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The HKUST Ancient Map of China Collection – the next step: from digital images to GIS and datamining

Dr Marco CABOARA, Digital Scholarship & Archives Manager, The Hong Kong University of Science and Technology Library, HK

Introduction

In the early 1990s, the Library of the Hong Kong University of Science and Technology began to establish a special collection – Antique Maps of China. With the focus on European maps of China produced between 16th to 19th centuries – this is a unique collection in the region. Today the collection consists of about 100 individual maps and 2 atlases, mainly in western languages, such as Latin, Italian, French, Dutch and English. This collection has samples of almost all maps of China produced by European cartographers from the 16th to 19th centuries, vividly recording the long history of cross-cultural exchanges between China and the West.

In 2003, a print catalog for this collection “China in European Maps - A Library Special Collection” was compiled. This catalog includes concise descriptions highlighting the intrinsic value of individual maps, the translation of map titles into English and Chinese, and indexes. To prepare for publication, all maps were photographed and converted into PDF files, put it online for open access. An interface was designed for searching and retrieval. User could search by name of the map maker, title and geographic regions. Links to the images of these maps were added to the library online catalog. The roll out of this database did attracted more uses on our collection.

In 2012, we received a donation supporting digitization of the special collections, including maps, travelogues, rare books, and thread bound books and all maps scanned in high resolution. The digital images are available for online viewing via our Rare & Special e-Zone and a selected number has an accompanying detailed description. In addition to standard indexes, such as map maker, title, and geographic regions, all keywords in the record are searchable.

While this has made the HKUST one of the most important and widely accessed collection in East Asia, the present trend of digital cartography requires to go far beyond these achievements; what is now required is to annotate and translate all the information on the map, from place names to lengthier descriptions, link them to Geographic Information System (GIS) and make them searchable for data mining foremost by Chinese scholars interested in the maps but not familiar with the languages used, and also by western scholars not specialized in China studies.

Initial stages of digital annotation

I will here present the initial steps I have been taking in this direction since I took charge of the Special Collections in January 2016.

When I was still simply collaborating in the description of a selected number of our maps, I established contacts with the International Cartographic Association Commission on Digital
Technologies in Cartographic Heritage, the main international organization in the field of digital cartography. Together with the previous head of the Archives and Special collections, Sintra Tsang, we took part in the 10th Conference “Digital Approaches to Cartographic Heritage” held in Corfu from the 27th to the 29th of May 2015 where we were approached by Simon Rainer, of the Austrian Institute of Technology, Vienna, Austria, member of the Pelagios project. PELAGIOS stands for 'Pelagios: Enable Linked Ancient Geodata In Open Systems' - its aim is to help introduce Linked Open Data into online resources that refer to places in the historic past. The project started as a collaborative attempt to annotate classical texts and plot their place names into maps. Its first two phases were dedicated to classical antiquity (Greece and Rome) were funded by JISC, the UK higher education, further education and skills sectors’ not-for-profit organization for digital services and solutions. The third phase, Pelagios 3, extends its coverage to medieval Christian, Islamic, and Asian geography and is funded by The Andrew W. Mellon Foundation. Within the Pelagios 3 research project there is a tool uniquely suited to our collection needs, Recogito, a Web-based tool for annotating place references in early geospatial documents.

The approach to Greek and Roman place names started from text annotation, linking place names in texts with contemporary locations (here is an example from the Book 2 of the *Ilyad*).

![Place names from Homer’s *Ilyad* (fig 1.) shown on a georeferenced map (fig.2)](image)

The approach to Chinese place names starts instead from the annotation of historical maps, treated as images, as can be seen in the case of the map of China by John Speed (The Kingdome of China, London, 1626 [http://lbezone.ust.hk/bib/b536691](http://lbezone.ust.hk/bib/b536691)):
Speed’s map of China (fig. 3) and the same map with image annotations (fig. 4)

**Image annotations are created in two steps: marking and transcribing.** A detailed screenshot shows how to proceed to annotate a given place name on the map, the province of Henan (spelled Honao in Speed’s map):

Fig. 5 Detail of Speed’s annotated map of China
Fig. 6 Details of place name annotation on Speed’s map

