Geographic Information System

Intro. to GIS & Overview

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Photo credit: ChatGPT

Outline

- What is GIS?
- GIS File Elements
- Types of GIS
- Download Geo-Datasets
- An Overview of ArcGIS Pro
- References

What is GIS?

- GIS is a computer system or software that may create, manage, analyze, and illustrate map data that is attached to unique locations.
- It could be a platform that enables users to capture, store, manipulate, analyze, and present spatial or geographic data.
- The location data, along with all associated information, provide a foundation for mapping and analysis used in virtually every field.

What is GIS?

- With the advancement in technology, a GIS map is dynamic, means that the map can be modified in a very little time, and can be stored, displayed, and printed out quickly and efficiently.
- GIS is a new methodology in science and applications; it is a new profession and a new business.

What is GIS?

GIS refers to three integrated parts:

1. **Geographic:**
   The geographical location of the real world (coordinate system)
2. **Information:**
   The geo-based database, e.g., attributes and labels
3. **Systems:**
   The hardware, software, or any kind of applications.

What is GIS?

[1/2] From Oxford Bibliographies (2017)...

- A GIS (Geographic Information System) is a computer- based tool that helps us visualize information with patterns and relationships that are not otherwise apparent.
- The ability to ask complex questions about data analyze many features at once and then instantly see the results on a map is what makes GIS a powerful tool for creating information.

What is GIS?

[2/2] From Oxford Bibliographies (2017)...

- GIS can be used in many disciplines, such as resource management, criminology, urban planning, marketing, and transportation.
- GIS is a useful tool for researchers and scientists, and it plays a vital role in scientific research, such as in environmental science, earth sciences, and other fields.

What Can a GIS Do?

1. **Capture data:** You can add data from many sources to a GIS, and you can also create your own data from local directory. You will learn about getting data into a GIS.
2. **Store data:** You can store and manage information about the real world in ways that make sense for your application. You will learn about organizing data.
3. **Query data:** You can ask complex questions about features based on their attributes or their location and get quick results. You will gain experience with querying.

What Can a GIS Do?

4. **Analyze data:** You can integrate multiple datasets to find features that meet specific criteria and create information useful for problem solving.
5. **Display data:** You can display features based on their attributes, a powerful feature you will come to appreciate. You will learn how to symbolize features in different ways.
6. **Present data:** You can create and distribute high-quality maps, graphs, and reports to present your analysis results in a compelling way to your audience. You will learn how to create a report and how to design an effective map.

GIS Infrastructure (5 Key Components)

- **Hardware:** The machine where the GIS can be run (computer, digitizer, plotter, printer).
- **Software:** The program needed to run the GIS (ArcGIS and its extensions)
- **Data:** The digital and database (information)
- **Organization & People:** This is the most important part of the GIS structure. GIS is too important and so costly that it cannot be considered just equipment. It requires organization and staff to utilize this technology.

GIS Principles

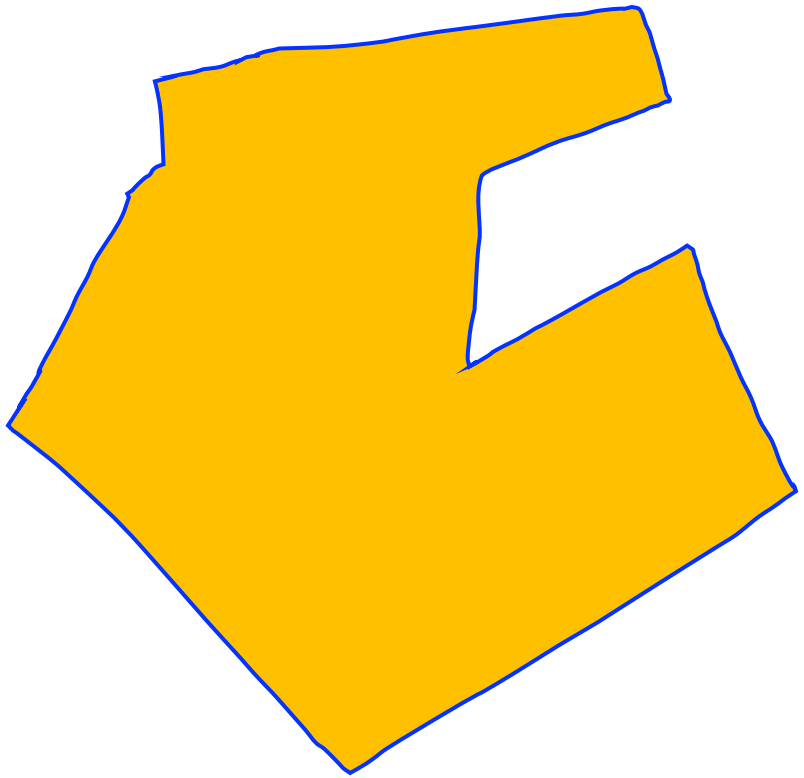
- The computer is an unavoidable technology in our time (But...). We are living in the digital age, which has become an important element in nearly all professions.
- Computer training in most scientific disciplines is essential.
- GIS is an inevitable technology that will be used in all scientific fields. GIS has become the accepted and standard means of using spatial data.

GIS Principles

- GIS is more accurate, flexible, object efficient, and rapid fun than the traditional method of spatial data inventory.
- GIS is replacing traditional cartography. Much of the traditional “pen & ink” cartography performed by skilled drafts persons and artists is being replaced by GIS.
- GIS is opening new horizons. New modes of analysis and applications are constantly being discovered.

GIS File Elements

- Basically, the geographic datasets could be classified into two types: vector data and raster data.
- All of them have at least three elements: coordination system, georeferencing, and shape.
- Usually, these datasets have several information as shown in attribute table.



Types of GIS

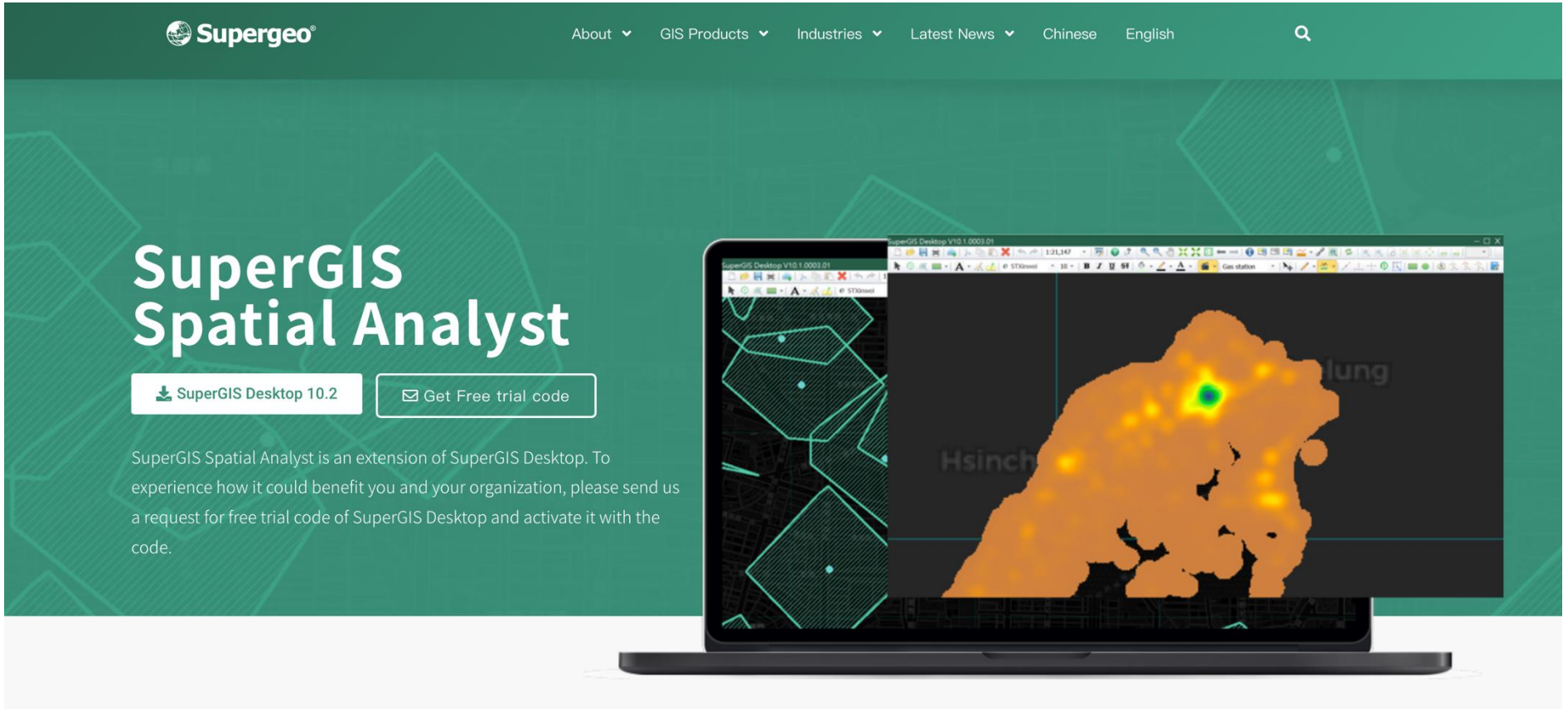
- **Conventional GIS software:**

  As abovementioned, the conventional GIS usually refers to a system or software to store, analyze, and illustrate map data and geo-information.

- **Web GIS:**
  Story map, website-like web dashboard …
  See the following examples…

