analysis dialog for Aspect:

- Input layer:** Clipped (mask) [EPSG:3826]
- Band number:** Band 1 (Gray)
- Advanced Parameters:**
  - Return trigonometric angle instead of azimuth
  - Return 0 for flat instead of -9999
  - Compute edges
  - Use ZevenbergenThorne formula instead of the Horn's one
- Additional creation options [optional]:** 0%
- Buttons:** Help, Run as Batch Process..., Cancel, Close, Run

放入網格資料



從symbology手動調整顏色

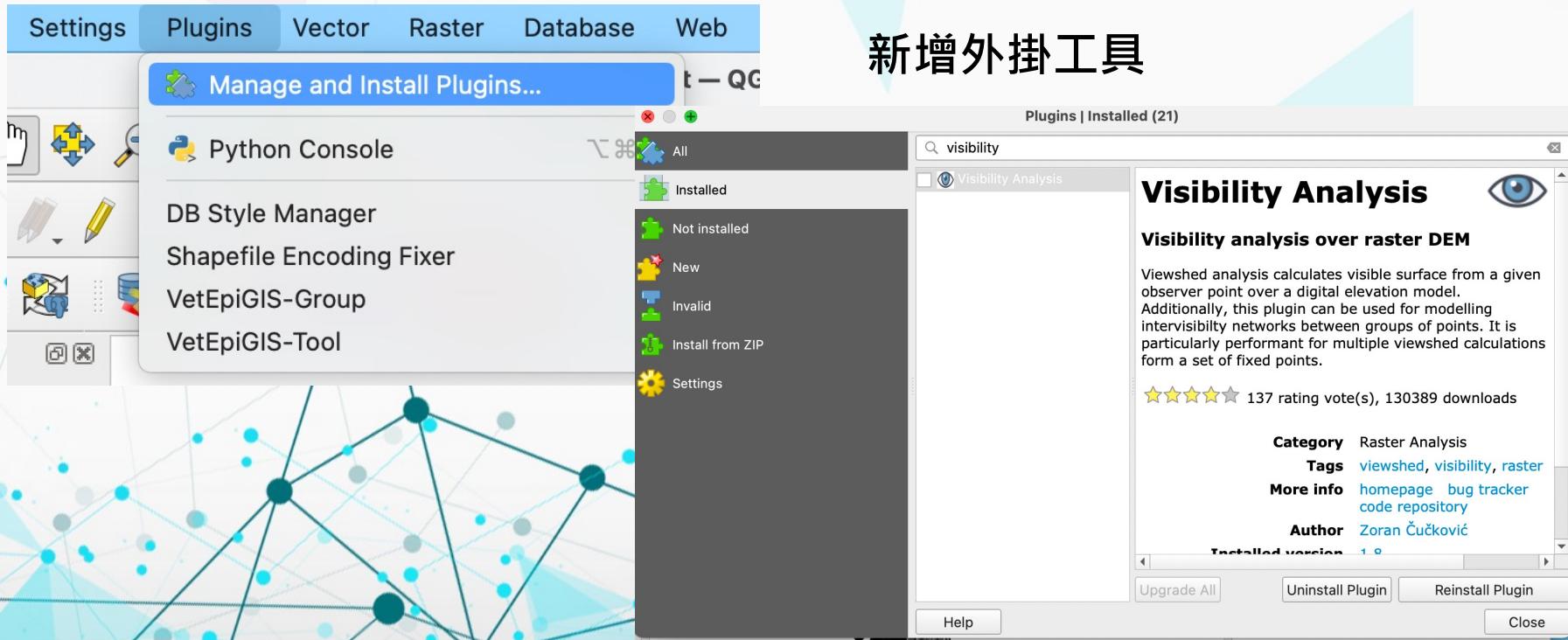


QGIS Symbology settings for aspect:

- Band Rendering:** 单色 (单色)
- Min / Max Value Settings:** 22.5, 39.115
- Color Ramp:** 0 to 360 (Quartic)
- Color Legend:** A circular legend showing 8 segments representing aspect ranges: 0-22.5 (red), 22.5-67.5 (orange), 67.5-112.5 (yellow), 112.5-157.5 (green), 157.5-202.5 (cyan), 202.5-247.5 (blue), 247.5-292.5 (purple), and 292.5-337.5 (pink).
- Buttons:** OK, Cancel, Apply, Help

# View Shade 視域分析 1

需要先安裝外掛程式：上方欄位>plugins>Manage and install plugins> Visibility Analysis



# View Shade 視域分析 2 create view point

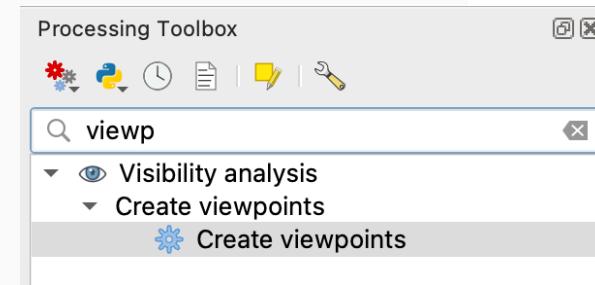
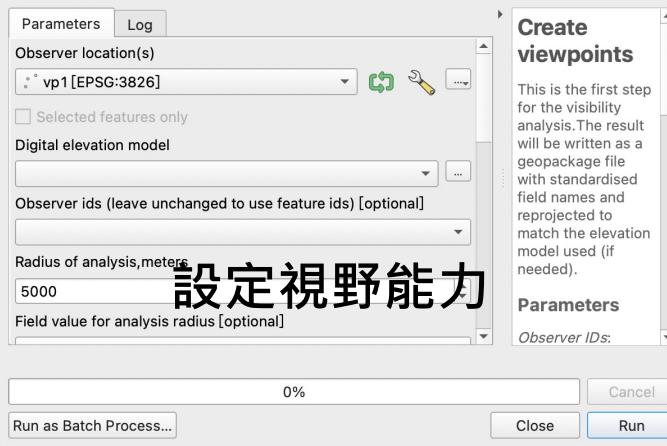
主要步驟：

1. 新增觀覽點 polypoint ( 新增點位圖層 為 實習三的內容 )

