The Digital Gazetteer of Song Dynasty China (DGSD) Version 1.1
Database Release Notes
March 2010
Revised July 2022
Ruth Mostern and Elijah Meeks

A. Introduction

In 1958, Sinologist Hope Wright published a work entitled *An Alphabetical List of Geographical Names in Sung China*. Originally published in Paris by the Centre de Recherches Historiques of the École Pratique des Hautes Études, and reprinted as a second-generation photocopy in 1992 by the Journal of Song-Yuan Studies, the *Alphabetical List* is now out of print.

Wright's compilation is the most comprehensive print source for Song geography in any language. The Digital Gazetteer of Song Dynasty China (DGSD) is a MySQL database derived primarily from the *Alphabetical List*.

The *Alphabetical List* is an index to every jurisdiction in the Song (960-1276) spatial administrative hierarchy named in one or more of the following three Song texts: the *Song History* (宋史 *Song shi*) Geography Monograph, the 980 *Records of the Universal Realm in the Taiping Era* (太平寰宇紀 *Taiping huanyu ji*), and the 1085 *Treatise on the Nine Territories in the Yuanfeng Reign* (元豐九域志 *Yuanfeng jiuyu zhi*).

The *Alphabetical List* consists of 3,827 headwords, including all Rank One circuits (路 *lu*), Rank Two prefectures (府 *fu*, 州 *zhou*, 軍 *jun*, and 監 *jian*), Rank Three counties (縣 *xian*) and county-rank *jian*, and Rank Four towns (鎮 *zhen* and *cheng*), markets (場 *chang*) and stockades (寨 *zhai*) that existed at any time during the Song dynasty, along with centers of state industry (mines, foundries, and commodity markets) located in prefectures, and information about the number of cantons (鄉 *xiang*) in each county, the resident (住 *zhu*) and guest (客 *ke*) population of each prefecture in 980 and 1085, the civil rank of each prefecture and county, the designation of counties that served as prefecture seats, the military-ceremonial designation, if any, of each prefecture, the latitude-longitude coordinate of each prefecture, and the distance of each county from the seat of its parent prefecture.
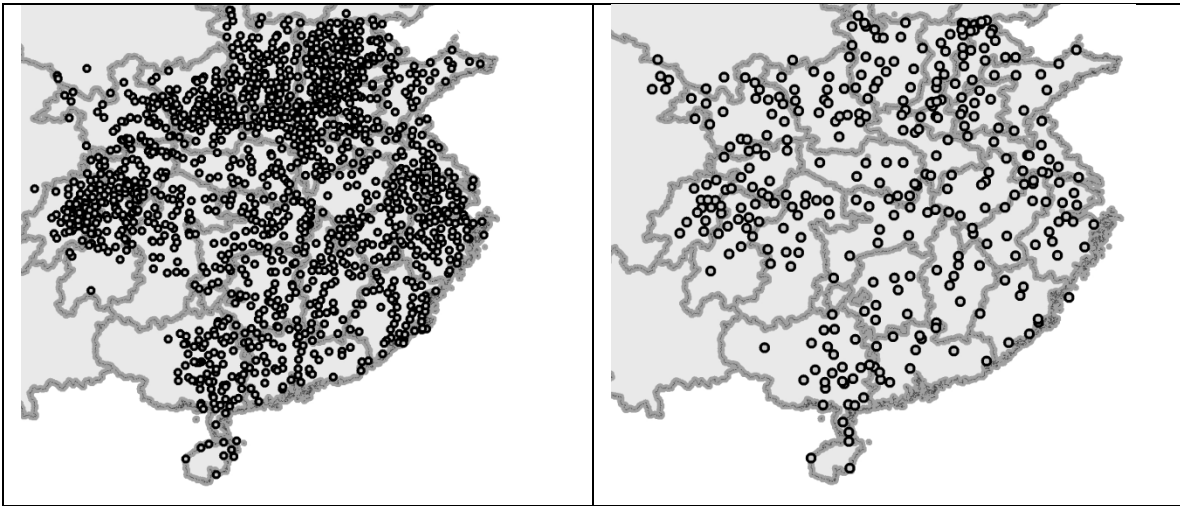
Figure 1: These two maps of all Song counties (left) and prefectures (right) in the year 1120 are derived from DGSD data.
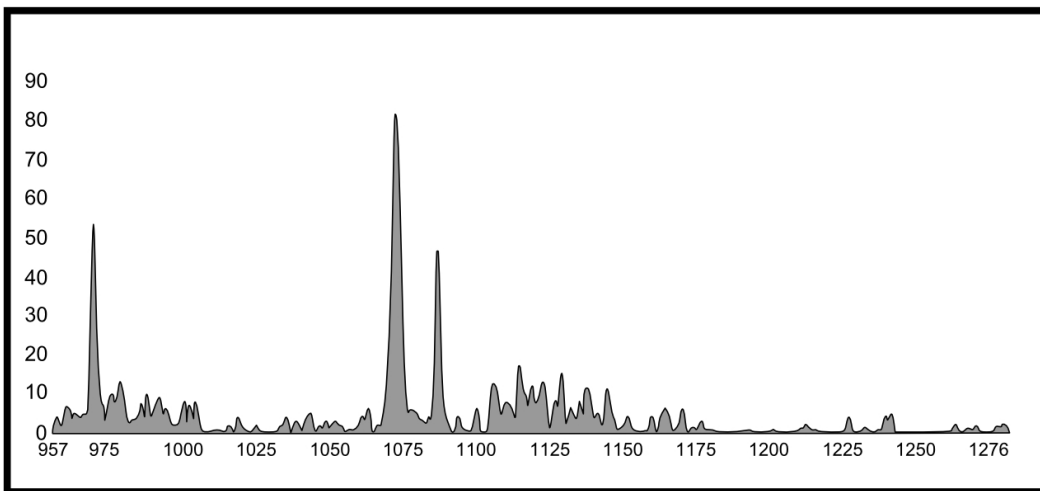