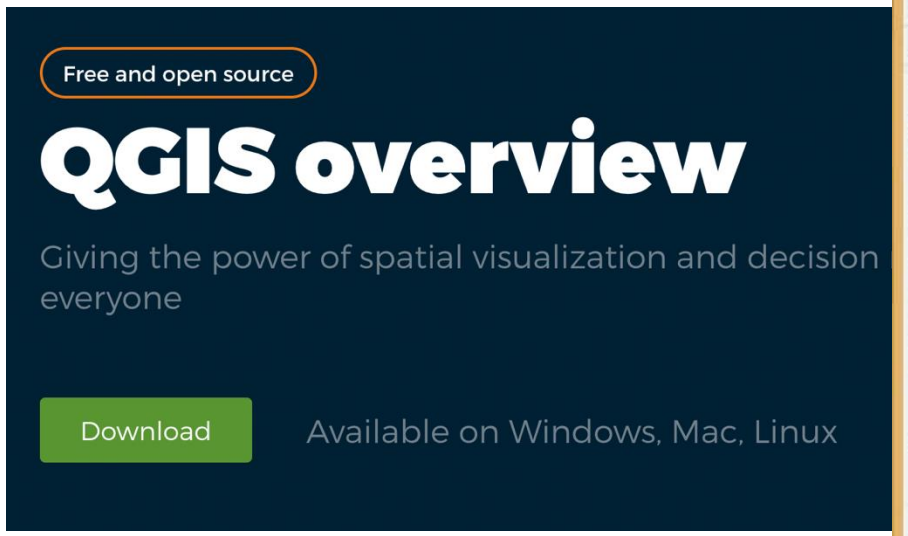
Types of GIS – Conventional

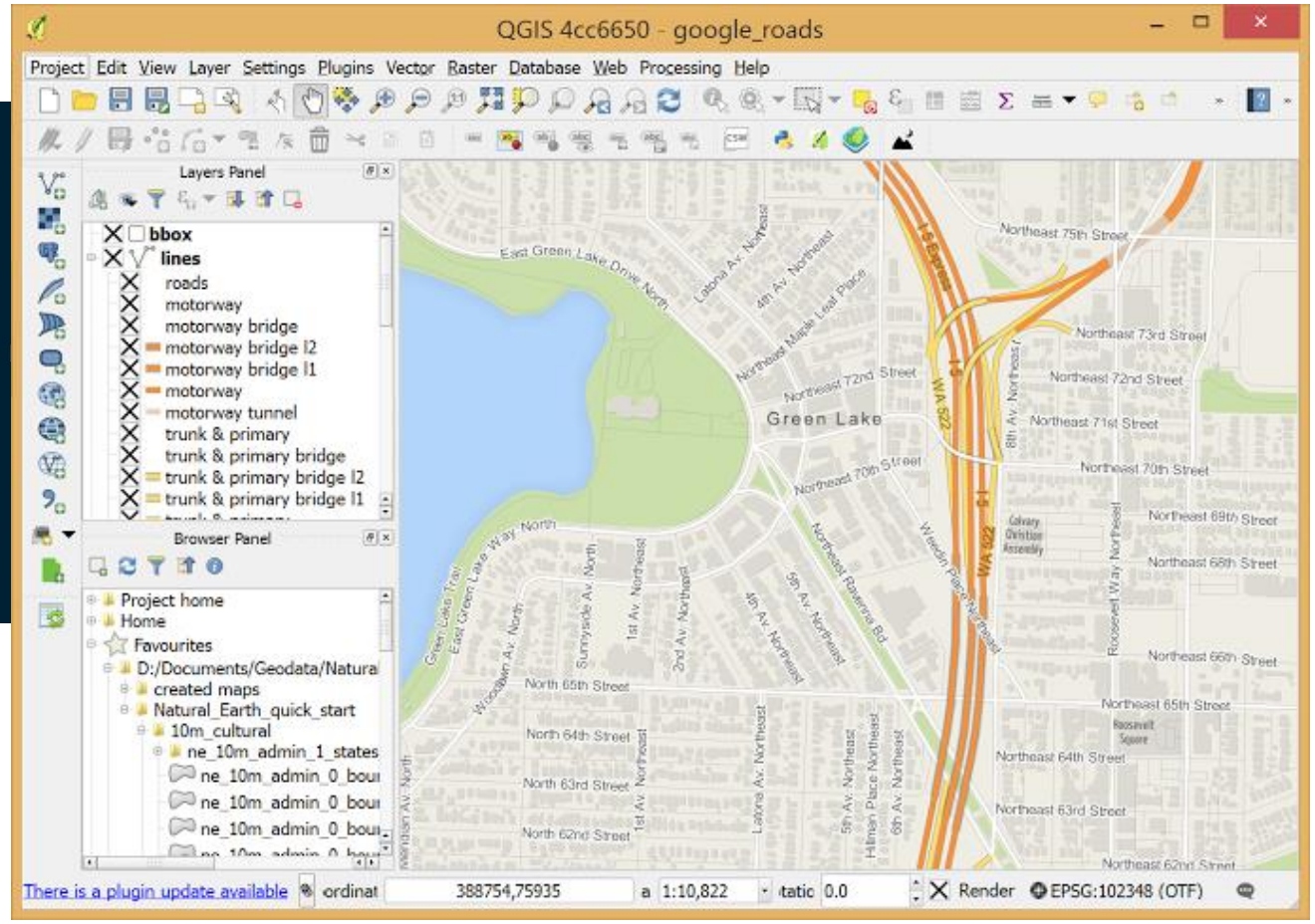
- Taiwan version – SuperGIS



Types of GIS – Conventional

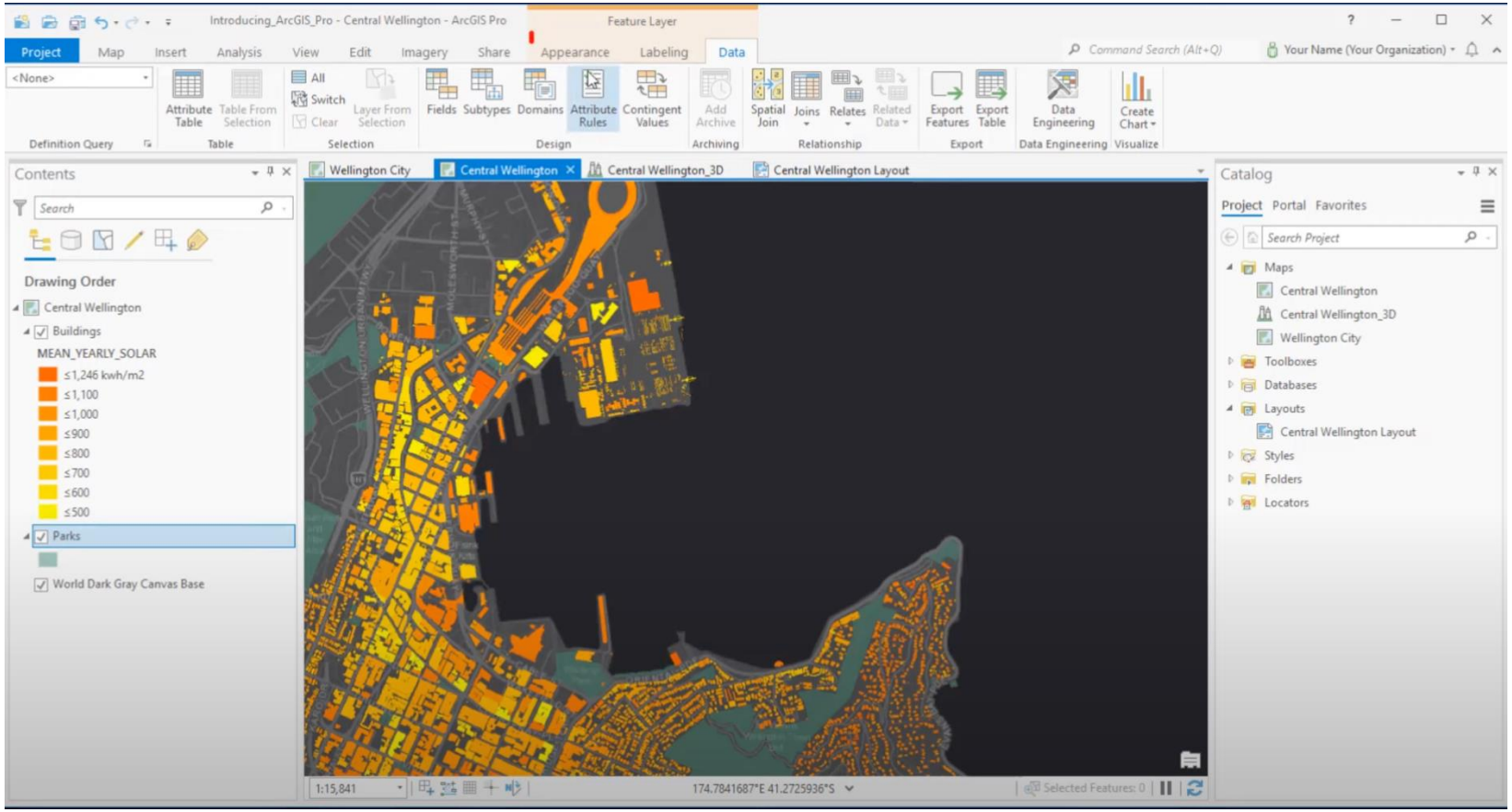
- Quantum GIS





Types of GIS – Conventional

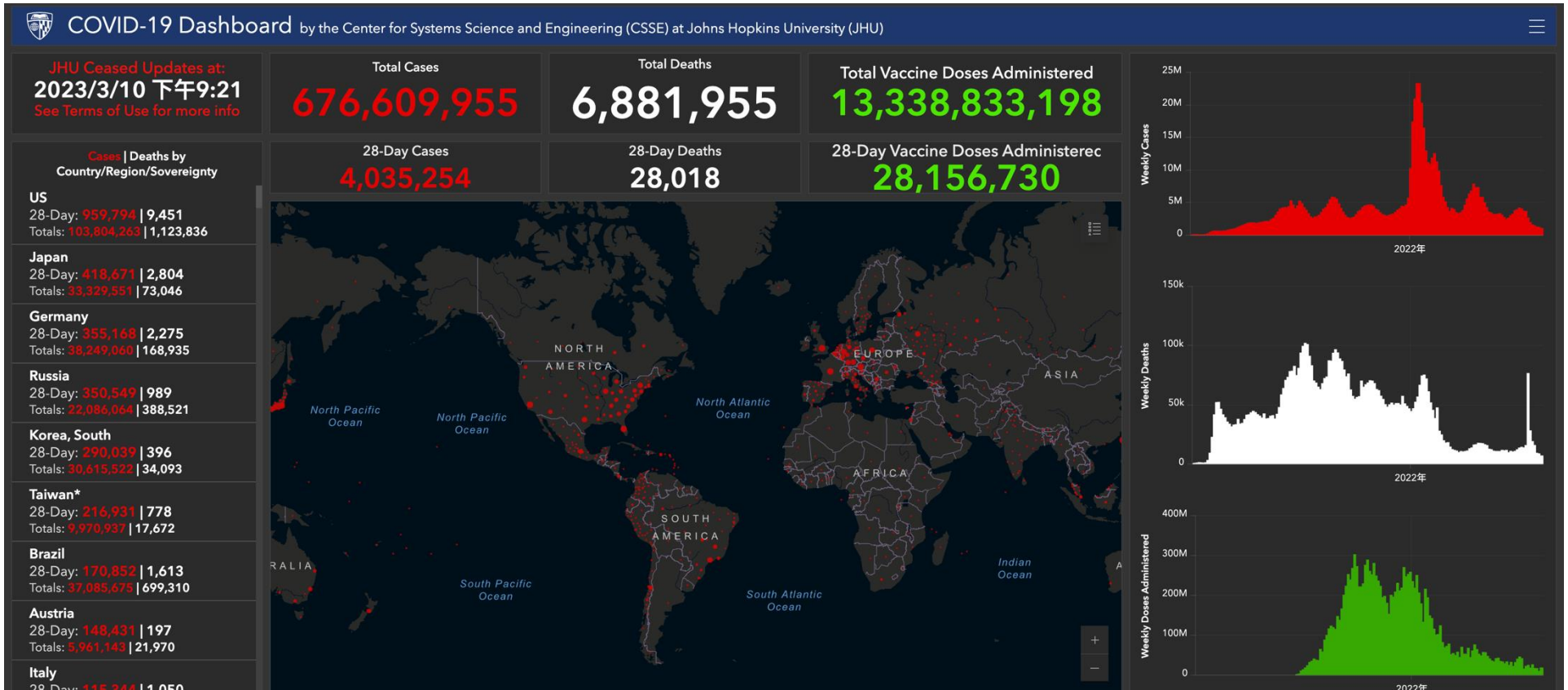
- ArcGIS Pro



Source: https://www.youtube.com/watch?v=1YhdQToyPg4&ab_channel=ArcGIS

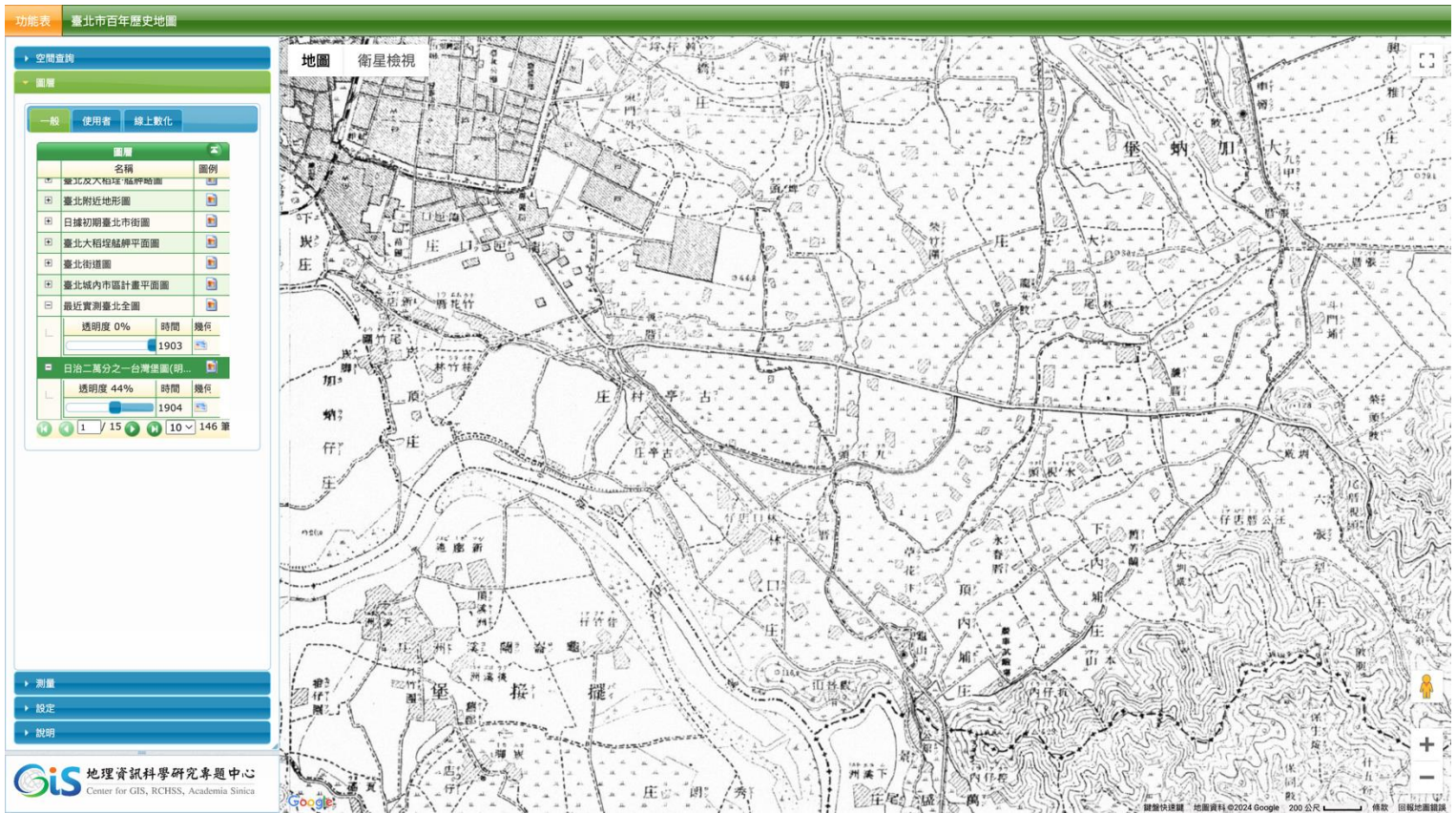
Types of GIS – Web GIS

- COVID dashboard
- https://coronavirus.jhu.edu/map.html



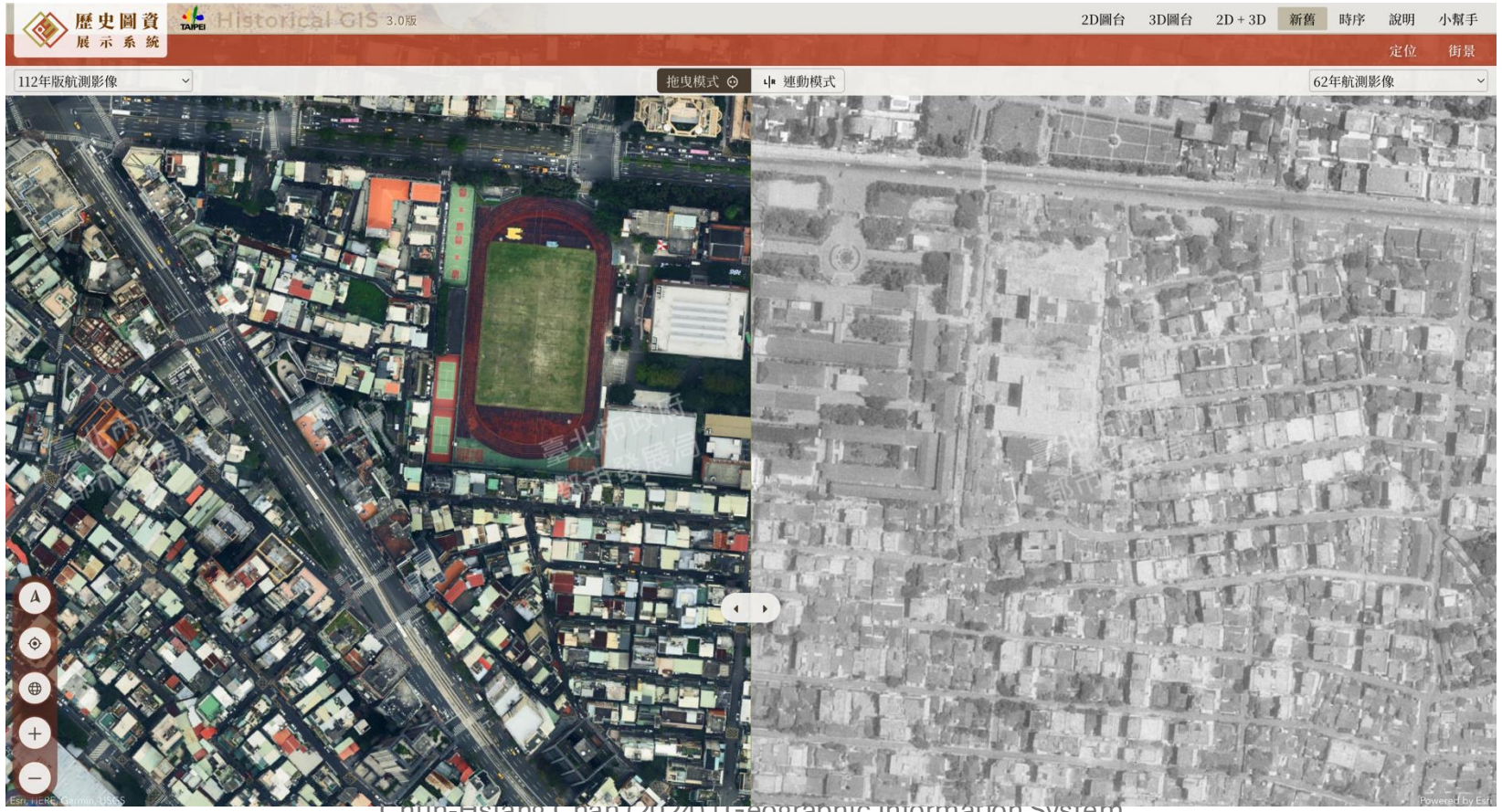
Types of GIS – Web GIS

- 臺灣百年歷史地圖
- https://gissrv4.sinica.edu.tw/gis/twhgis/



Types of GIS – Web GIS

- 台北市歷史地圖 https://www.historygis.udd.gov.taipei/urban/



Types of GIS – Web GIS

- 國土利用現況調查
- https://whgis-nlsc.moi.gov.tw/GisMap/NLSCGisMap.aspx

Simple Lab Practice

- Please use the above-mentioned web GIS platforms to observe the historical changes in the location of NTNU's main campus.
- You may make a screenshot to record the changes and highlight the critical timestamps that exist in significant constructions.