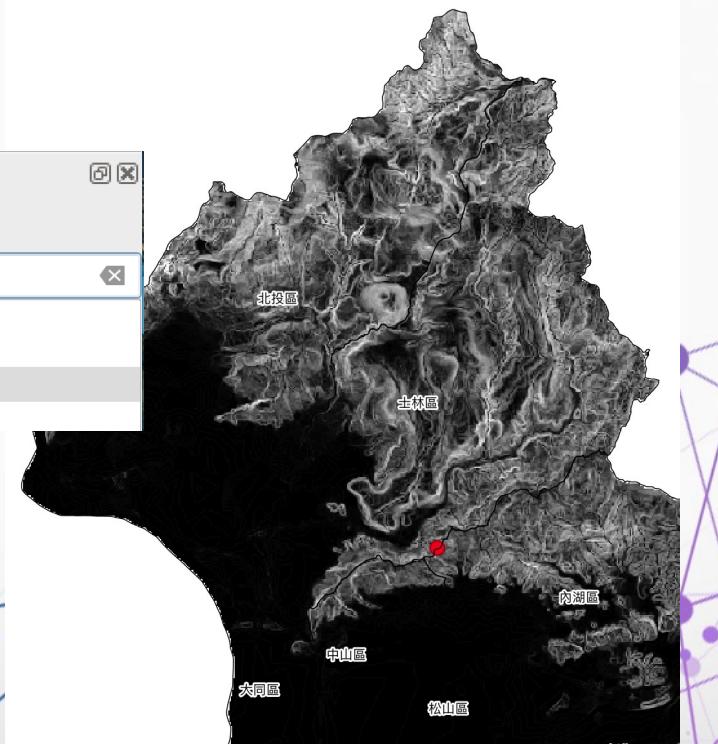
**2. 把現成的polypoint 創建成 viewpoint**

3. 利用 viewshed 視域分析 範圍

輸入polypoint 點位向量資料



建立觀看點位

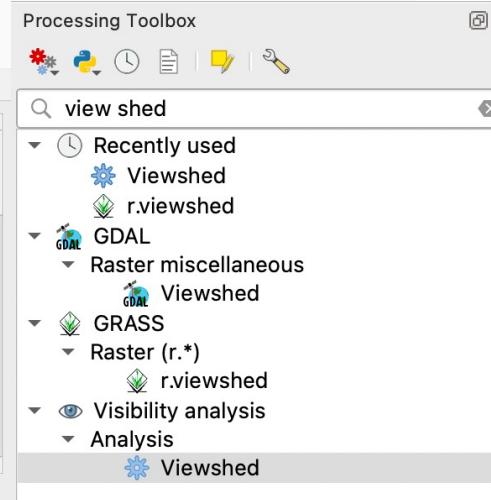
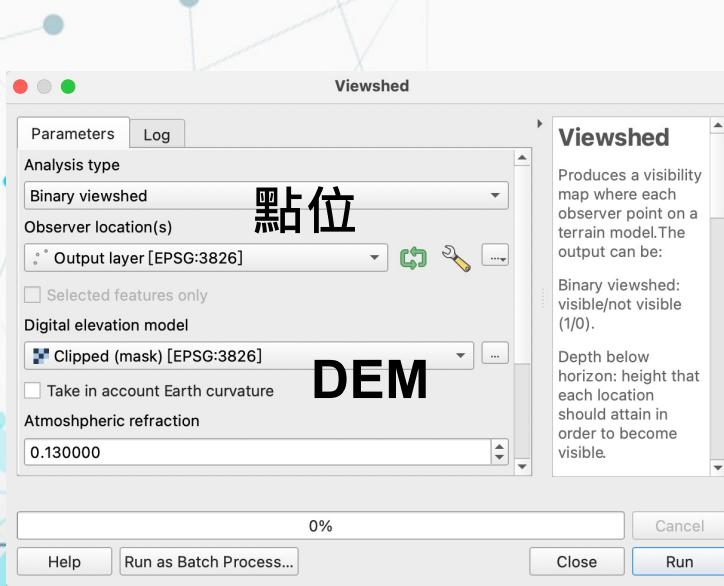


# View Shade 視域分析 3 create view shed

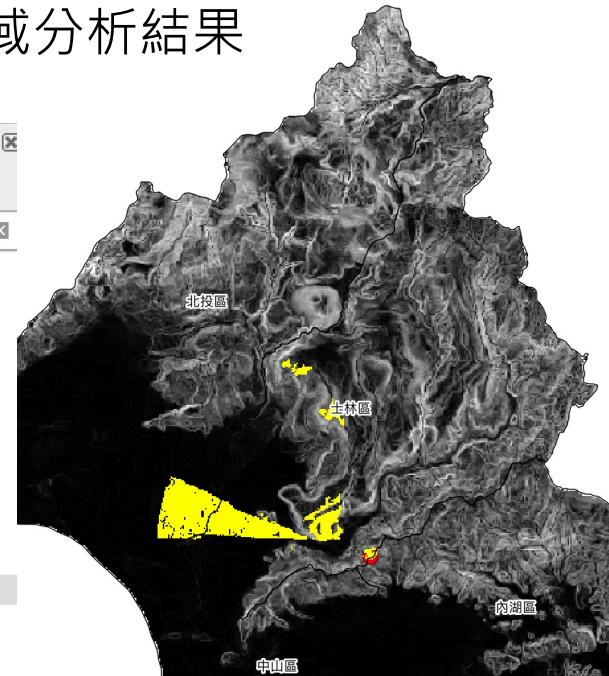
主要步驟：

1. 新增觀覽點 polypoint (新增點位圖層為實習三的內容)
2. 把 polypoint 創建成 viewpoint

## 3. 利用 viewshed 視域分析 範圍



視域分析結果



# 等高線 Contour

Contour

Parameters Log

Input layer  
Clipped (mask) [EPSG:3826]

Band number  
Band 1 (Gray)

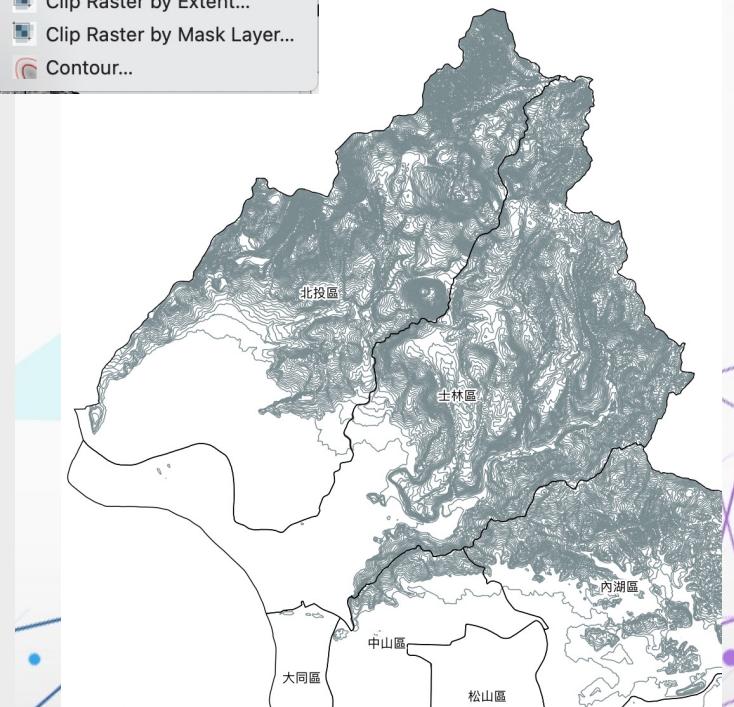
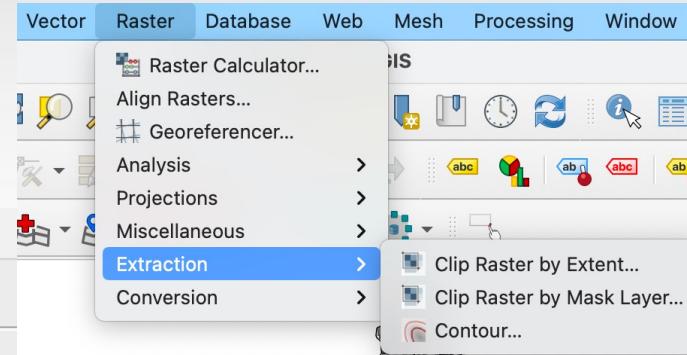
Interval between contour lines  
10.000000