Most place names in Speed’s map, though, are not as transparent as this. I have compiled a preliminary list of them (Table 1).¹

**Table 1. Placenames in Speed’s map of China**

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>C3</td>
<td>Achiou.</td>
</tr>
<tr>
<td>D2, E2</td>
<td>Aichij.</td>
</tr>
<tr>
<td>D1</td>
<td>Aixu.</td>
</tr>
<tr>
<td>D1</td>
<td>Alij.</td>
</tr>
<tr>
<td>C2</td>
<td>Amhiau.</td>
</tr>
<tr>
<td>D1</td>
<td>Amlicam</td>
</tr>
<tr>
<td>B1</td>
<td>Aracão.C.</td>
</tr>
<tr>
<td>B1</td>
<td>Bengal.</td>
</tr>
<tr>
<td>B2</td>
<td>Binlia:chu</td>
</tr>
<tr>
<td>C1, D1</td>
<td>Borota.</td>
</tr>
<tr>
<td>B2</td>
<td>Buichio.</td>
</tr>
<tr>
<td>B1</td>
<td>C.Agouro.</td>
</tr>
<tr>
<td>C2</td>
<td>C.Chiquiano.</td>
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¹ Based in part of the Cartographia Nederlandica website list: [http://www.orteliusmaps.com/topnames/ort164.html](http://www.orteliusmaps.com/topnames/ort164.html)
compiled to illustrate Ortelius’ map of China, 1584 ([http://lbezone.ust.hk/bib/b534948](http://lbezone.ust.hk/bib/b534948)).
How can these westernized place names be related to the Chinese place names they reflect?

To solve this issue, I have proceeded to annotate another famous map, Matteo Ricci’s 1602 坤舆萬國全圖 Kunyu wanguo quantu (Map of the World).

Fig. 7 Ricci’s 1602 map of the world

Ricci’s map is not in our collection, but it has been extensively studied and annotated. Furthermore, due to its importance, it is often discussed in classes on Chinese and World History at our University and can therefore serve as a form of outreach for the Special Collections. I have transcribed all the place names on the Ricci map and plan to connect them with the Western place names in the contemporary printed maps of China in our collection.

The following images illustrate this process.
Fig. 8 Detail of Ricci’s annotated map of the world

Fig. 9 Details of place name annotation on Ricci’s map
After the compilation of these two lists of Western and Chinese place names in Western sources will be completed, the next step will be to geo-resolve them. Geo-resolution is the act of linking place references, i.e. place names in a document to places in Recogito's internal place directory, so that they can be plotted on a map.

As this phase has not yet taken place for our maps, I will use an example the geo-resolution of Roman place names from Recogito. Geo-Resolution is divided into two major sections: the toponym table 1 which lists all the place names that were tagged in the document, and the map 2 which displays the locations of those place names that are already linked to a place. At the bottom, there's a footer 3 showing some basic completion stats.

![Fig. 10 Geo-resolution of Roman place names from Recogito](image)

The geo-resolution is typically displayed as a gazetteer shortcode; the image here given gives the manual (or corrected) geo-resolution for the place names. The map (2) shows markers for the geo-resolved place names.

Greek and Roman Digital Geography has already produced databases of geo-resolved place names. For Chinese pre-1911 maps, such lists need to be created. A possibility is to collaborate with exiting projects such as the one run by Harvard and Academia Sinica.
Prospects for the project

Even though the UST collection consists of around 100 maps and we have at present annotated 2 (one of them outside of the collection) the chronological and cartographic unifying features of the collection is such that the same place names recur over and over, so that by extensively annotating and giving geo-reference to the Speed and Ricci map a solid foundation for the digital annotation of the whole collection will be ensured. Once the annotated maps will be made available online, the scholars and the general public in the West and in China will have for the first time a tool with which to study and understand Western printed maps from the 1500 to the 1800 century.

After the completion of this stage, the annotation could move to visual and cultural features such as the meaning and provenance of the cartouches images.

Fig. 10  Top left corner of Speed’s map of China

Fig. 12  Source of Speed’s image
Linschoten, *Itinerario*, 1596.

Fig. 13  Source of Speed’s image
Ortelius, Map of China, 1584