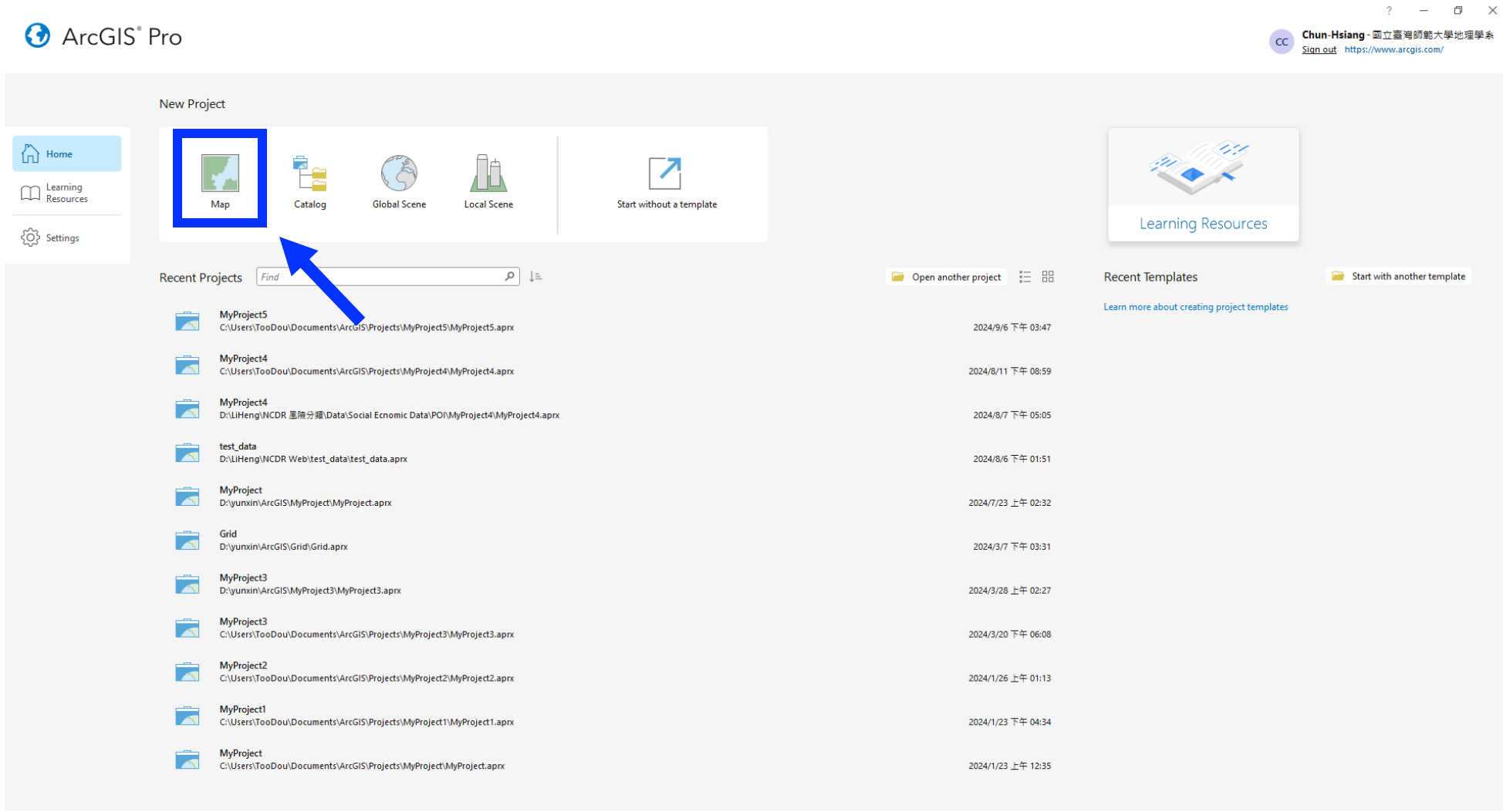
Download Geo-Datasets

- 政府資料開放平臺 https://data.gov.tw/

Download Geo-Datasets

- 內政部社會經濟資料服務平台
- https://segis.moi.gov.tw/STATCloud/QueryInterface

An overview of ArcGIS Pro



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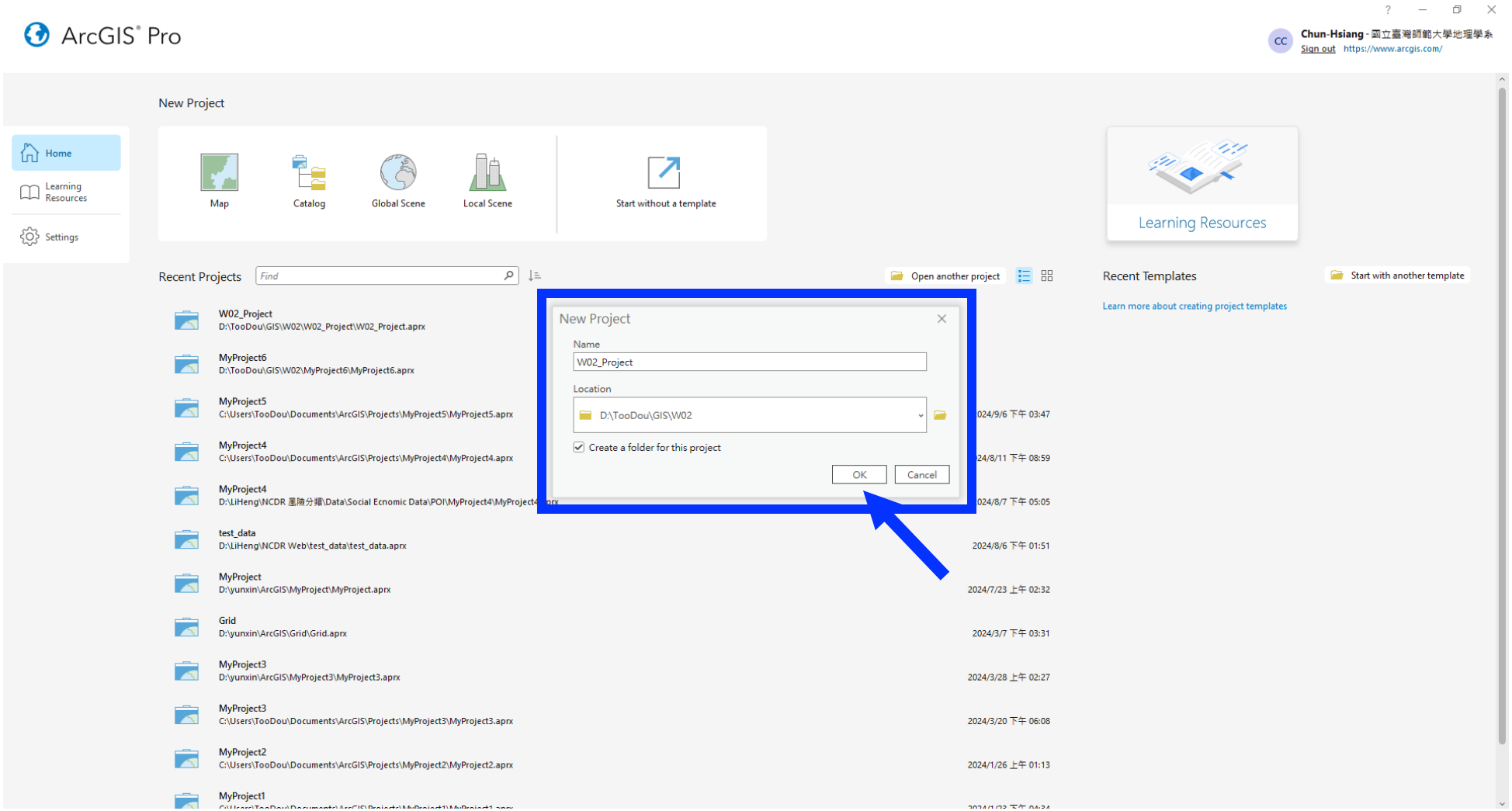

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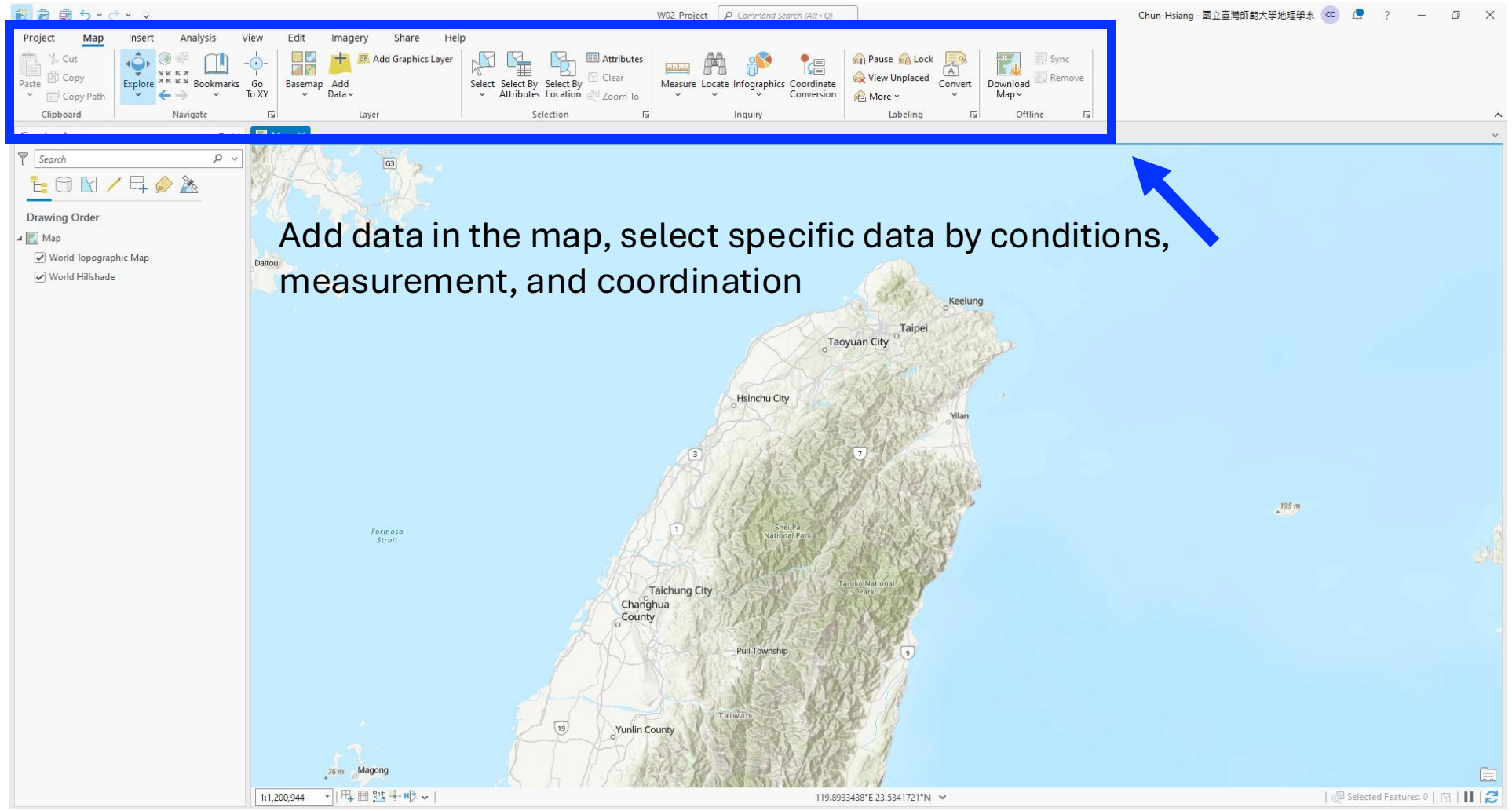

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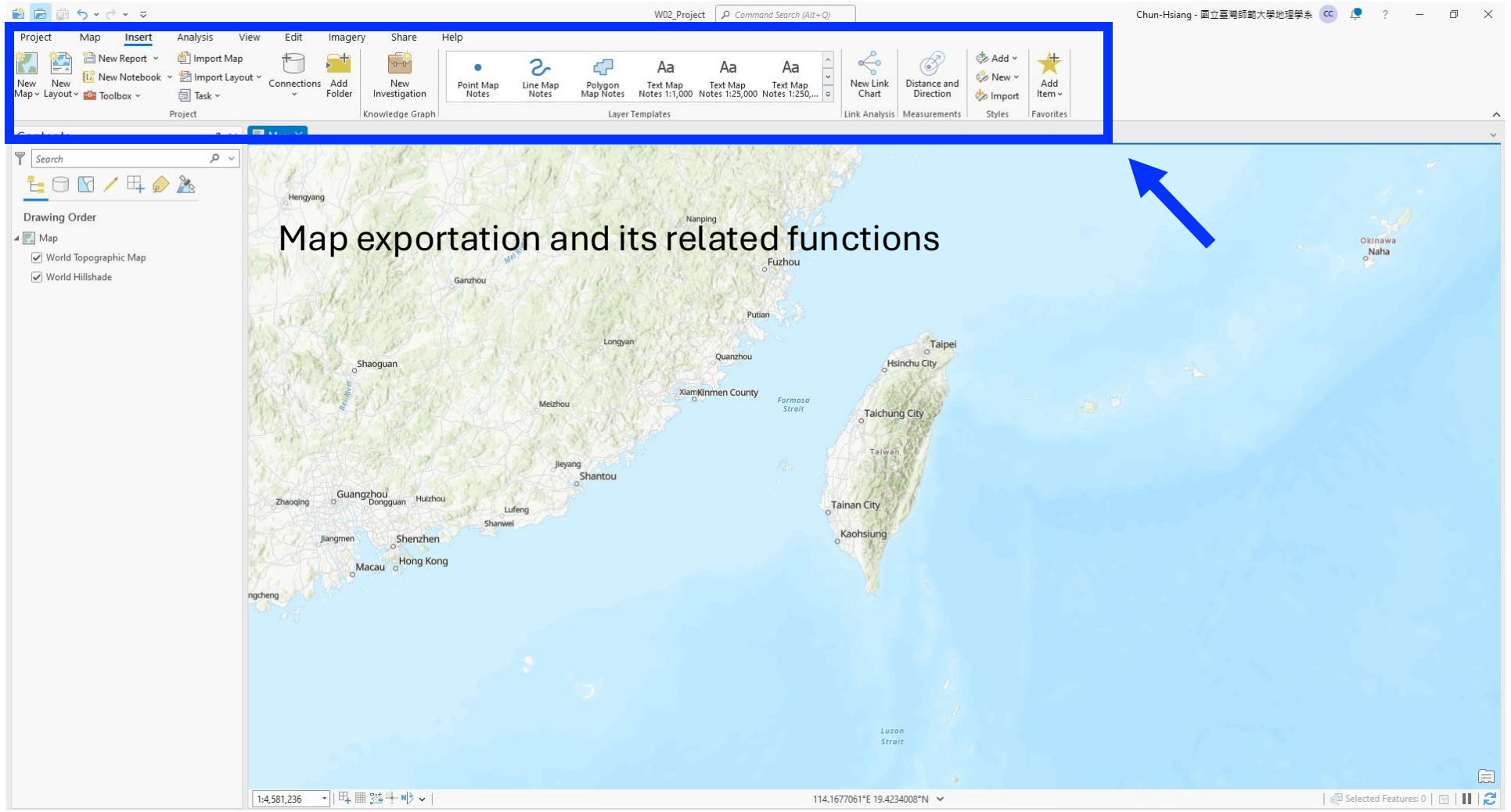

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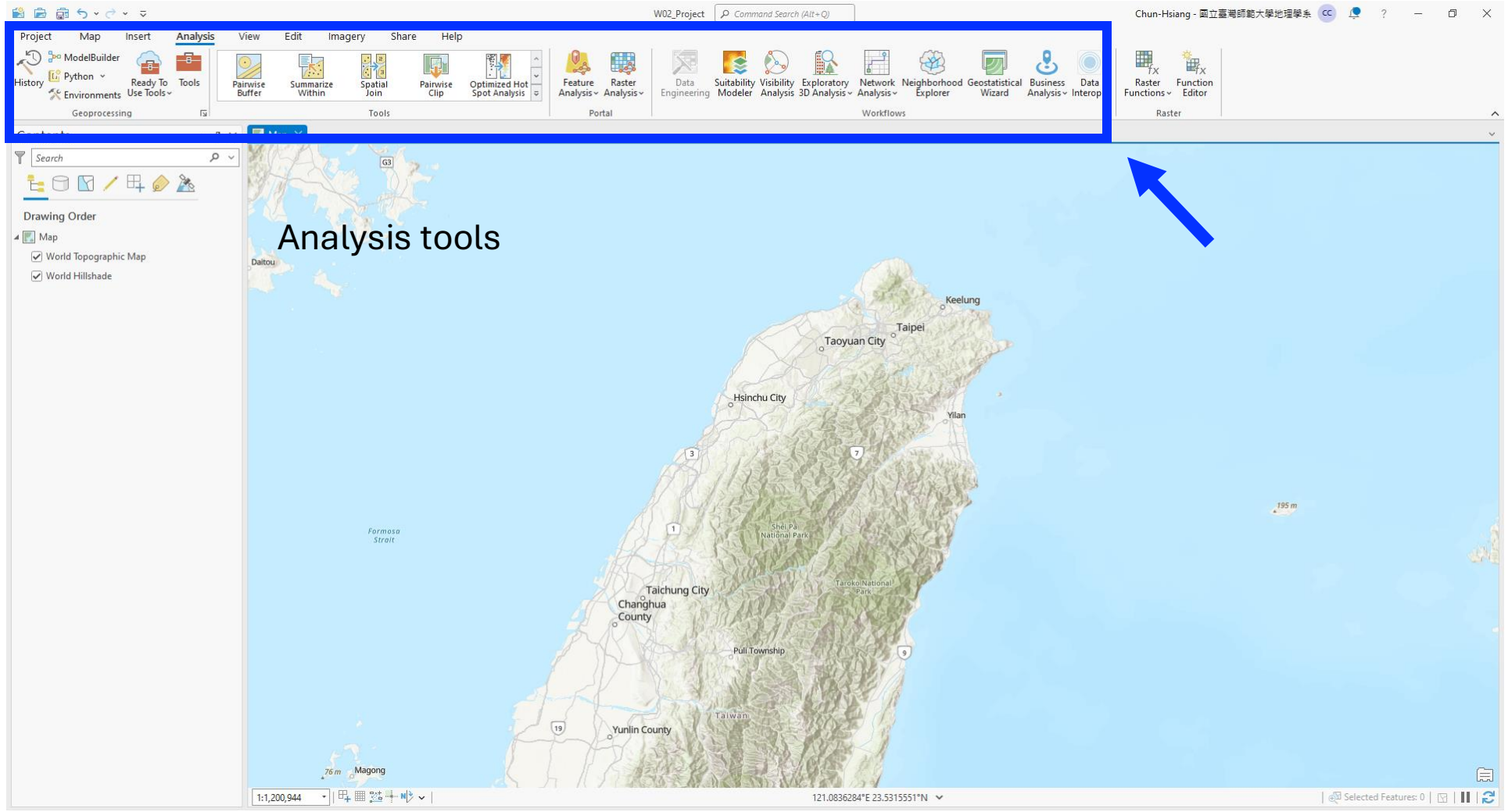