Attribute name (if not set,no elevation attribute is attached) [optional]  
ELEV

Offset from zero relative to which to interpret intervals [optional]  
0.000000

0% Cancel Run

Help Run as Batch Process...

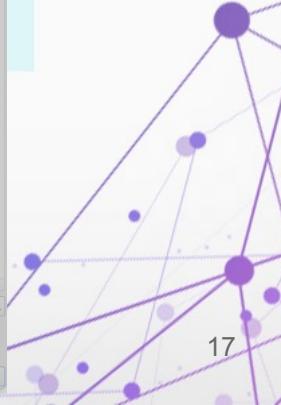
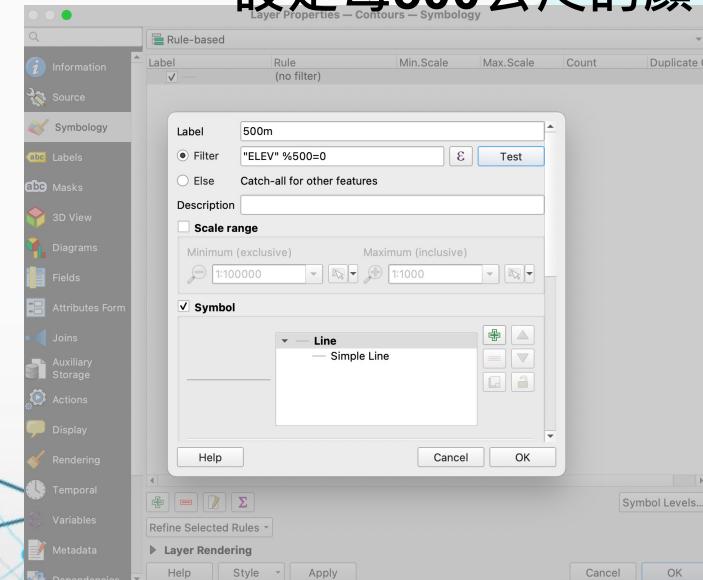
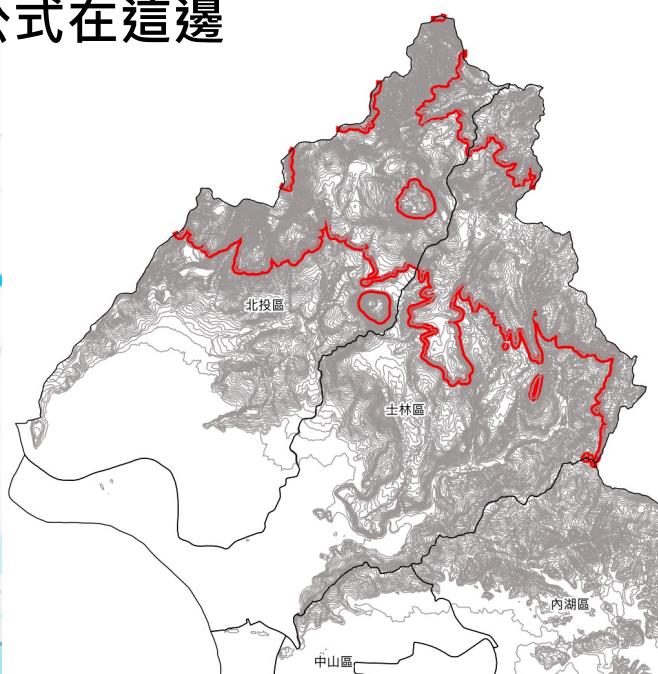


