中華歷史地理資訊系統的建立與應用

—中央研究院 Academia Sinica—
Background

• Temporal and spatial attributes of people, events, and objects
  Spatio-temporal coordinates

• Traditional methods and tools have their limits in integrating temporal and spatial attributes
Ideas

• Manage spatial attributes
  Time-Space
  Past-Present

• Create visual effects

• Construct a system environment which suits human cognitive model
Methods

• Establish a Web-GIS environment by integrating GIS (Geographic Information System) and internet technology

• Integrate maps and remote sensing (aerial and satellite) images

• Construct Historical GIS
Accomplishments

Two virtual spatiotemporal infrastructure:

Chinese Civilization in Time and Space, CCTS

Taiwan History and Culture in Time and Space, THCTS
Chinese Civilization in Time and Space, CCTS

- Overlay Dr. Tan’s《The Historical Atlas of China》and《Arc/China》(1:1,000,000) and construct a spatio-temporal framework of more than two thousands years.
Taiwan History and Culture in Time and Space, THCTS

- 《Atlas of the historic administrative pau division of Taiwan》 (1904), 《Atlas of the topography of Taiwan during the period of Japanese rule》 (1920) and the newly published “Topography of Taiwan” and remote sensing images, constitute the main body of base maps. These base maps cover four different periods of Taiwan history: the “Dutch and Spanish Period”, the “Chengs’ Dynasty”, the “Qing Dynasty”, the “Japanese Colonized Period” and After WW II.

[Images of maps and user interface]
Applications

• Integrate Academic Resource
• Facilitate Thematic Research
• Promote Knowledge dissemination
Integrate Academic Resource

- Literature database
- Statistical database
- Image database
Literature Database

- “Scripta Sinica”
- “Bibliography of Chinese Local Gazetteers”
- “Taiwan Research Network”
- “Taiwan Geographic Name Information System”
- 「臺灣總督府檔案資料庫」
Integration with “Scripta Sinica” in CCTS: Both new and historical place names on the digital map can be linked to many databases, which contain related articles and bibliography in literature.
Integration of place names with digitized literature database in THCTS:
Statistic Database

- “Grain Price and Population in Qing”
- “Taiwan Population Statistics in early Japanese Colonized Period”
The application of CCTS in the analysis of “Price Trends and Population Distribution in Qing Dynasty”: visualizes statistic data and helps analyzing traditional economic pattern.
We established a precise administrative boundary of Japanese Colonial Period by digitizing historic maps. Also, by integrating various kinds of statistic data (e.g. population, industry...) with maps, we produced choropleth maps depicting various socio-economic characteristics. The example shows the distribution of population density of northern Taiwan in 1901.
Image Database

- China and Taiwan Map Database
- China and Taiwan Remote Sensing Image Database
Overlaying different types of spatial data (e.g. maps, satellite images, and aerial photos) would help researchers understand the environment of a place. The map below shows an overlay of Shanghai map and Landsat pseudo-color satellite image.
THCTS contains rich spatial data. Overlaying spatial data of different types and time periods facilitates analysis and comparison of information. The map below shows the seacoast transformation of Tainan area in the 17th and 18th century.
Ying Dynasty Relic

Ancient City of Shang Dynasty

Aerial Photo (1962)

Satellite Image (2001)
Facilitate Thematic Research

• Innovate research methods
• Integrated research resources
• Develop historical Geographic Information System
The Dispersal of the Formosan Aborigines in Taiwan

詳細說明請參見 周立安：《臺灣原住民與漢移民》（1990）
In geographic names database, historical names can be marked-up. In the project of “Mapping the Journeys of the Song-dynasty Poet Su Dongpo”, researchers used geographic names database in CCTS to map Su’s travel route. By tracing his journey, researchers can look into the spatio-temporal background of Su’s literature.
「A Travel Log Across the Sea」 records Yu’s journey across the Taiwan Strait from mainland to the island of Taiwan during the Kangxi reign. The journal provides detailed accounts of geographic locations of the towns visited, as well as the contemporary human landscape and ecological environment of Taiwan.
The system identifies place names and features of old maps on modern maps based on current research results. Researchers are therefore able to overlap multi-period data and reinforce the confirmation and analysis of the researches via dynamic linkage between spatial-related documents and verification information.
Map of Fu-kien and Taiwan area marine routes

‘Map of Fu-kien and Taiwan area marine routes’ combines the various marine routes based on compass records during the Sung and Yuan dynasty. It shows the most frequently used marine routes for transportation in the areas surrounding Fu-kien and Taiwan since the Sung dynasty. The Penghu archipelago had a dominant role in the marine-time history for its middle way location between mainland and Taiwan, and is also used as shelter during foul weather.
Promote Knowledge Dissemination

• Work for mutual communication and public participation
devvelop interactive Historical Geographic Information System

• Share resources with the public
Current elementary and junior high schools

Schools in Ching Dynasty and Japanese Colonial Period
Academic Exchange

• “Chinese Civilization in Time and Space” is now accessible by many academic institutions:
  - In Taiwan: National Taiwan University, National Taiwan Normal University and The Chung Hwa Institute of Buddhist Studies
  - Overseas: Princeton University, UC Berkeley, Columbia University, University of Pittsburgh

• “Taiwan History and Culture in Time and Space” is now open to the public through internet

• Support the National Digital Archives program
Academic Cooperation

- Library of Congress Map Collections
  - Historical Map of Taiwan, 1845
  - Historical Map of China, 1723
Prospects

• Virtual Center of Sinology Studies

• Open Lab for China and Taiwan Studies

• Enhance the recognition of environment, history and culture. Promote the harmonic development between man and land.
Thank you for your attention!