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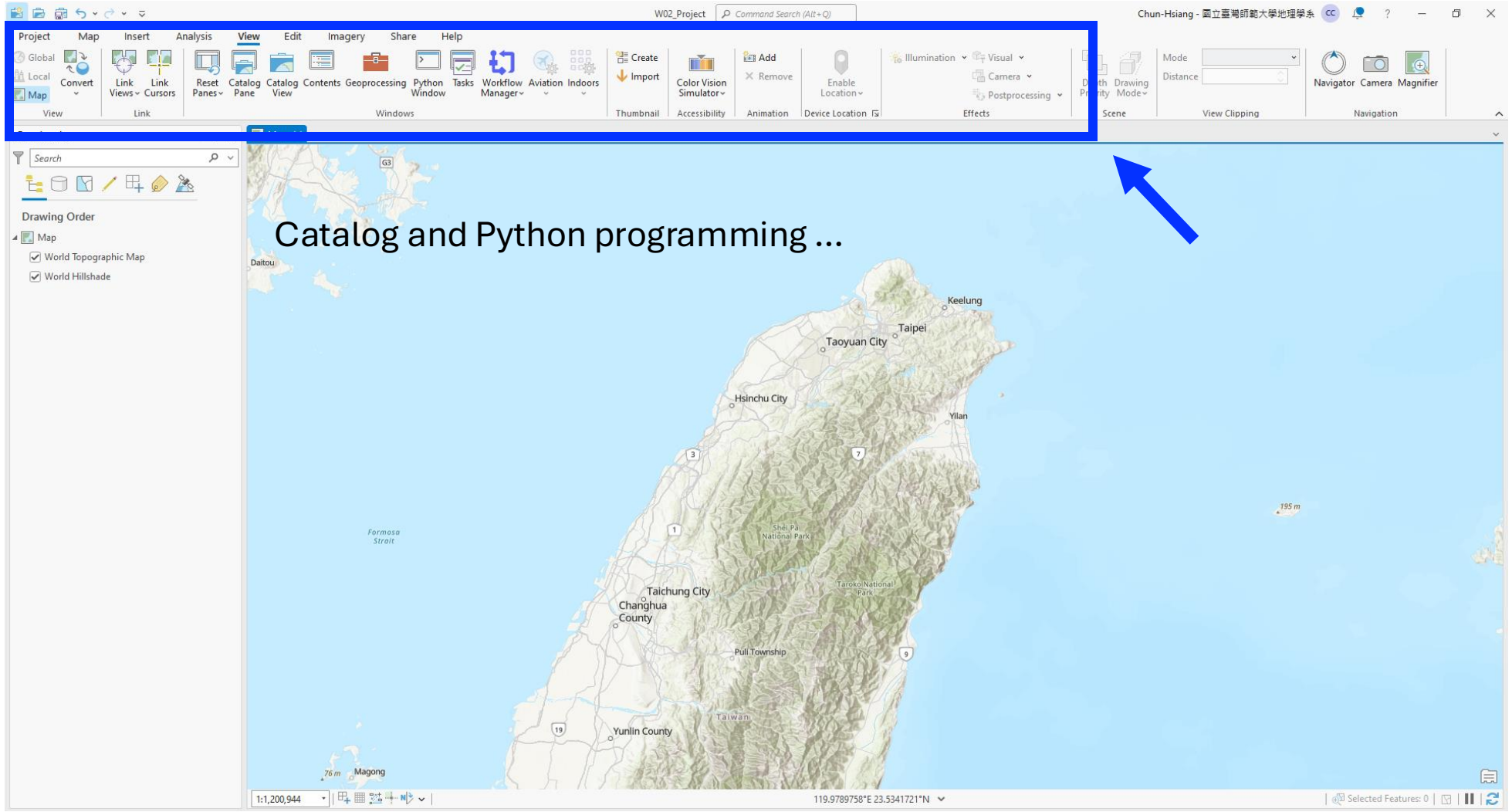

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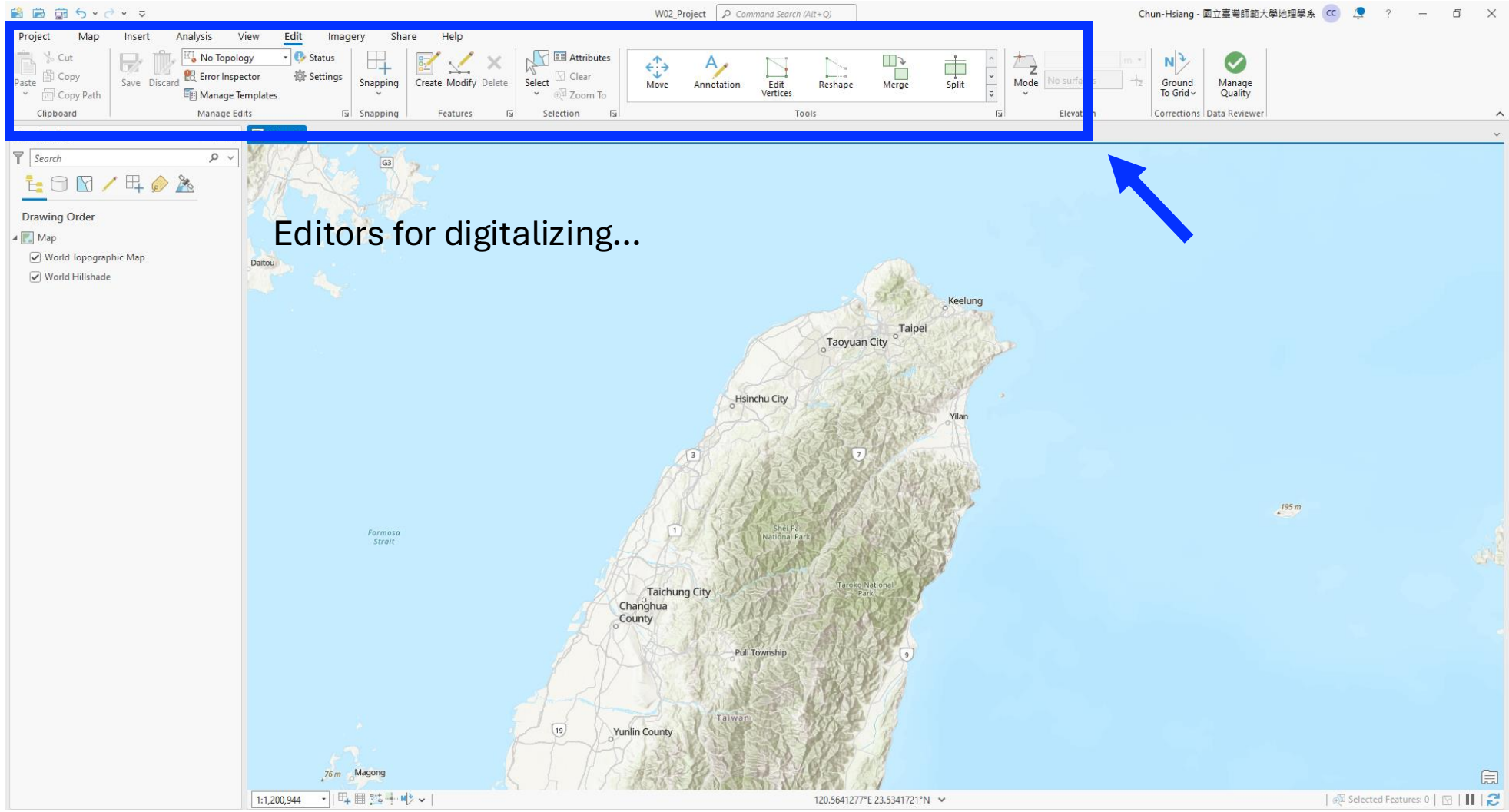

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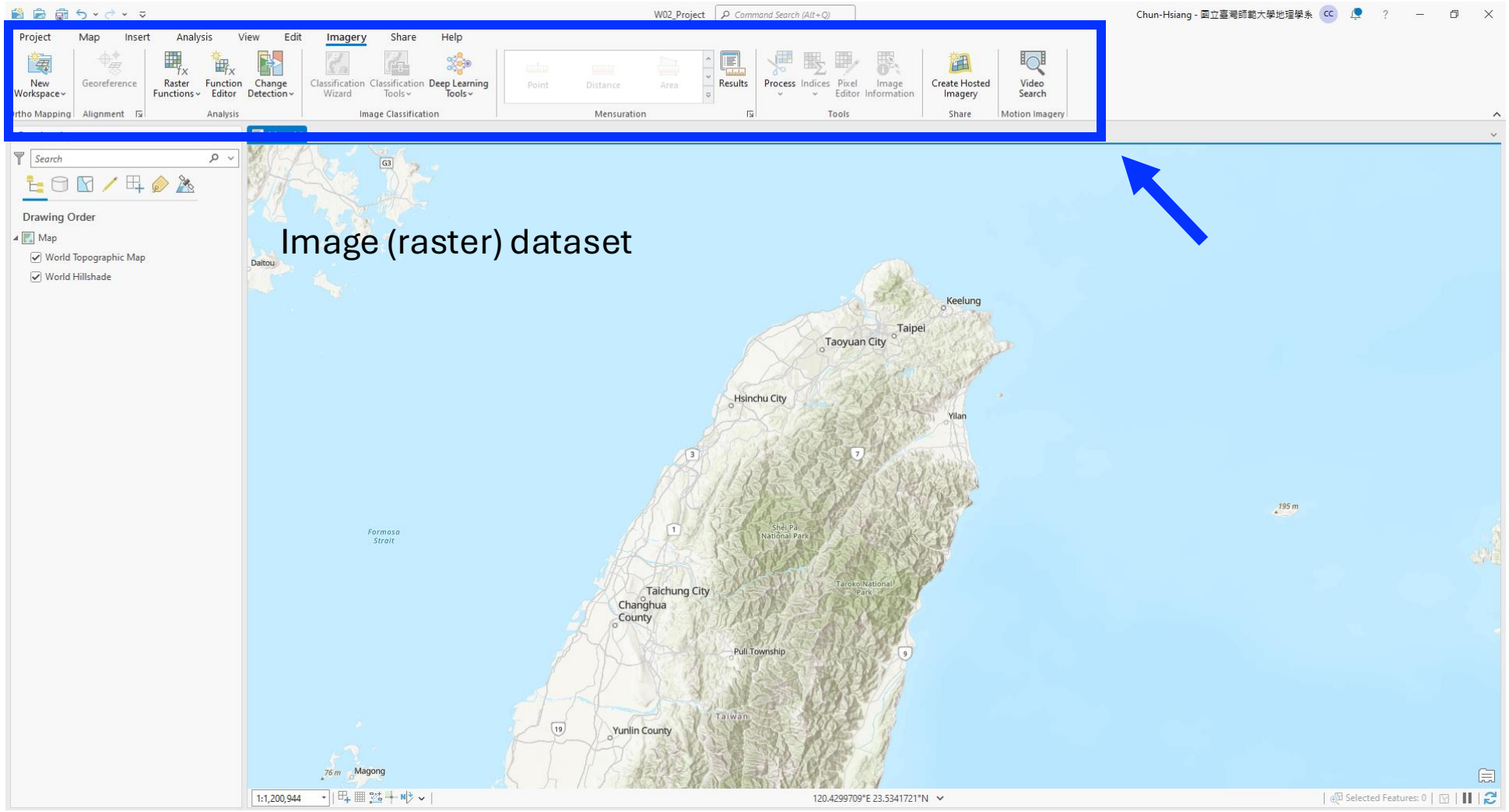

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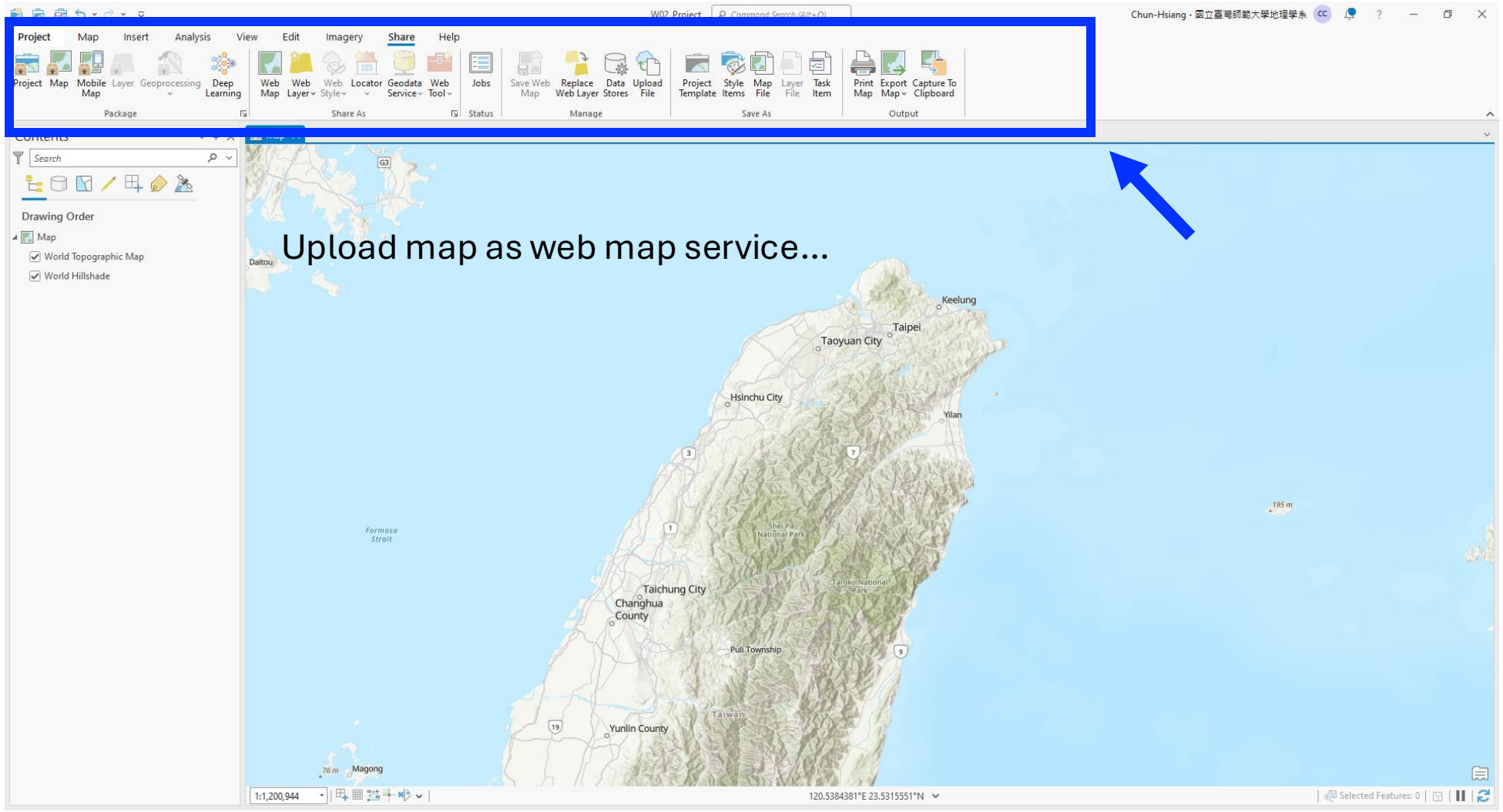

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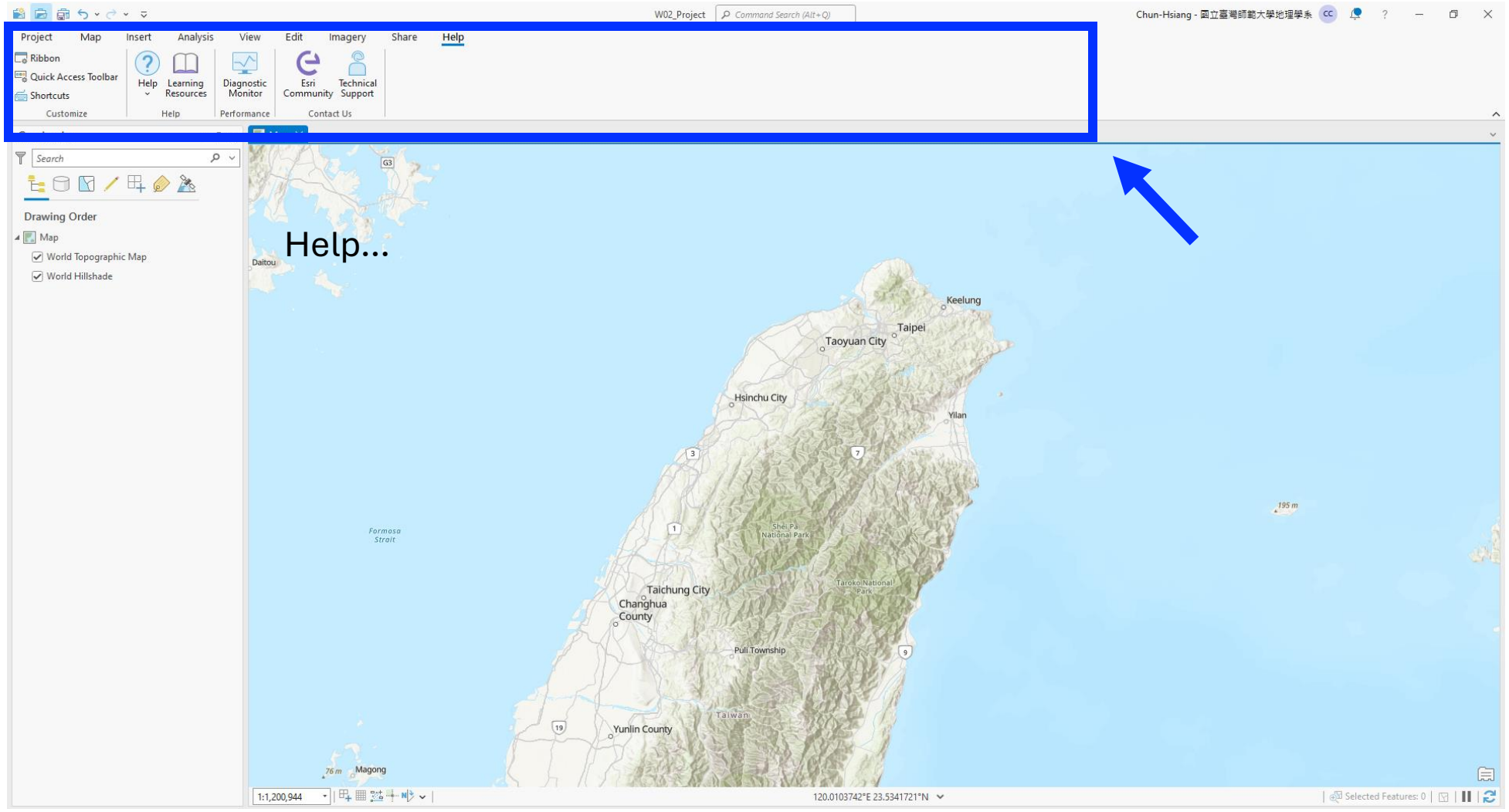