# Rule-Based Symbology 調整等高線樣式 Contour Symbology

Symbology：每500公尺用特別的線標出來

$$\text{"ELEV" \%500=0}$$

公式在這邊



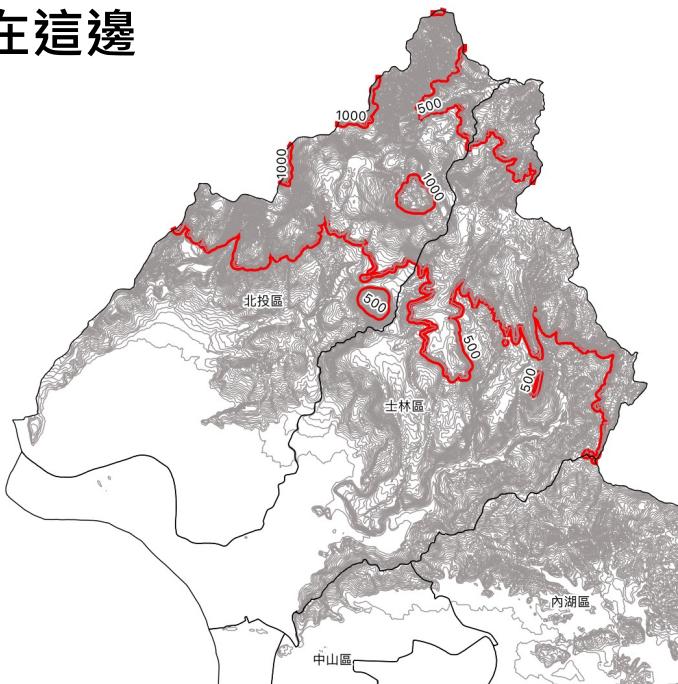
# Rule-Based Labeling

## 調整等高線樣式 Contour Label

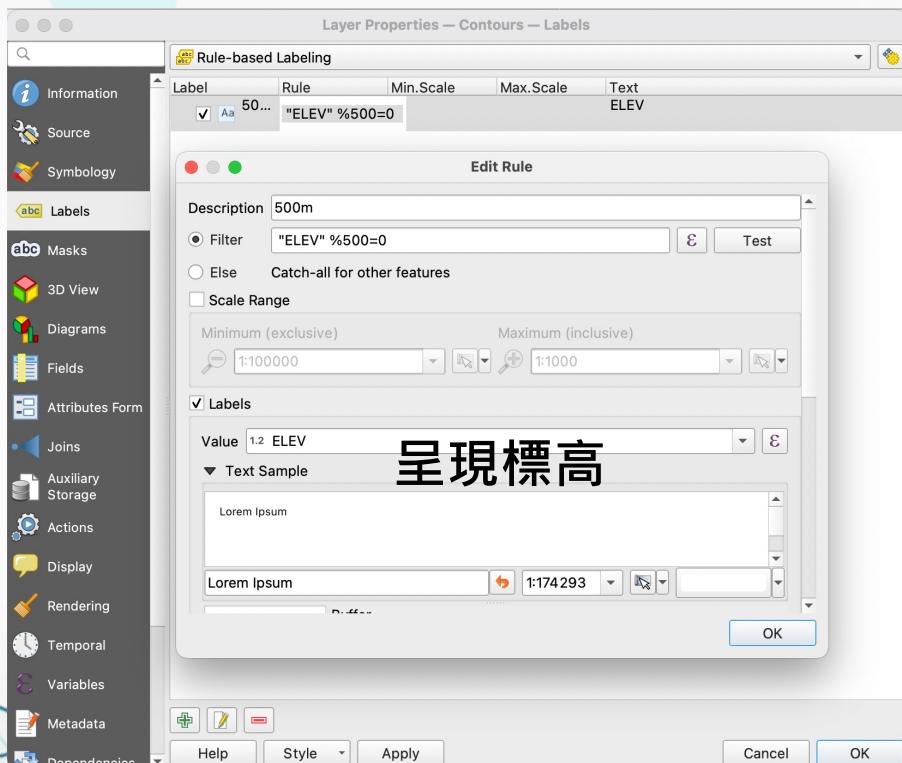
Symbolology : 每500公尺用特別的線標出來

"ELEV" %500=0

公式在這邊



篩選出每500公尺的等高線  
呈現每500公尺的標籤



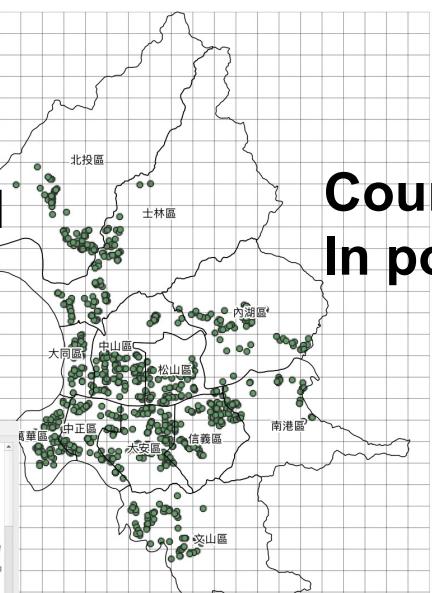
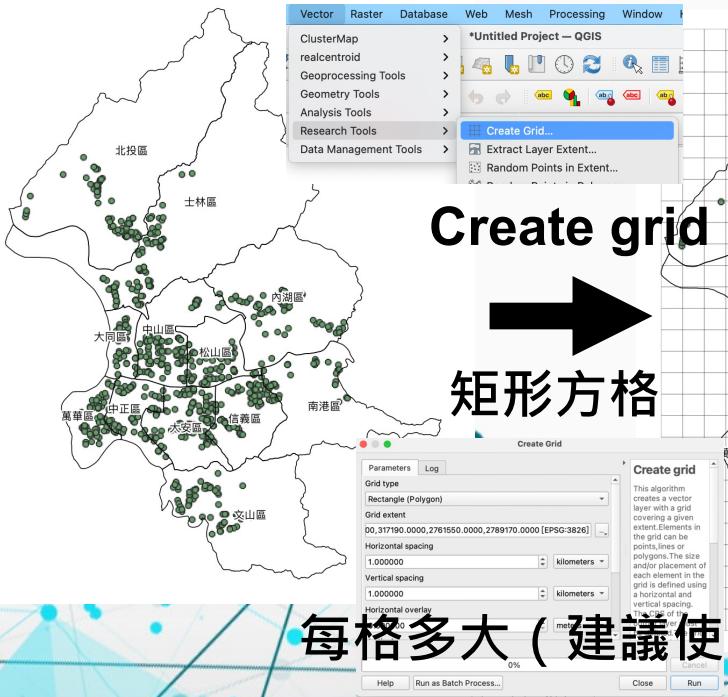
# 網格資料讀取與呈現

## 第三部分

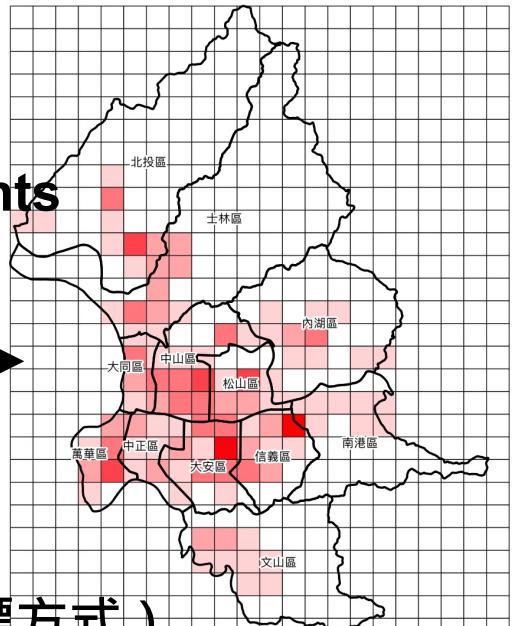
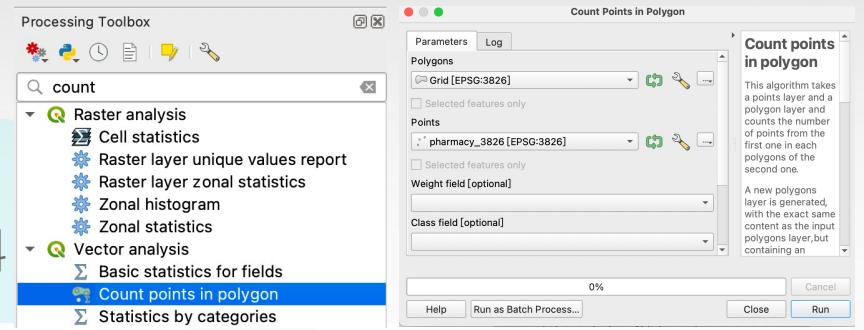
向量資料網格化