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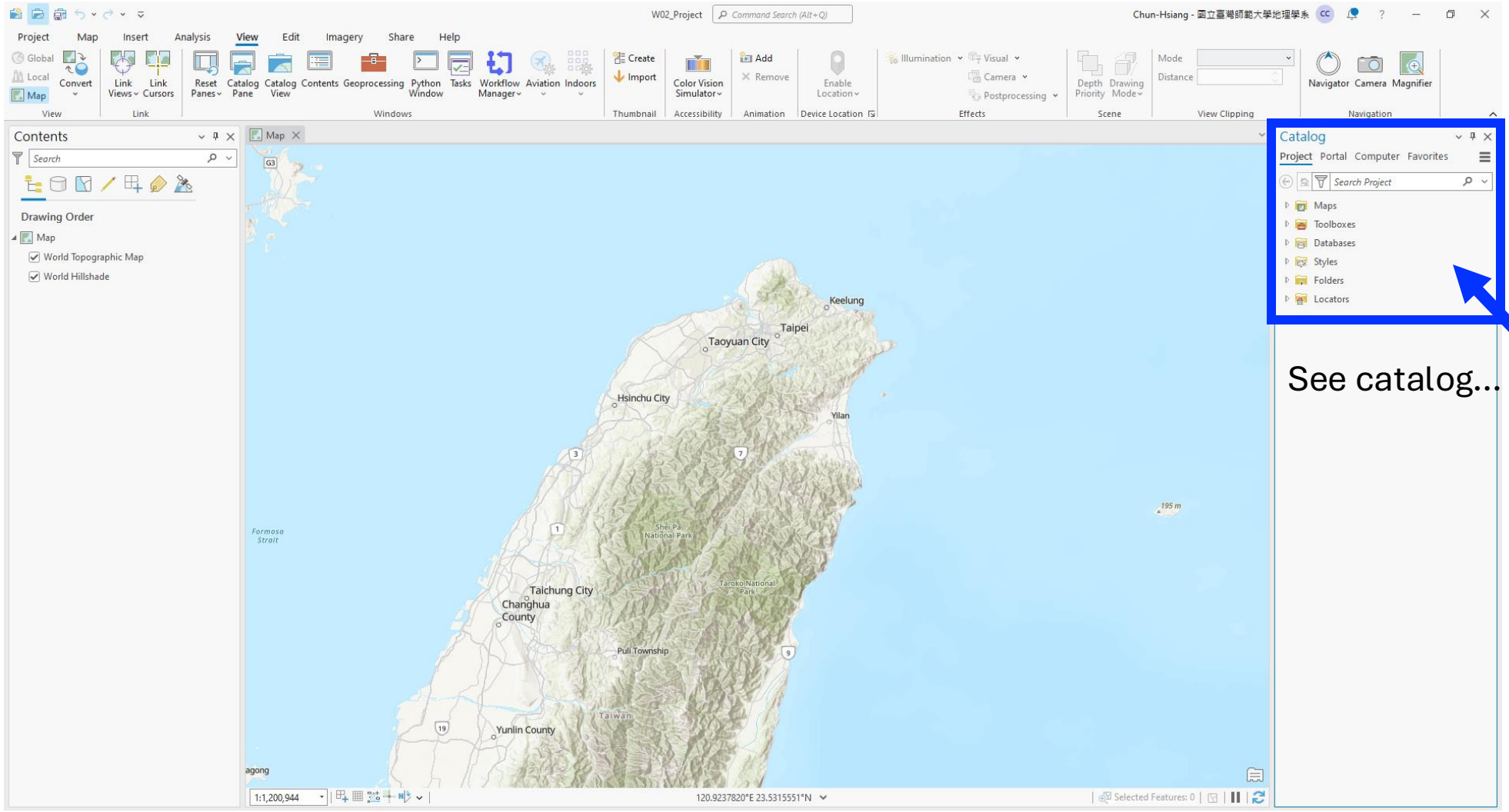

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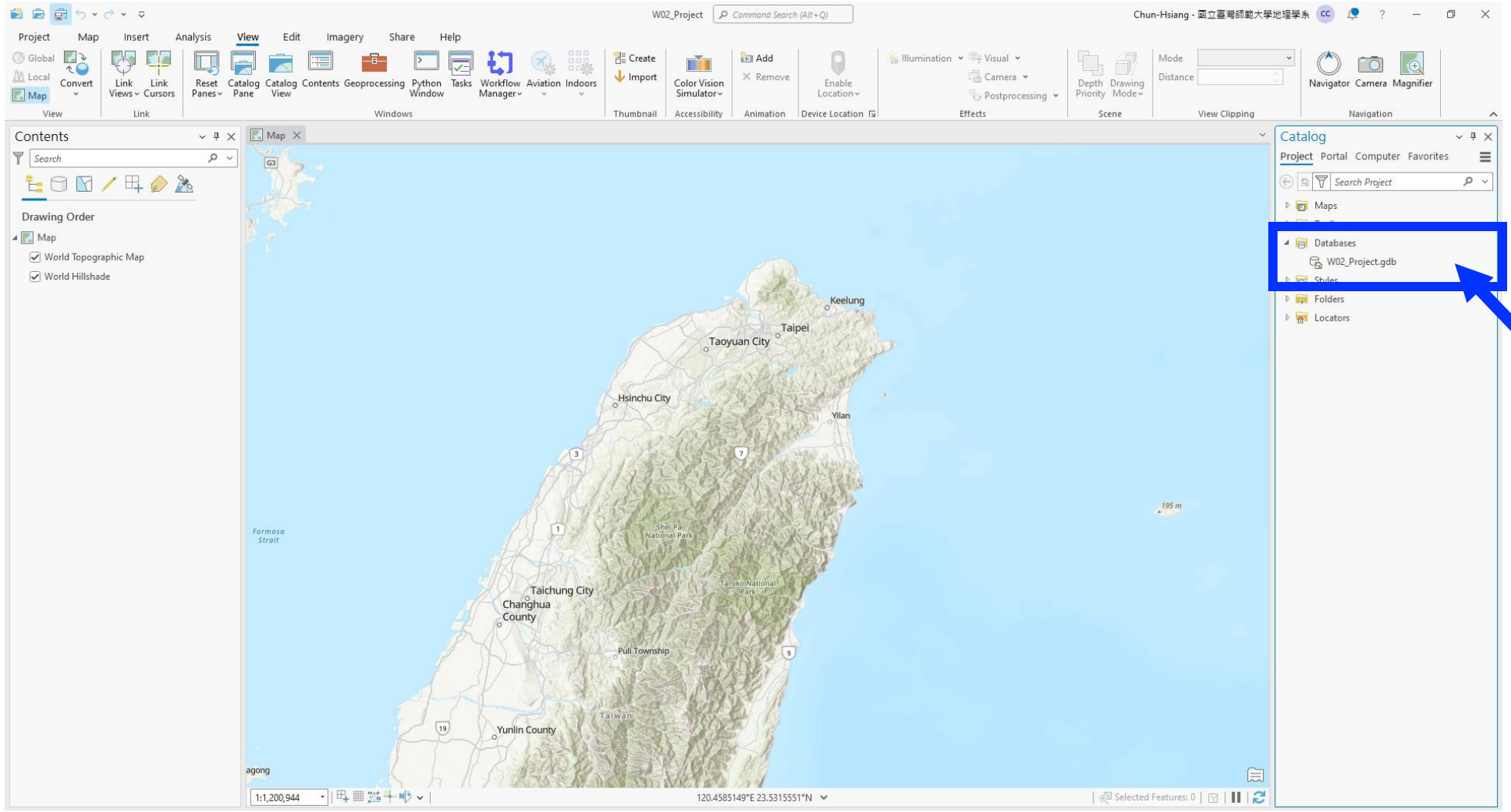

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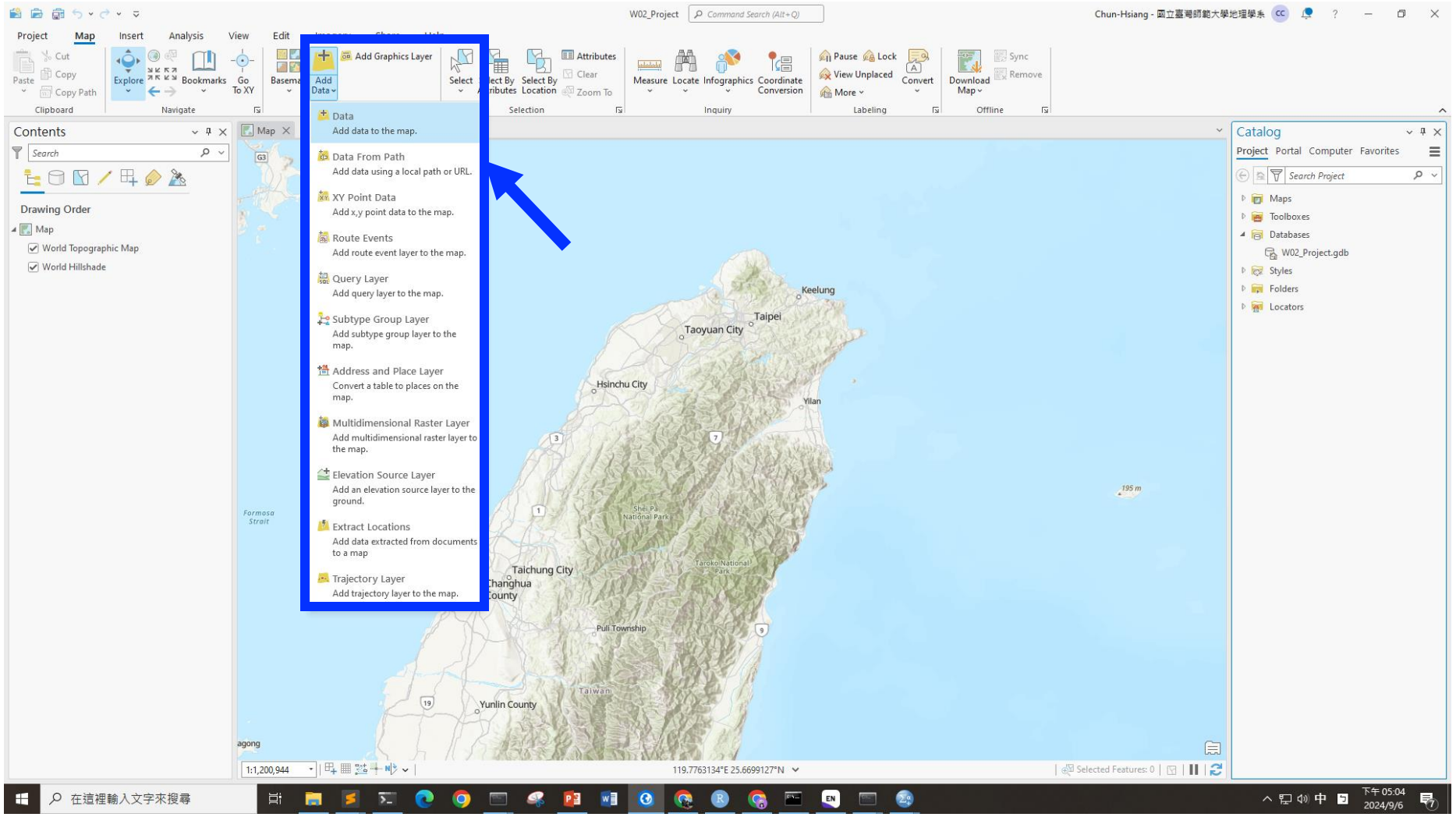

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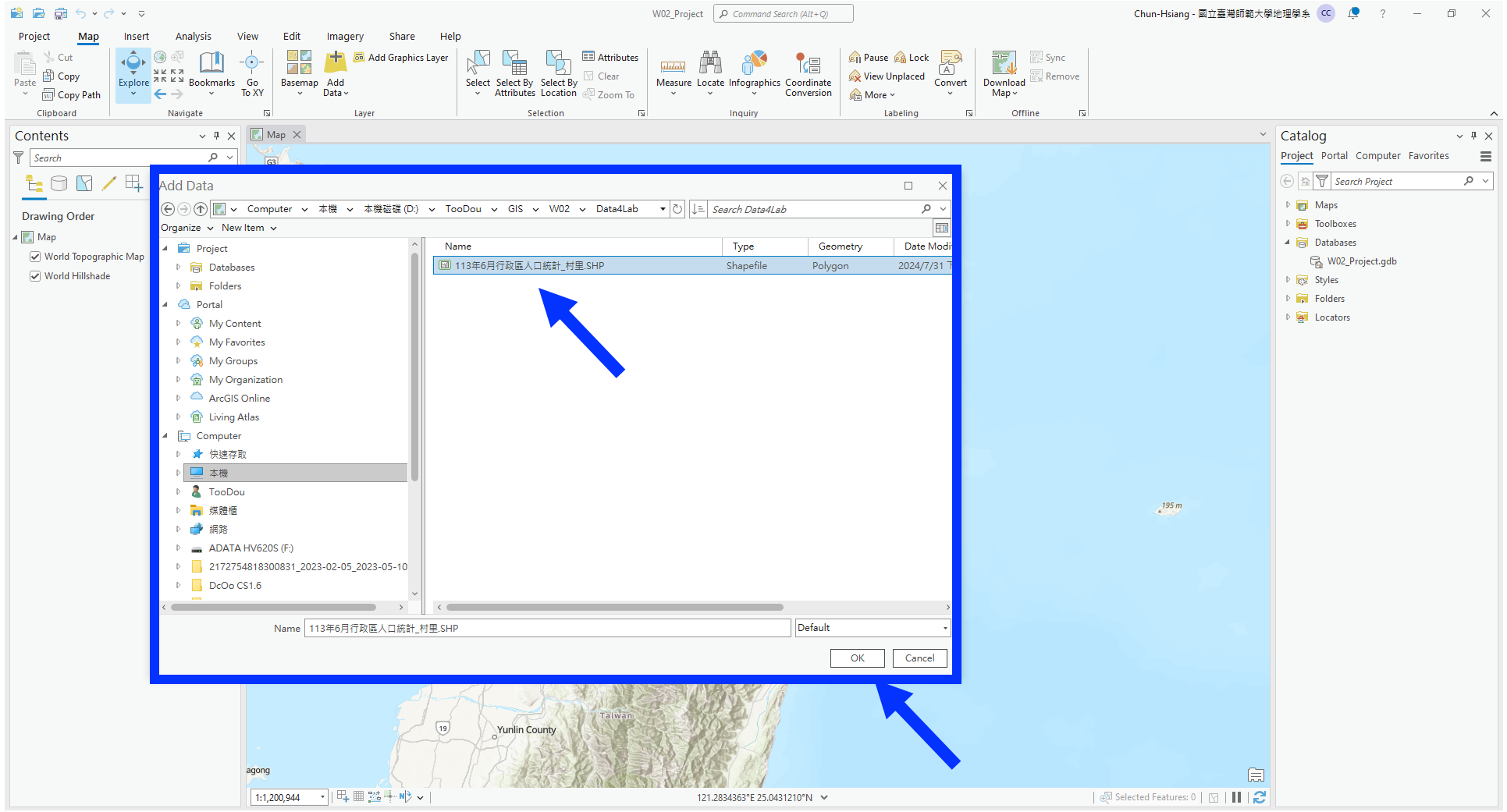

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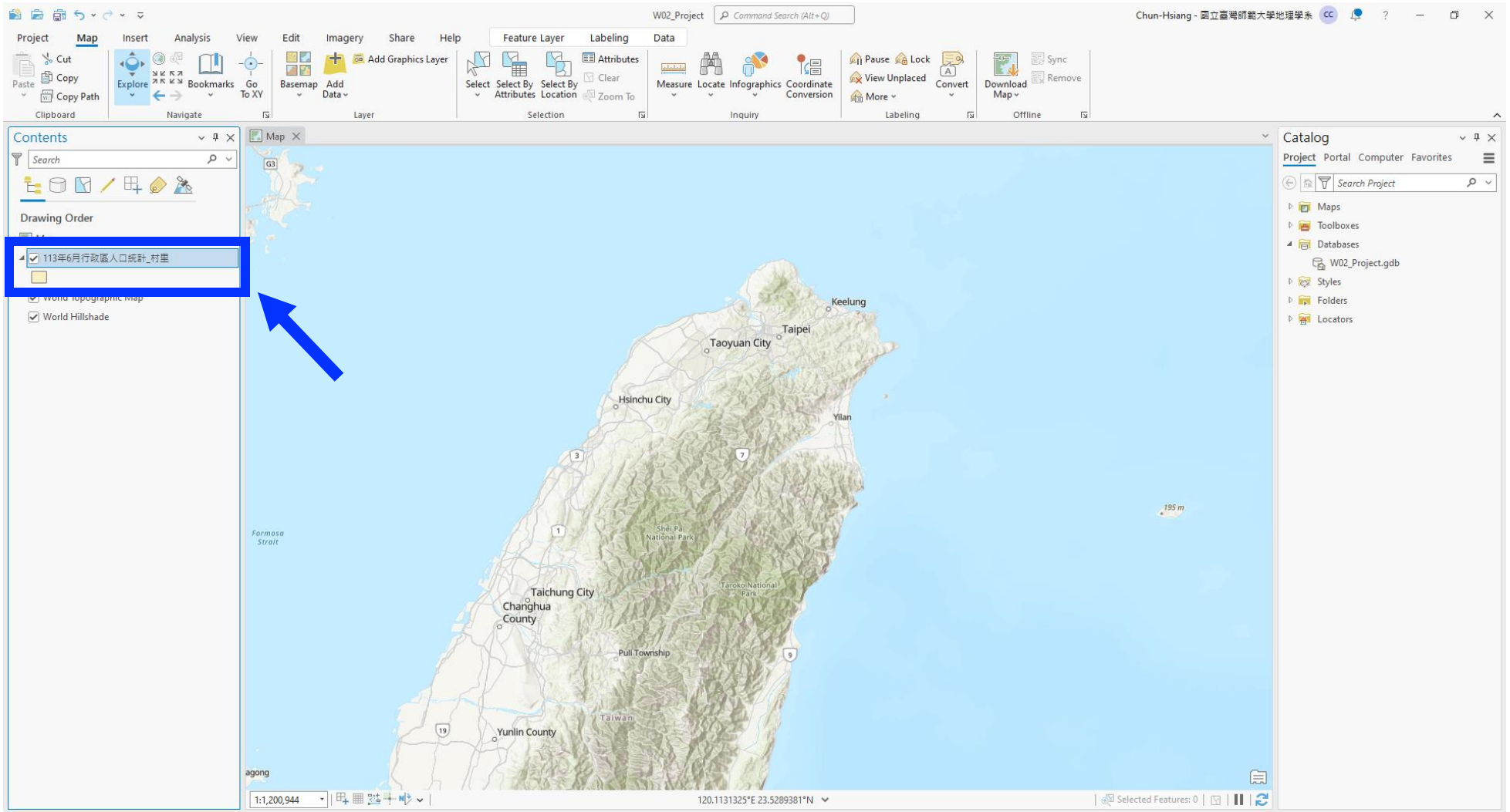

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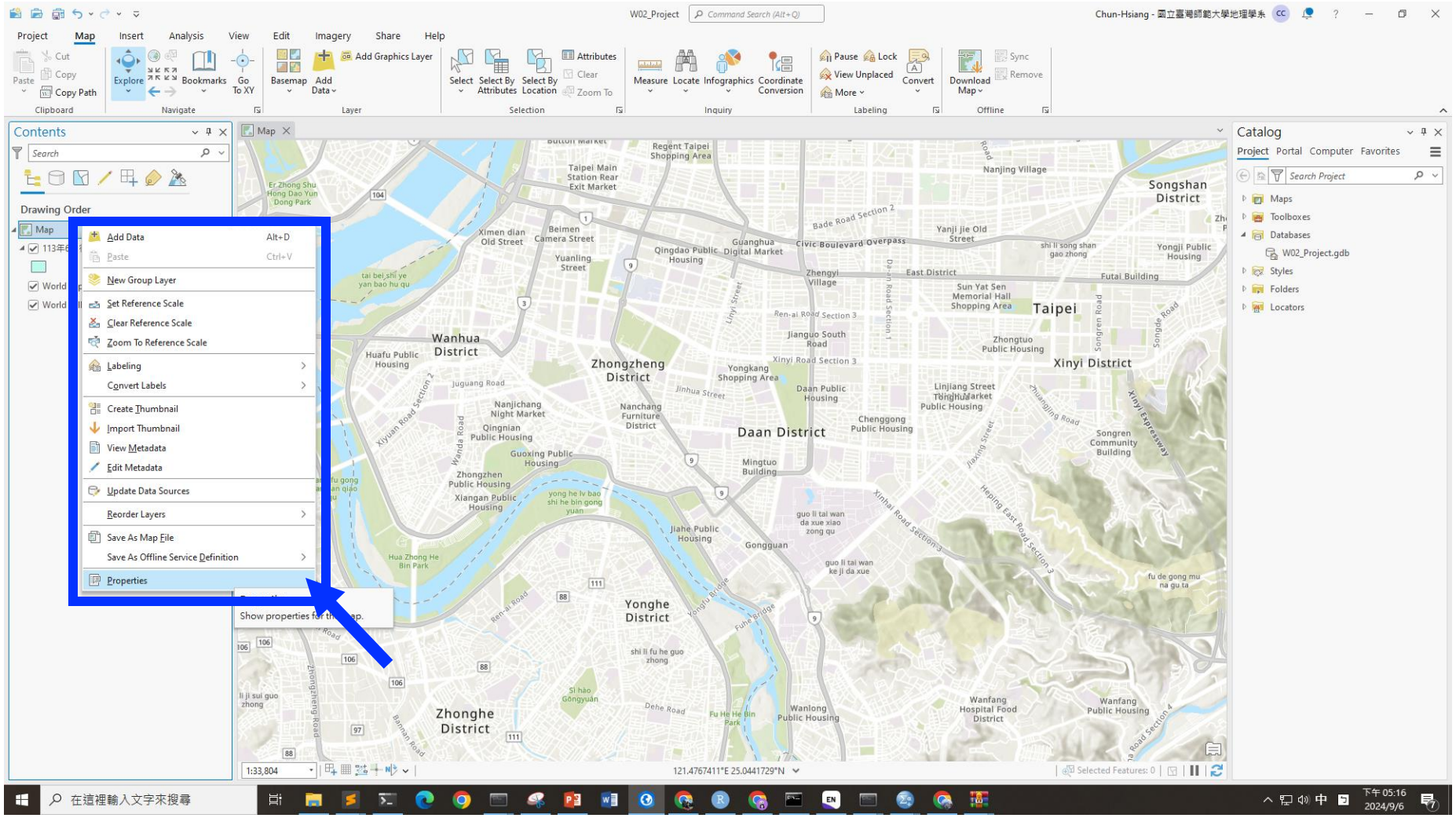

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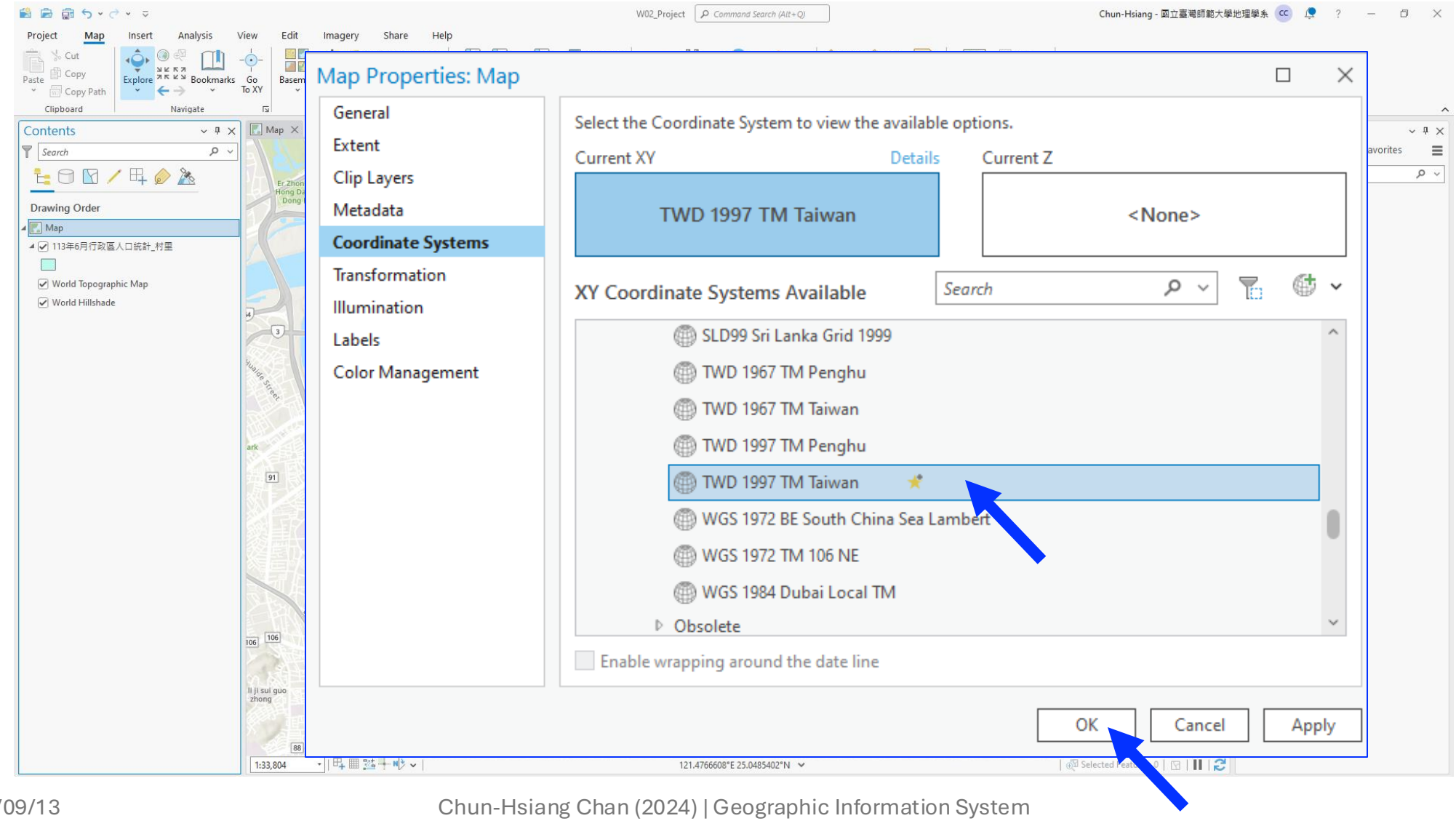

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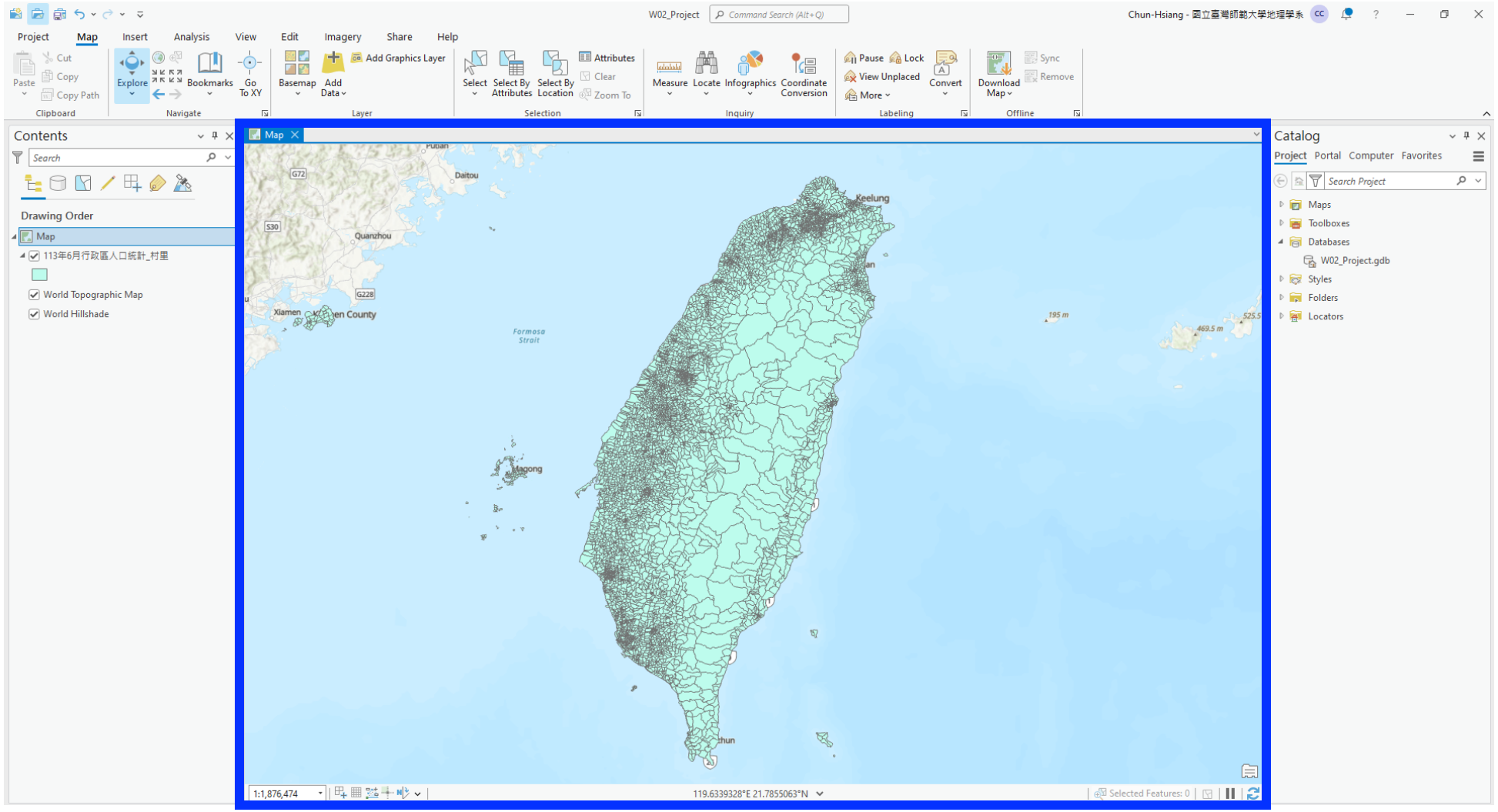

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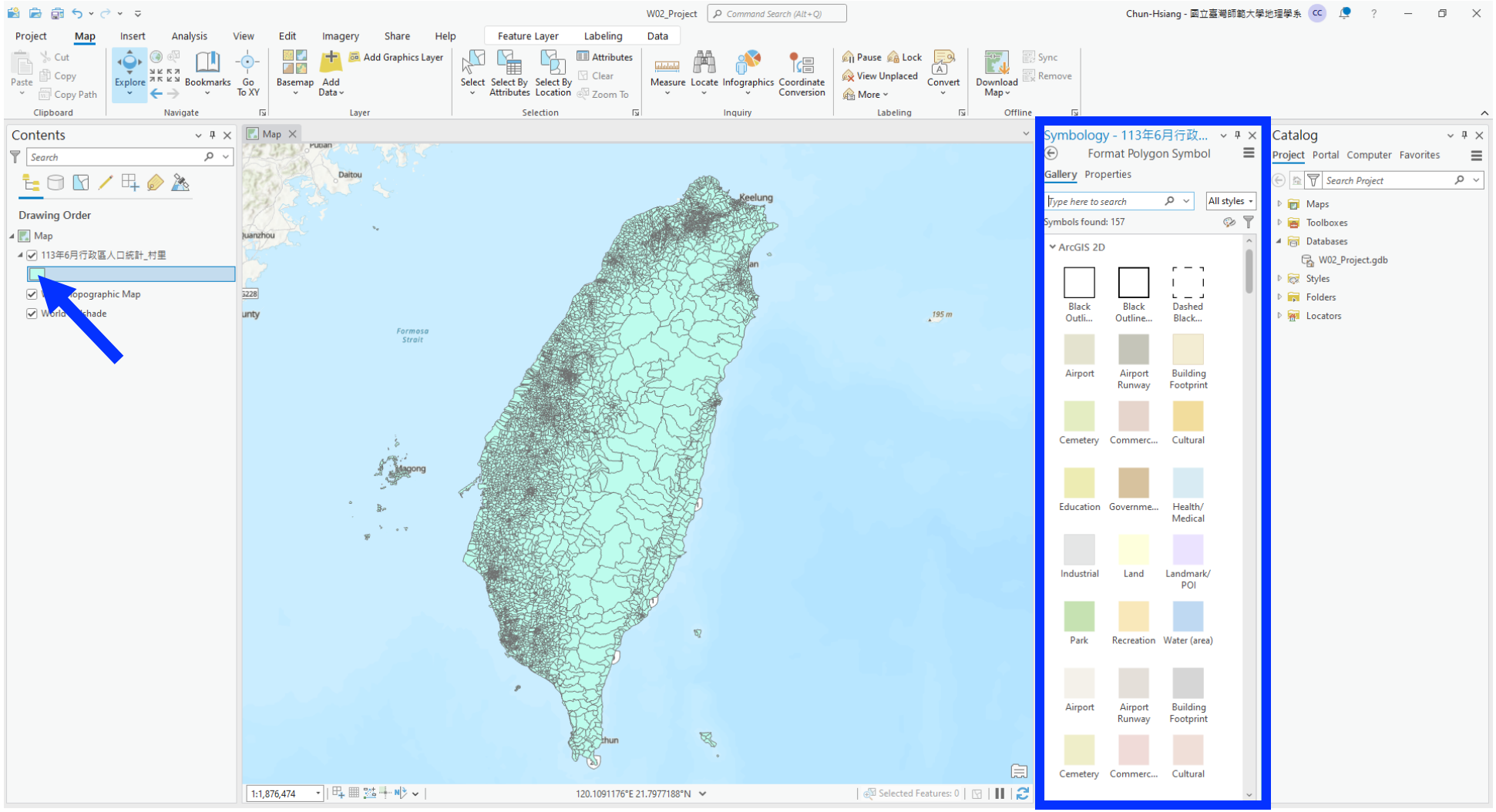