# Create Grid

- 建立虛擬網格，把向量資料轉成網格資料

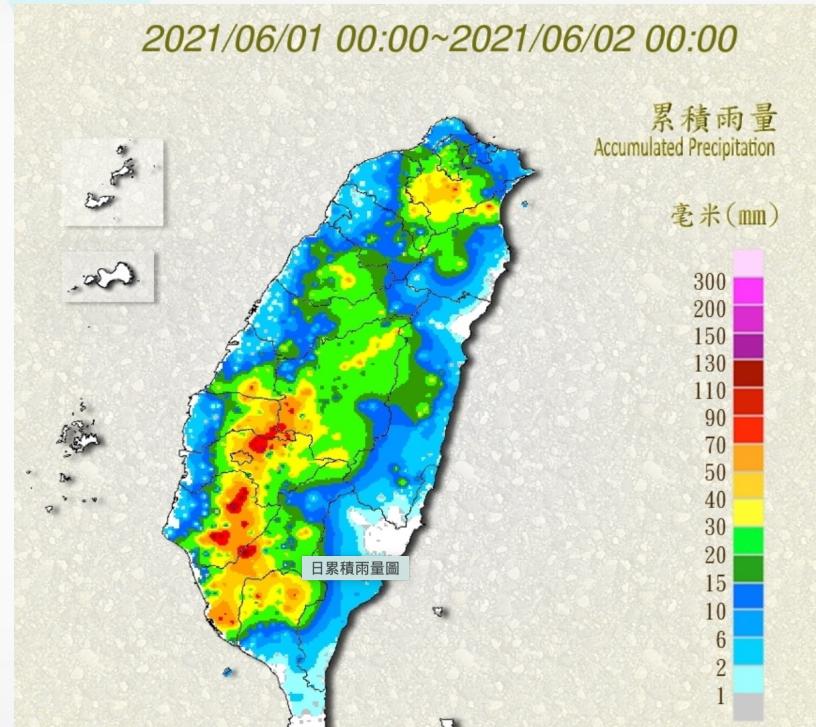
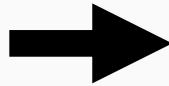


每格多大 (建議使用公尺為單位的投影座標方式)



# 實戰演練：中央氣象局累積雨量分布地圖

	station_id	station_name	lon	lat	city	city_sn	town	town_sn	attribute
1	01E310	南勢山	120.7271	24.5898	苗栗縣	11	後龍鎮	91	水利署第2河...
2	01E030	橫龍山	120.9606	24.4717	苗栗縣	11	泰安鄉	101	水利署第2河...
3	COR540	佳冬	120.5442	22.4212	屏東縣	20	佳冬鄉	341	局屬無人測站
4	COU760	東澳	121.825	24.5238	宜蘭縣	7	南澳鄉	93	局屬無人測站



A	B	C	D	E	F	G	H	I	J	
1	station_id	JobsTime	ELEV	RAIN	MIN_10	HOUR_3	HOUR_6	HOUR_12	HOUR_24	NOW
2	C0S980	2021/6/1 0:00	350	-998	-998	-998	-998	0.5	0.5	0.5
3	K2E710	2021/6/1 0:00	350	-998	-998	-998	-998	0.5	0.5	0.5
4	C0G880	2021/6/1 0:00	350	-998	-998	-998	-998	0.5	0.5	0.5
5	C0B620	2021/6/1 0:00	250	-998	-998	-998	-998	0.5	0.5	0.5

# 中央氣象局：累積雨量分布地圖（使用 EPSG:4326）

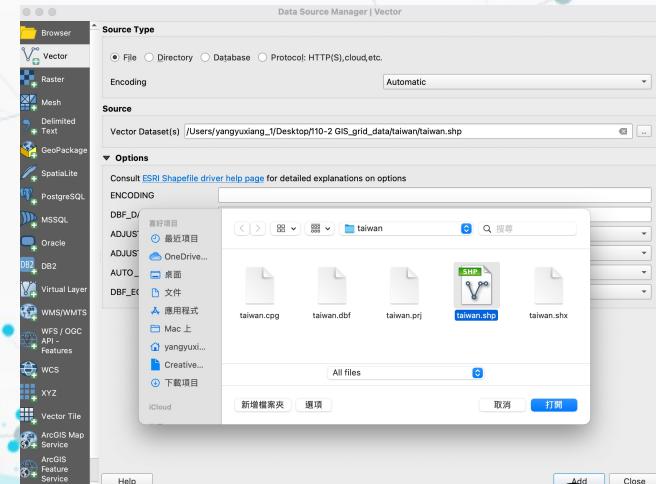
資料來源：中央氣象局自動雨量站（雨量觀測資料僅提供即時資料, .json檔案）：

<https://data.gov.tw/dataset/9177>

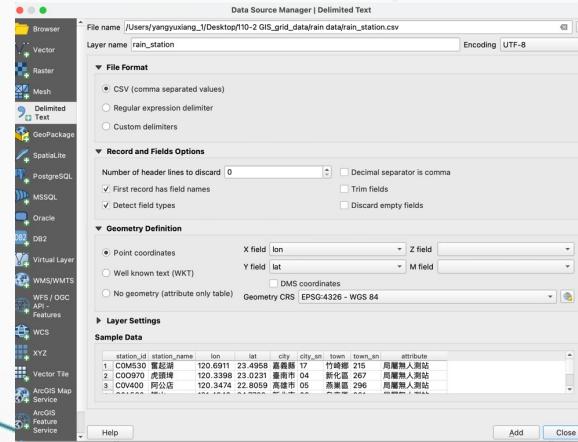
- 概念流程重點：
- 1. 下載資料，包含 0601的降雨資料（.json檔，自行轉換成.csv檔案）、雨量測站站點資料（.csv）。
- 2. 兩個.csv匯入QGIS，測站設定為點圖層，並且透過測站 id join雨量的24小時累積雨量（HOUR\_24）資料。
- 3. 把負值修改為0，空缺值修改為-1（參考後面投影片），最後輸出為.shp（polyline）。
- 4. 針對 polyline，使用內插 Interpolation>IDW，並且調整參數（參考後面投影片）
- 5. 處理完後為網格資料（raster），用台灣範圍的shapefile，利用raster>extraction>clip raster by mask，切出台灣內的雨量網格資料。
- 6. 用切出的資料，調整Symbology為Singleband pseudocolor，選顏色、數值分類的點選以及輸入（上一頁投影片），並另存Style為.qml檔案，記得interpolate 選擇discrete。