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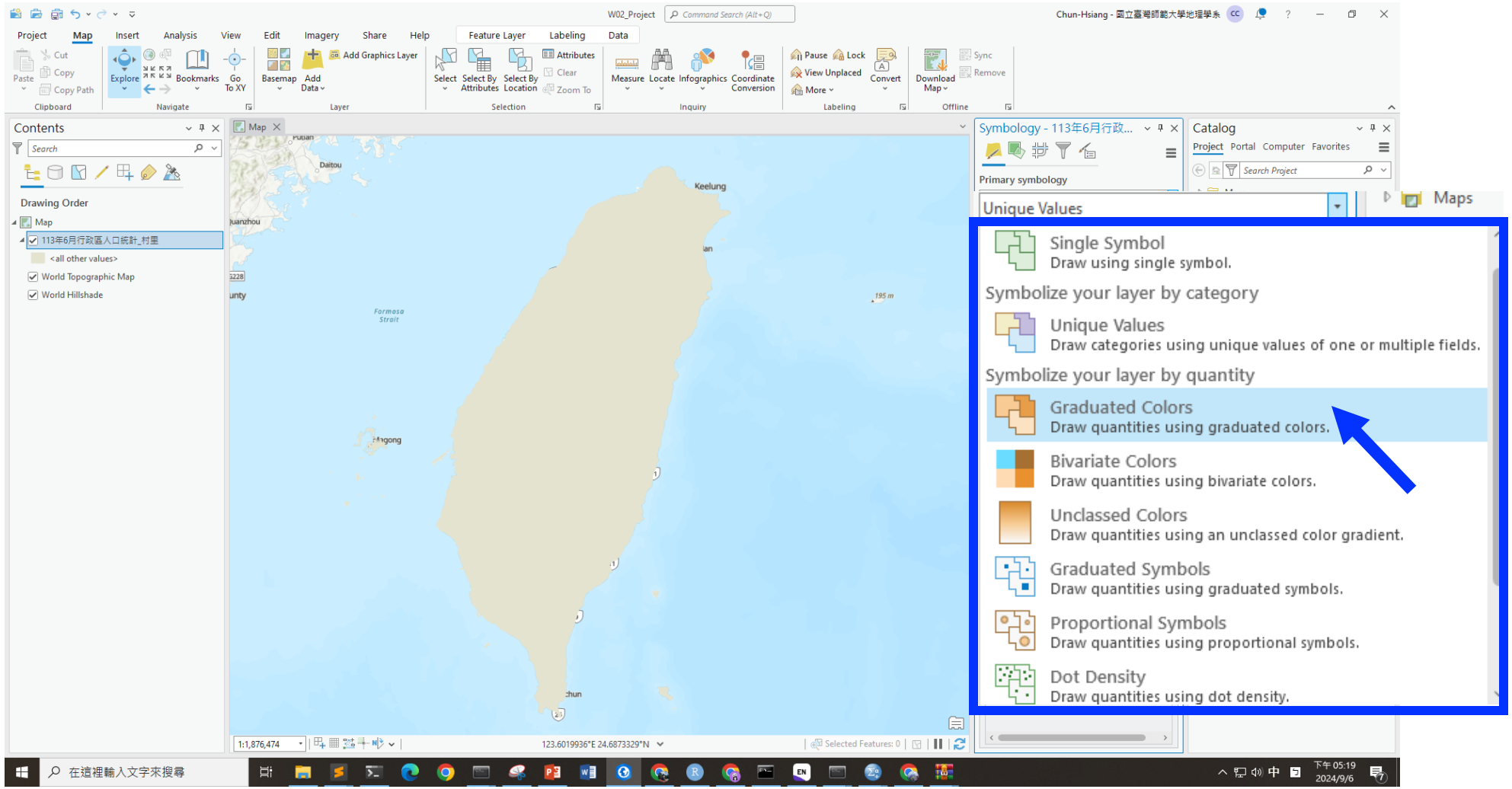

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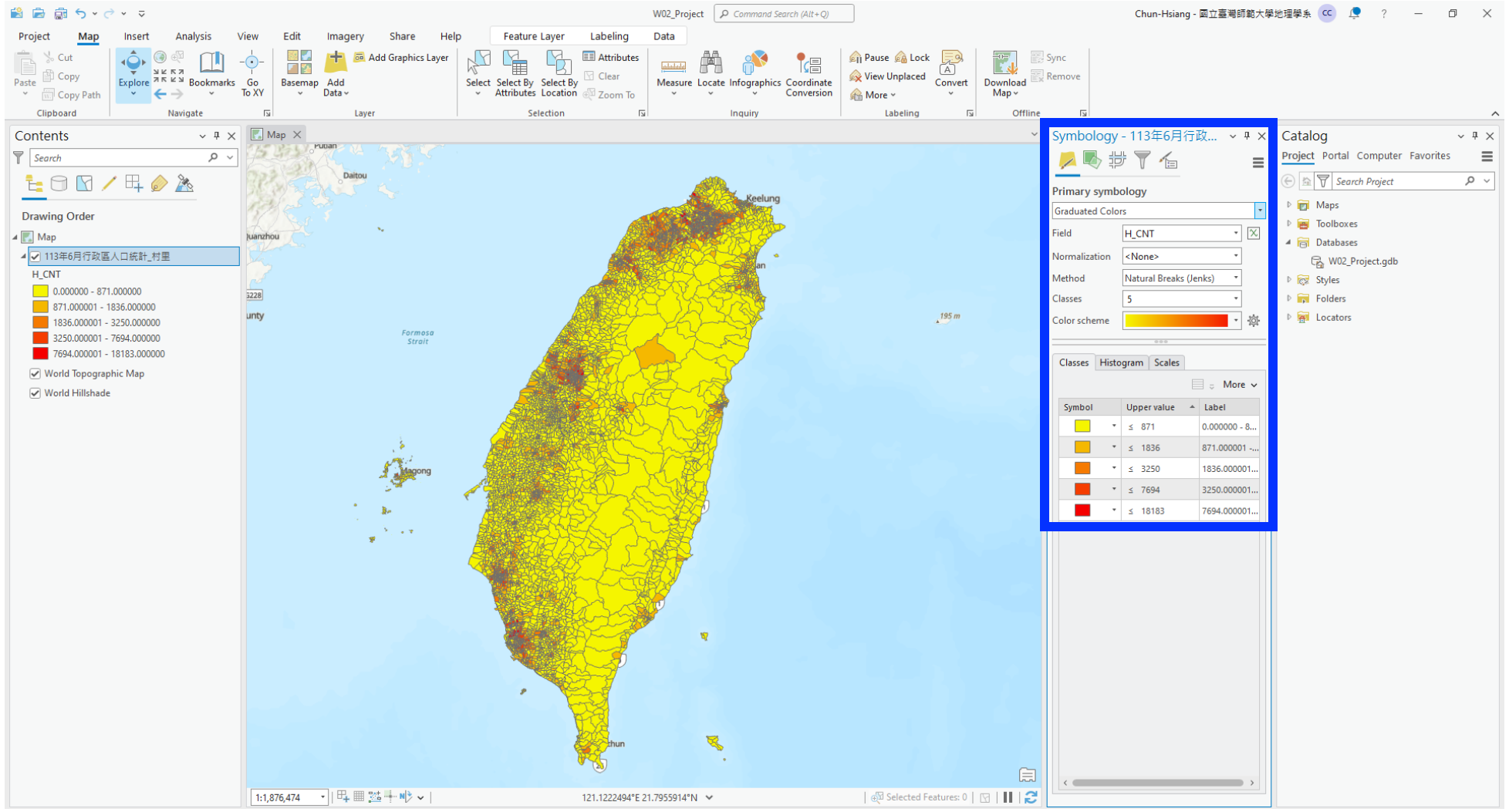

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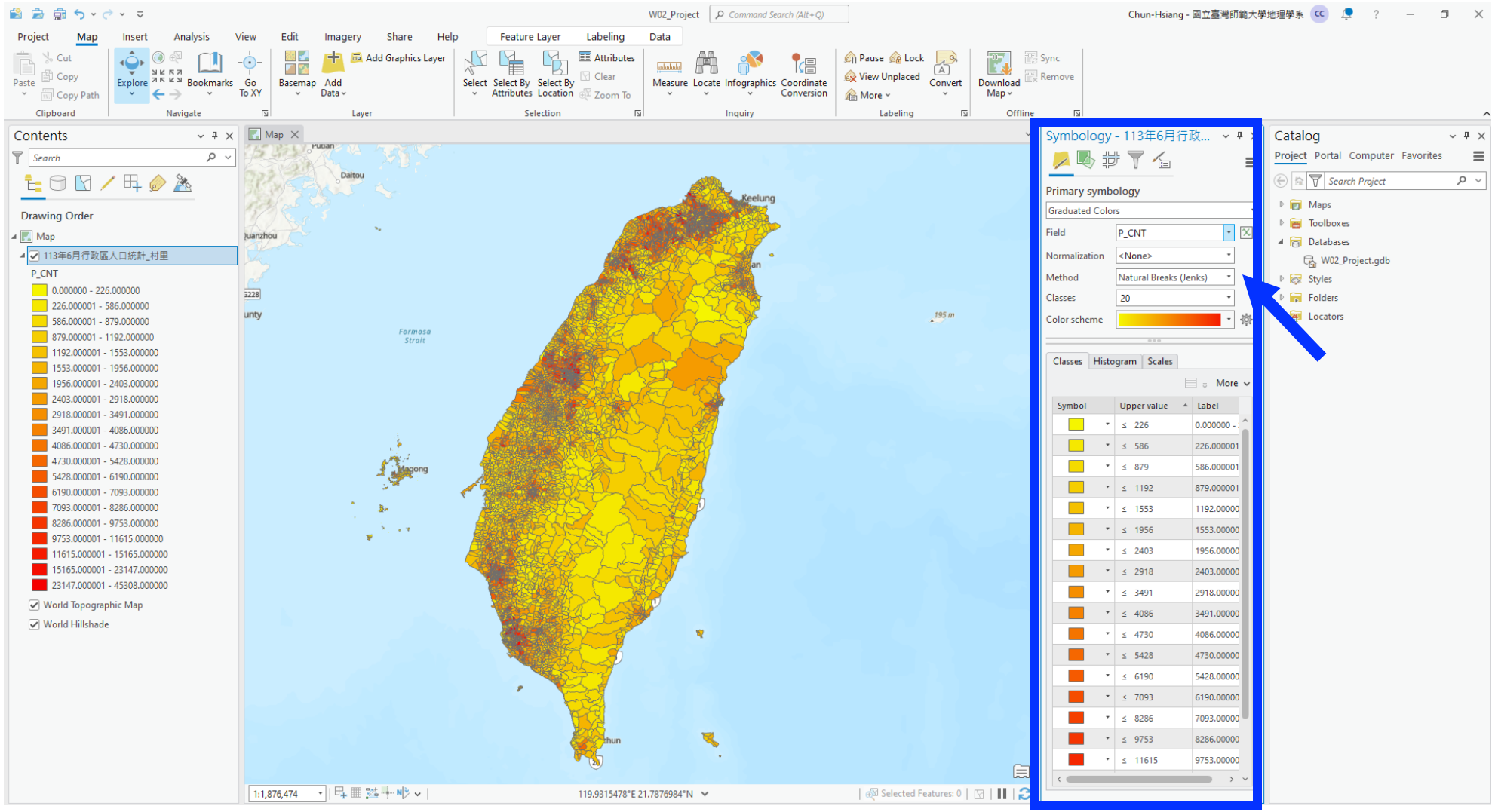

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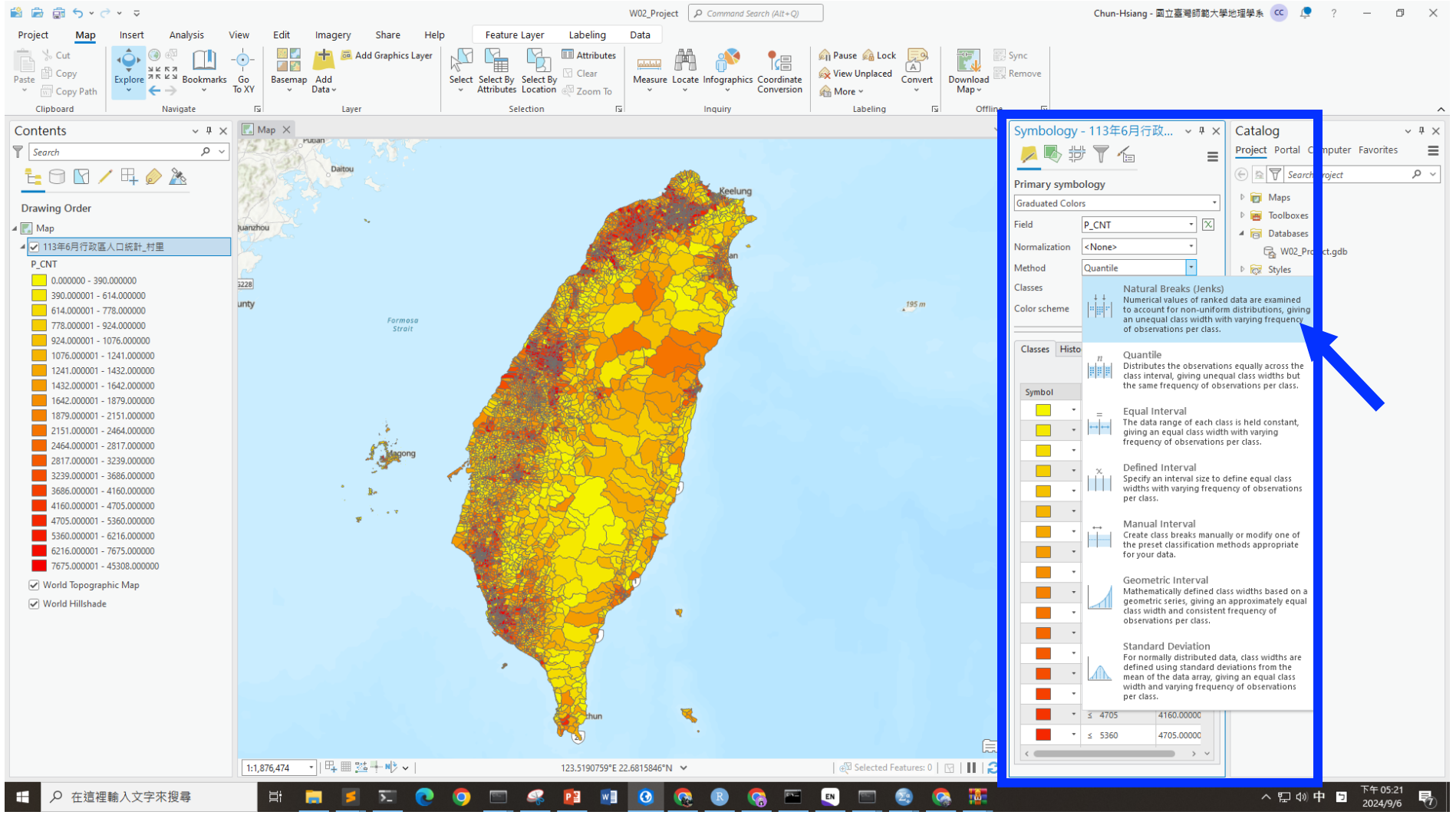