# 1. Load Data

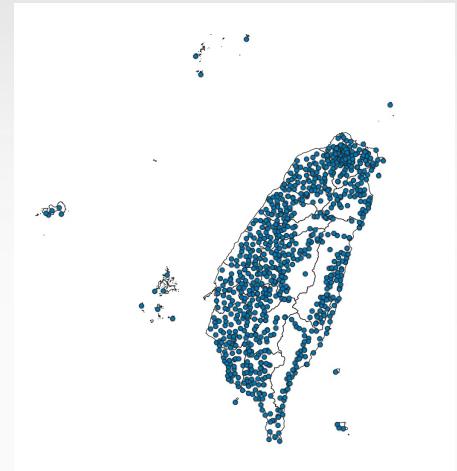
## Taiwan shp



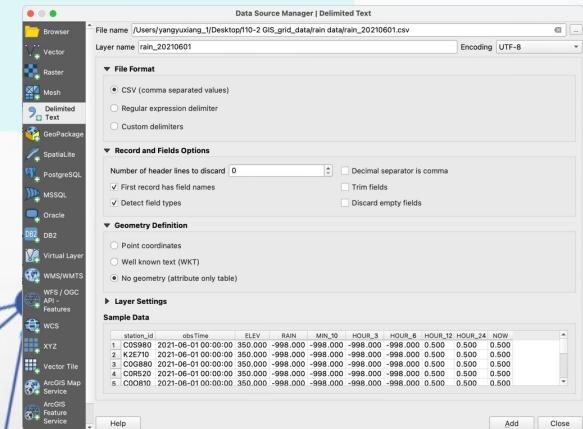
## Rain station. csv



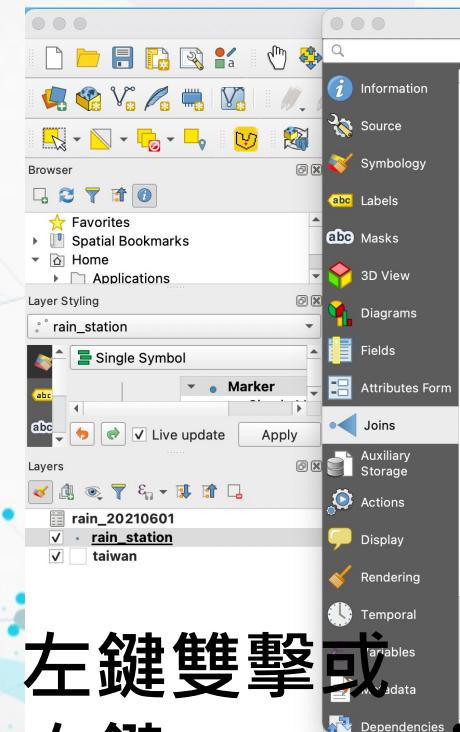
## Create geometry by X, Y Coordinates



## Rain data



## 2. Join Attribute



左鍵雙擊或  
右鍵 properties

按下 + 號

相同測站id  
合併資料  
把雨量資料進入  
到測站資料

	town_en	attribute	obsTime	ELEV	RAIN	MIN_10	HOUR_3	HOUR_6	HOUR_12	HOUR_24	NOW
1	215	局屬無人測站	2021-06-02 ...	1385	-998	-998	-998	-998	9.5	29	29
2	267	局屬無人測站	2021-06-02 ...	71	-998	-998	-998	-998	0	77.5	77.5
3	296	局屬無人測站	2021-06-02 ...	56	-998	-998	-998	-998	0	51.5	51.5
4	61	局屬無人測站	2021-06-02 ...	405	0	0	0	0	14.5	39	39
5	57	水利署第10河 ...	2021-06-01 ...	33	0	0	0	0	6	33	33
6	175	農委會土水保 ...	2021-06-02 ...	613	-998	-998	-998	-998	11	23	23
7	276	局屬無人測站	2021-06-02 ...	10	-998	-998	-998	-998	4.5	26	26
8	46	局屬無人測站	2021-06-02 ...	48	0	0	0	0	6	35	35
9	214	局屬無人測站	2021-06-02 ...	15	-998	-998	-998	-998	0	14	14
10	122	水利署第4河 ...	2021-06-01 ...	2303	0	0	1	1	13	39	39
11	119	局屬無人測站	2021-06-02 ...	563	-998	-998	-998	-998	1.5	5	5
12	116	局屬無人測站	2021-06-02 ...	311	-998	-998	-998	-998	17.5	17.5	17.5
13	38	北京市大工地 ...	2021-06-02 ...	118	0	0	0	0	20	20	20
14	219	中央氣象局	2021-06-02 ...	26.9	-998	-998	-998	-998	0	59.5	59.5
15	99	局屬無人測站	2021-06-02 ...	83	-998	-998	-998	-998	15.5	15.5	15.5
16	217	局屬無人測站	2021-06-02 ...	40	-998	-998	-998	-998	2.5	37	37
17	533	局屬無人測站	2021-06-02 ...	3690	-998	-998	-998	-998	27	42	42
18	228	中央氣象局	2021-06-02 ...	2.3	-998	-998	-998	-998	0	31	31
19	29	局屬無人測站	2021-06-02 ...	287	0	0	0	0	15.5	15.5	15.5
20	218	2	2021-06-02 ...	2	1	1	1	1	21.5	21.5	21.5

### 3. Modify Value

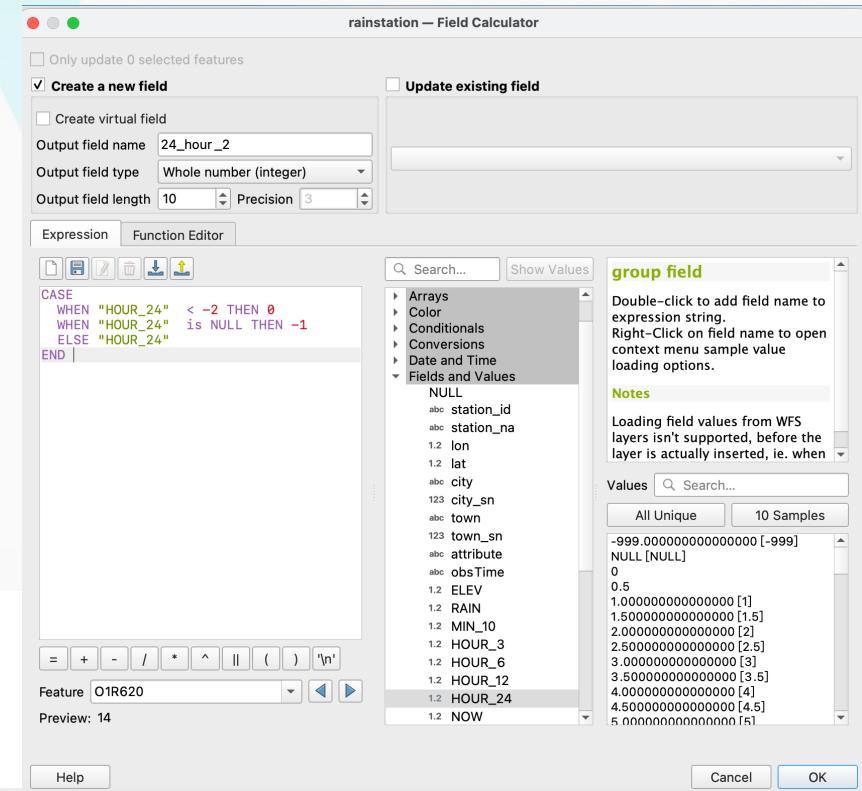
把負值 ( -999 ) 修改為 0 , 把空缺值修改為 -1

```
CASE
WHEN "HOUR_24" < -2 THEN 0
WHEN "HOUR_24" is NULL THEN -1
ELSE "HOUR_24"
END
```

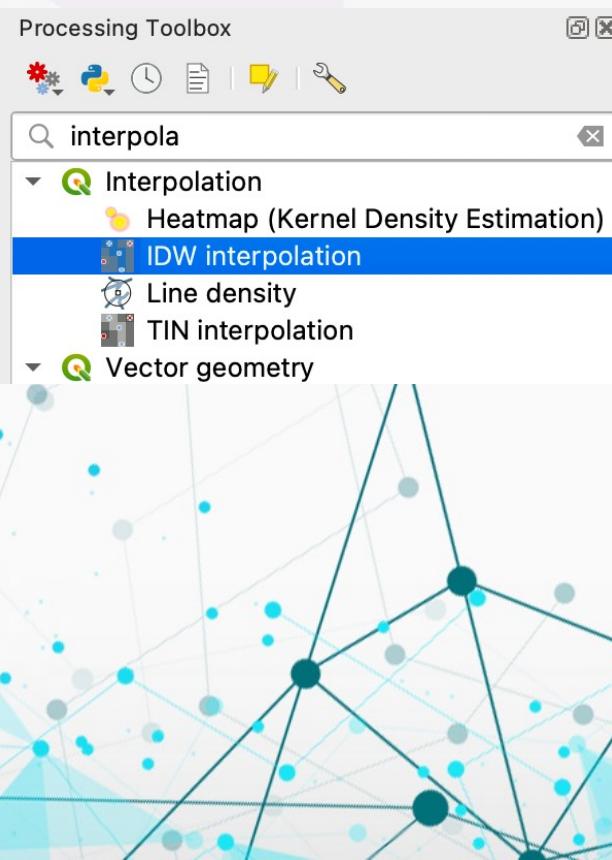
補充說明

- 雨量值小於 0.00 皆表示該時刻因故無資料。
- 雨量值為 -998.00 表示RAIN=MIN\_10=HOUR\_3=HOUR\_6= 0.00 。

● 說明檔案為-998，但資料實際是-999。

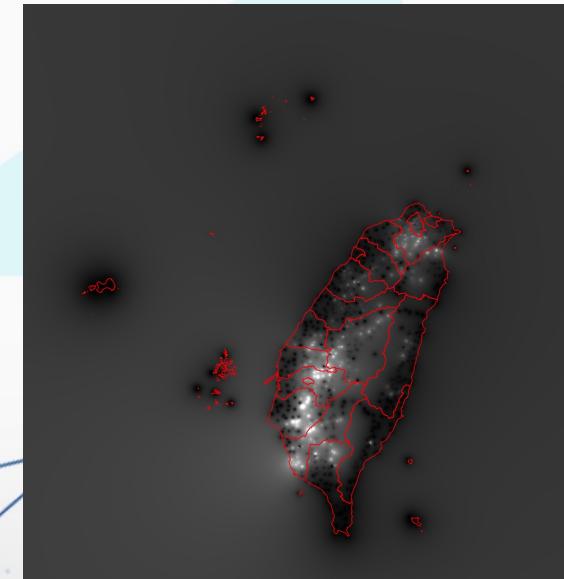
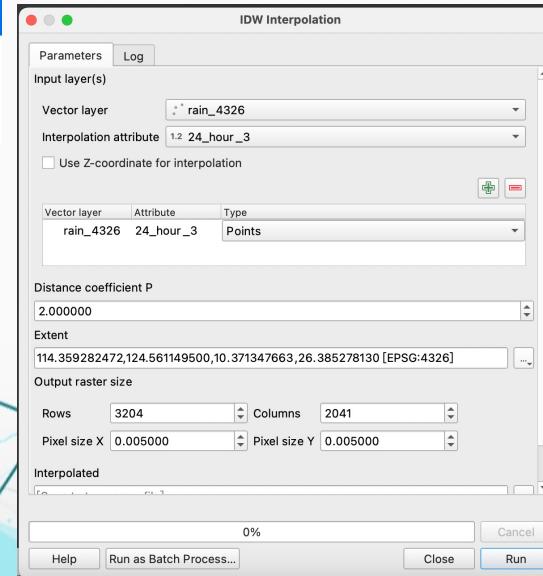