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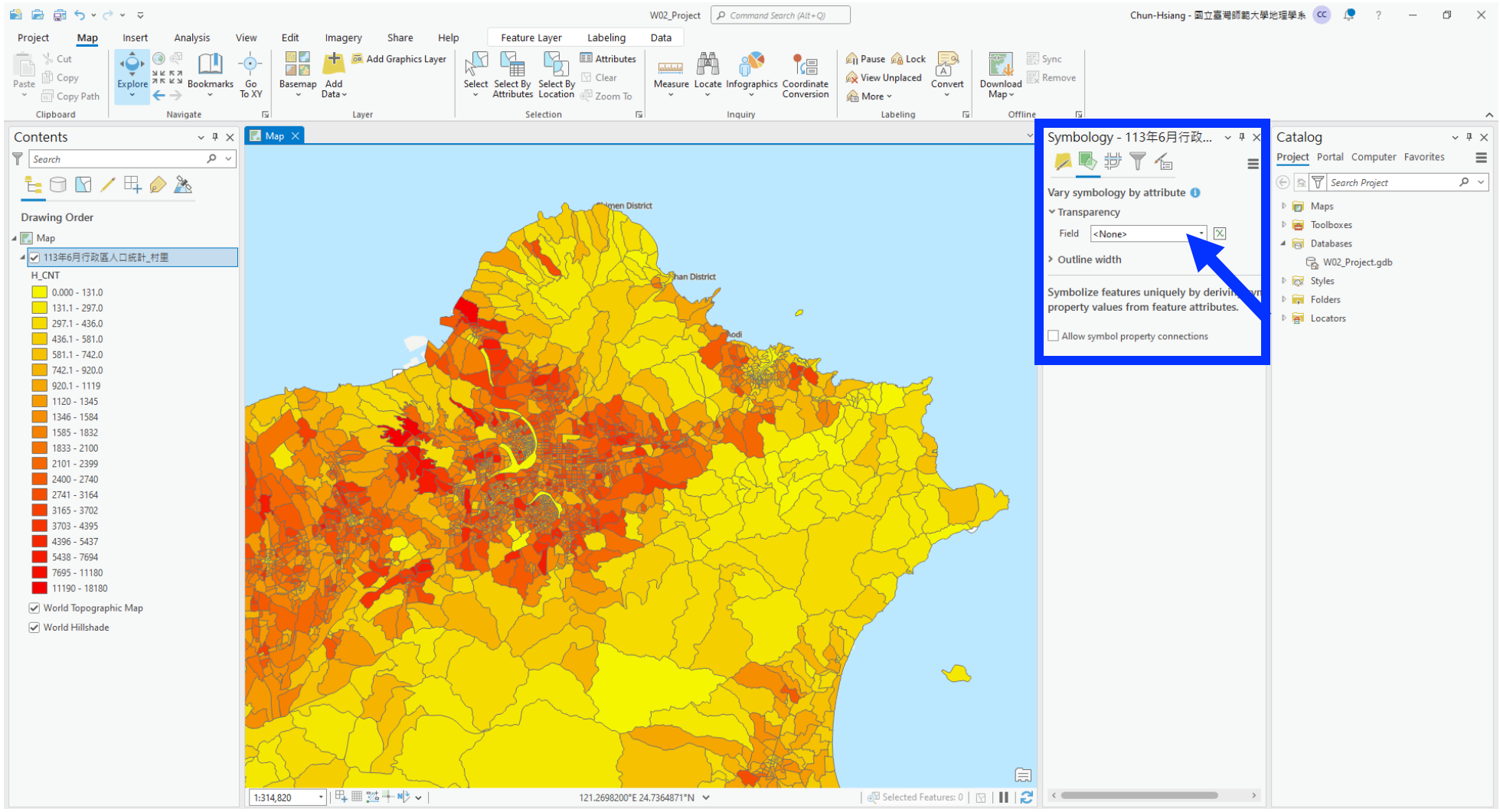

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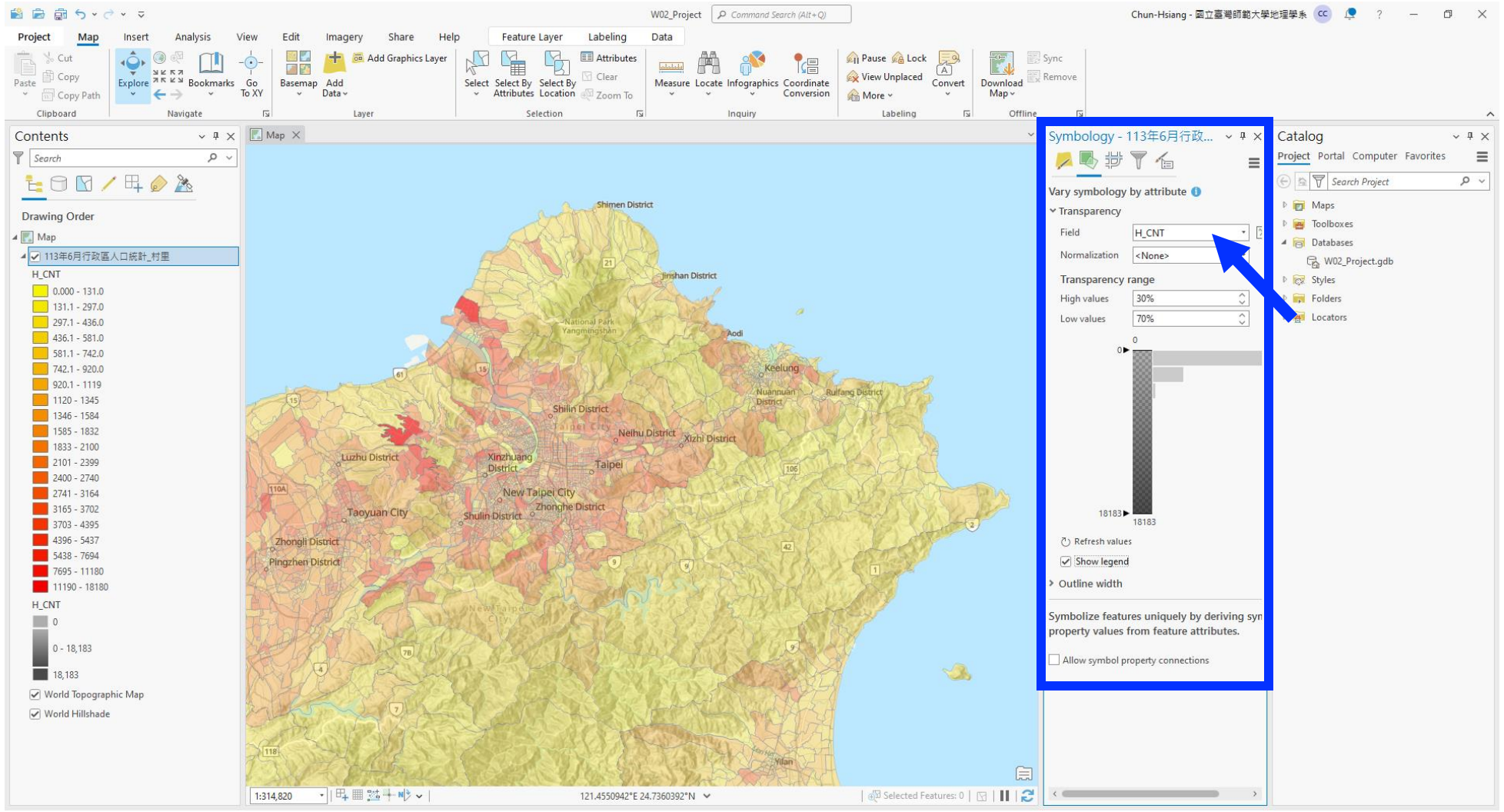

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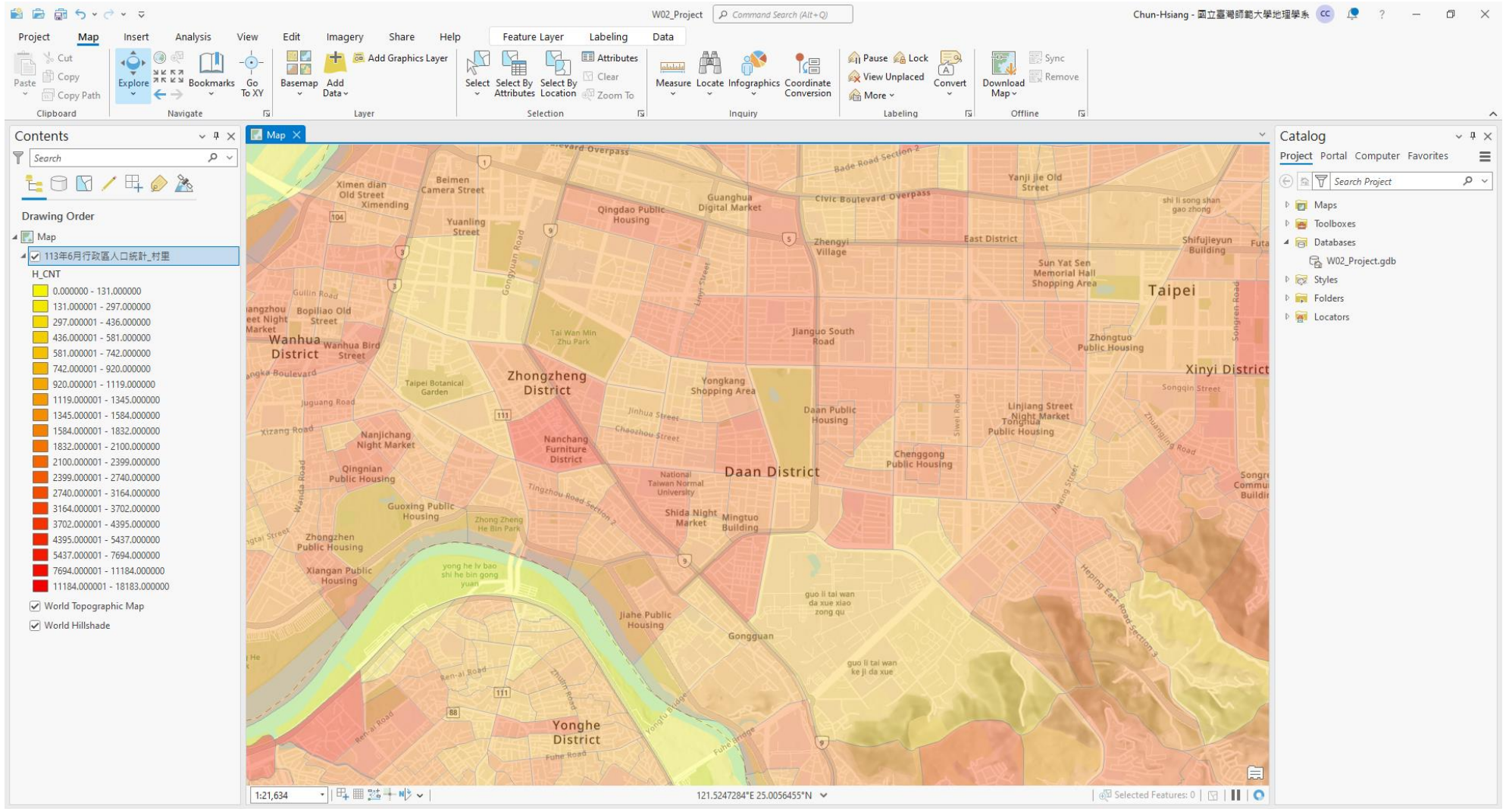

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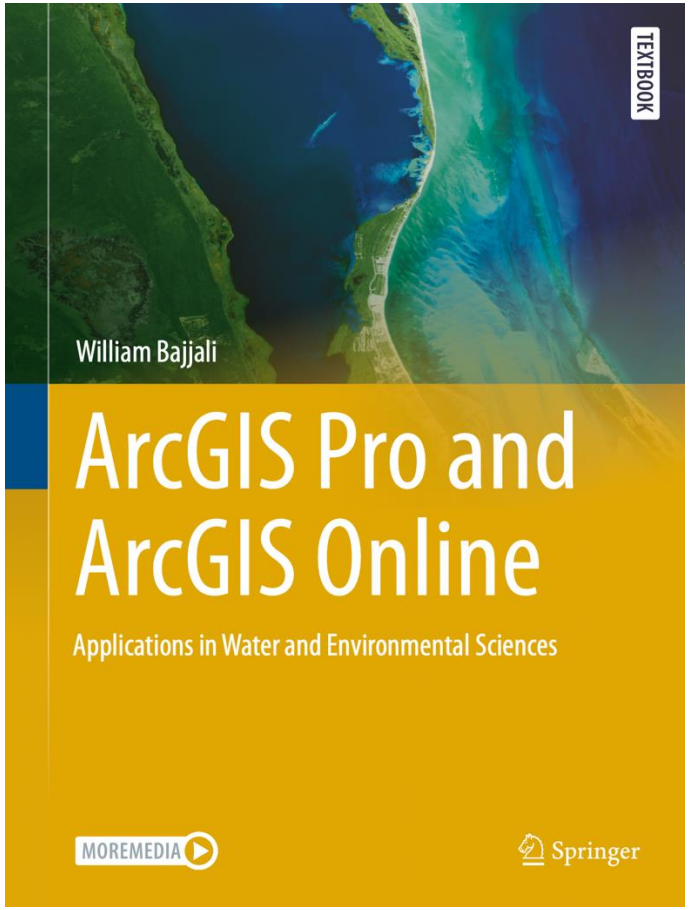

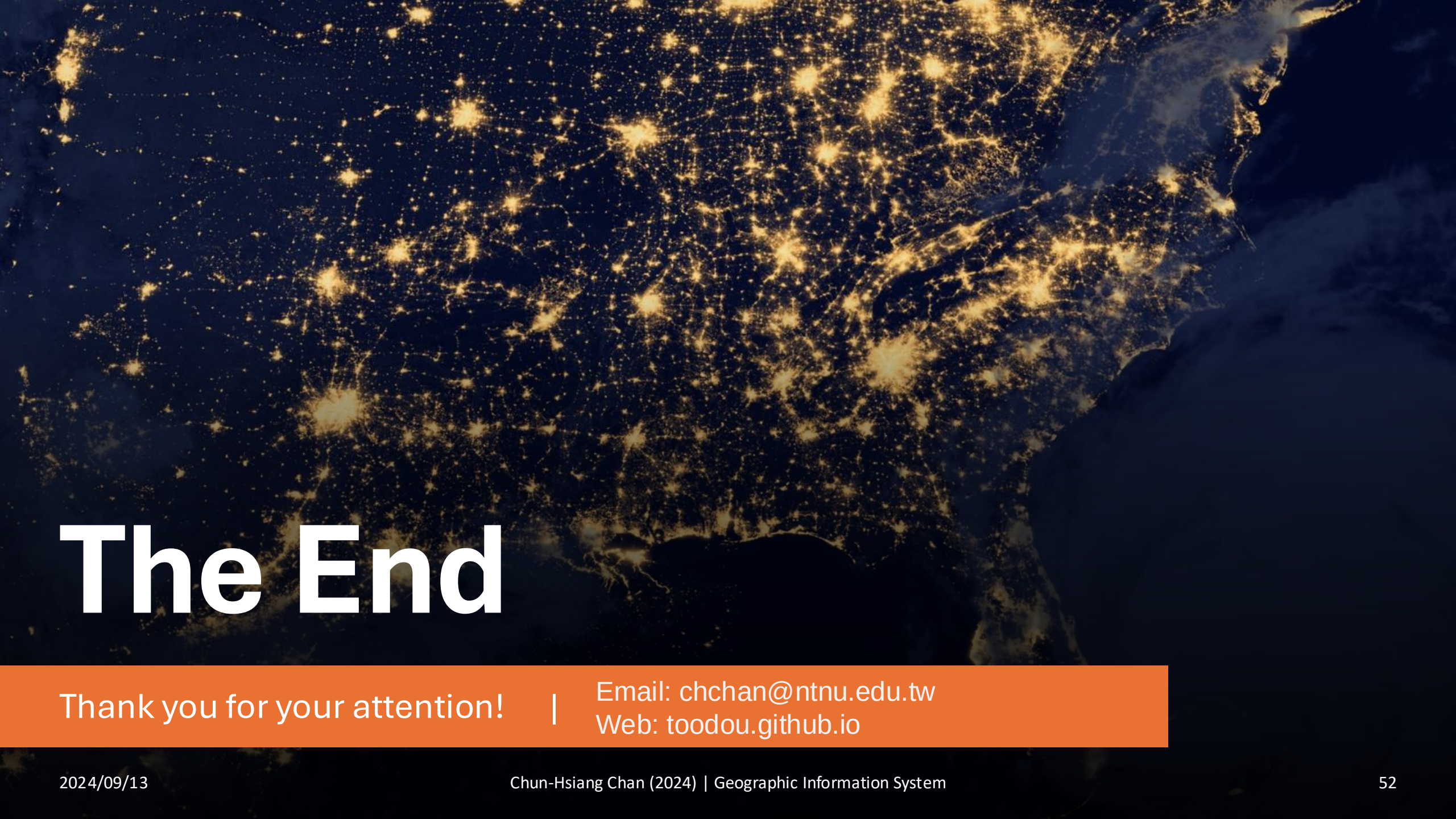

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Thank you for your attention! |

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