# 4. Interpolation IDW 距離反比權重內插



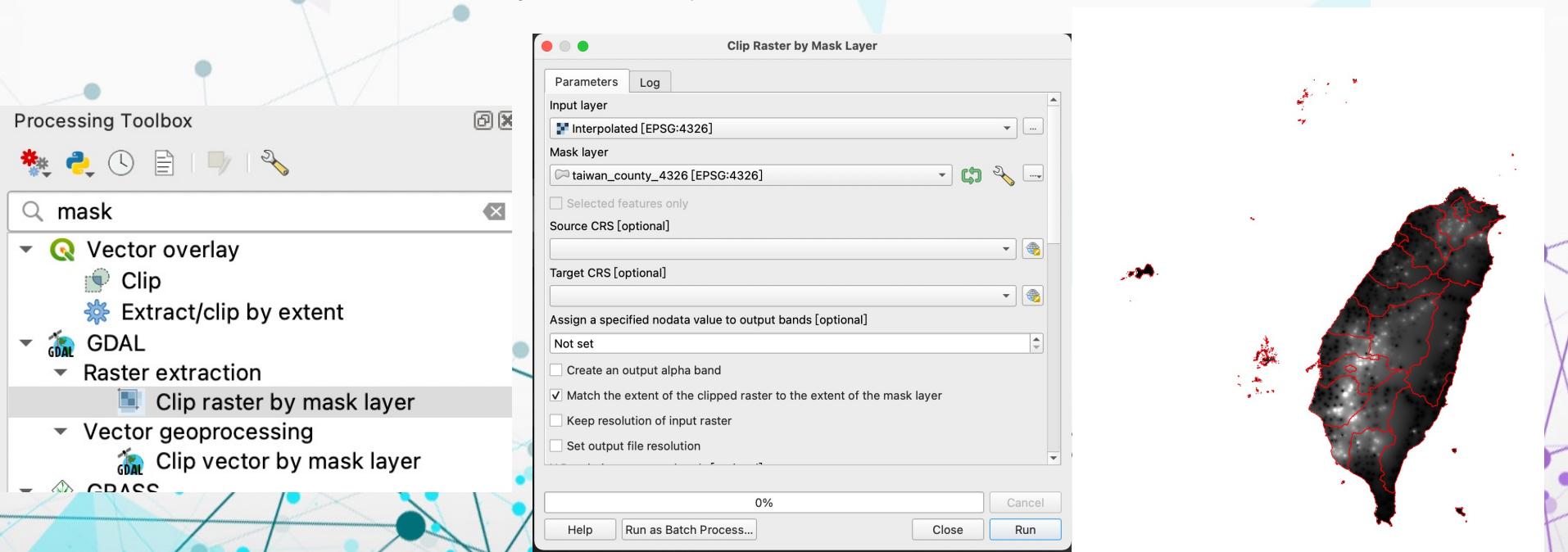
重點：

1. IDW空間內插 ( spatial interpolate )
2. 權重選擇調整過後的數值 ( H\_24降水量 ) , Extent選擇台灣為範圍 。
3. Pixel Size 選 0.005 \*0.005 (跑不動的話可以使用 0.01 \*0.01)

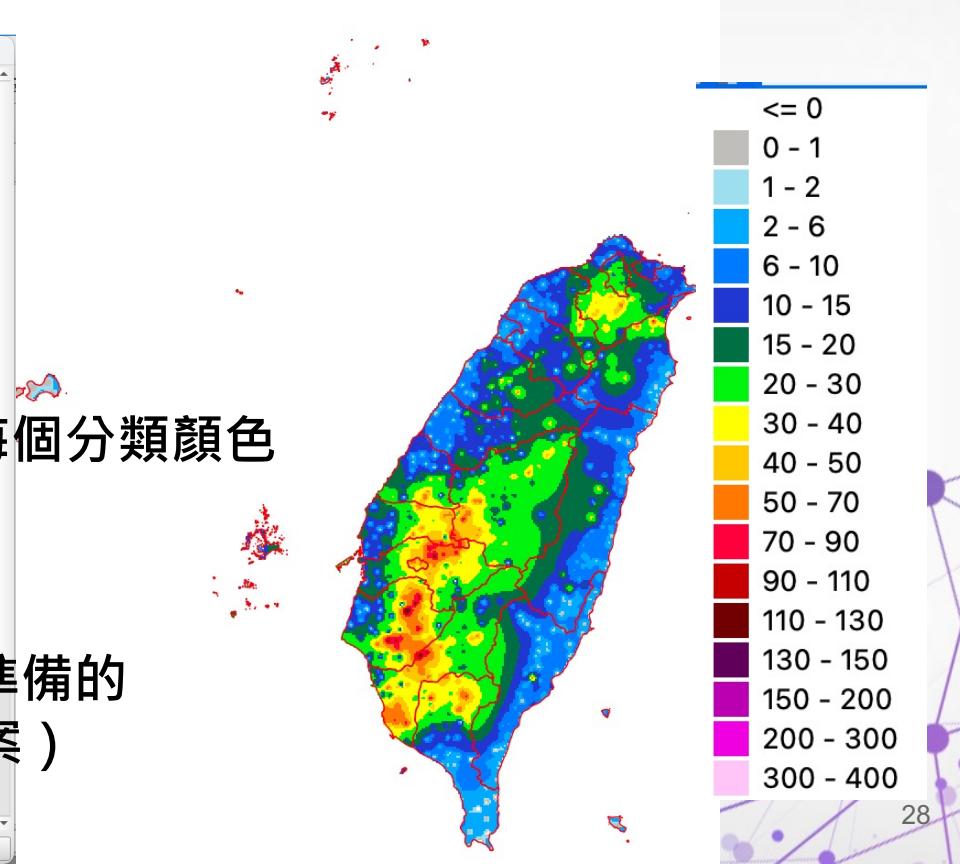
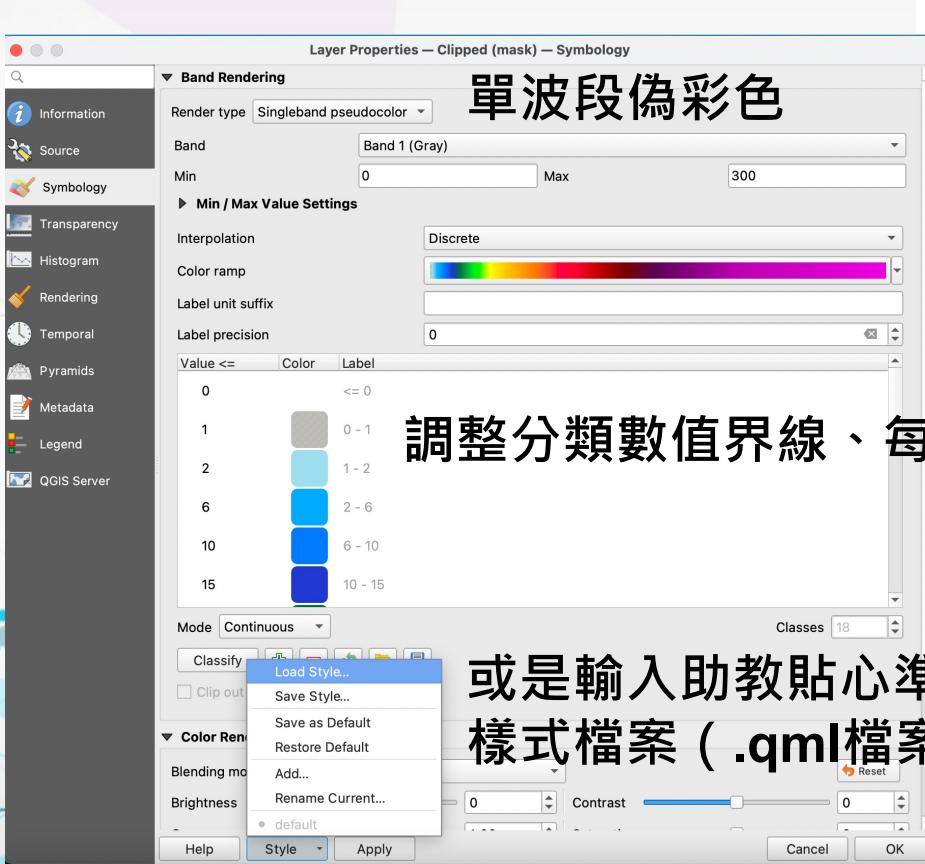


# 5. Clip for Taiwan Shape

- 處理完後為網格資料（raster），用台灣範圍的shapefile，利用 raster>extraction>clip raster by mask，切出台灣內的雨量網格資料。



# 6. Adjust Symbology – Singleband PseudoColor



# The End