Figure 2: This timeline records all Song spatial change events recorded in the DGSD.

We initially developed the DGSD to support Ruth Mostern's book *Dividing the Realm in Order to Govern: The Spatial Organization of the Song State (960-1276 CE)* (Harvard Asia Center, 2011). The book demonstrates how the Song court repeatedly reorganized the structure of counties and prefectures in order to distribute civil and military officials around the empire in accordance with changing priorities. Therefore, the DGSD is designed to identify the events that transformed the political landscape, and to make the histories of often fluid places as accessible as the names of the jurisdictions.

The development of the DGSD was supported in part by the Society for Song-Yuan Studies, the UC Merced Graduate and Research Council, and the UC Merced Center for Research in the Humanities and Arts.

B. Methodology

The DGSD is a genre of database known as a digital gazetteer. The term gazetteer generates some confusion in Chinese studies, since it is the English word most commonly used to describe the Chinese local geographies known as 地方志 *difangzhi*. As the expression is used by geographers, a gazetteer refers to a place name directory, like the list at the back of an atlas. In a networked computing environment, gazetteers refer to databases organized around named places and their locations, and they have become an essential to all spatial search infrastructure. A gazetteer is distinct from a geographic information system (GIS), although the two are often used together and frequently translated into one another. A gazetteer is a database about named places, while a GIS is a system for storing, analyzing, and displaying georeferenced information. In a GIS about land cover or public health, for instance, data organized by spatially located named places might play a relatively limited role.

By contrast, spatial information for historical scholarship is most commonly derived from texts. Unlike data digitized from maps or observed from sensors, land surveys, or satellites, texts are saturated with place names. The critical task for historical geography is to determine how those names relate to entities that can be mapped, when those entities existed, what attributes are essential to understanding and classifying them, and how this information changed over time. Historical GIS systems like the Vision of Britain/Great Britain Historical GIS (GBHGIS) and the China Historical GIS (CHGIS) are therefore all designed around gazetteer architecture.

A gazetteer can be used to answer research questions about historical political geography *per se*. It can also be utilized as one component of a data architecture. For instance, future users of the DGSD can integrate new data sources for research and visualization on the geography of social networks, commerce, transportation, artistic practice, or any other topic that would benefit from spatially explicit treatment.

The *Digital Gazetteer* data model is highly indebted to the one developed by CHGIS, though it has been extended to accommodate the additional attribute information available from the *Alphabetical List*. Each *Alphabetical List* headword was initially designated as an *entity*. This entity indexes the multiple names, ranks, attributes, parent-child relations, and change events associated with a particular place. Since Song places experienced frequent changes in name, parent-child relations and other characteristics, the information about each entity is located in two related tables, each indexed to the entity table.

With some data processing, the DGSD can be used to recreate Hope Wright's original entry style, allowing users to browse the database as if it were simply an electronic version of her text. However, using a full range of SQL queries and spatial analysis, it can also be used to create maps and snapshots depicting the political landscape during a given period or to analyze the frequency of changes and their characteristics.

C. An Example of Song Spatial Complexity: Modeling Ningyuan

Ningyuan 寧遠 in Guangnan West circuit had three different names over the course of the Song, three different jurisdiction types, and was transferred multiple times. In 1150 it was known as Jiyang and was a Rank Two *zhou*, while in 1080 it was a Rank Four town known as Linchuan, and in 1050 it was a Rank Three county known as Ningyuan. Hope Wright, whose work is organized by place name, describes some of the history of this place as follows:


```
.CHI-YANG (chün) 吉陽      Kuang-nan W. 18 N., 109 E. (Yai)  *=Hsia. Formerly Yai chou,
                          reduced to Chu-yai chün 1073; abol 1136, att as Ning-yüan hs to
                          CH'IUNG, Kuang-nan W. Re-est as Chi-yang chün 1143.
                          1073-1136: No hsien. 2 chen. Lin-ch'uan, T'eng-ch'iao.
                          From 1143: 2 hsien: Ning-yüan (former Lin-ch'uan chen); Chi-yang
                                    (former T'eng-ch'iao chen.)
                          Pop.(1080) 251   [TP 351 (340; 11)]
                                           [YF 351 (340; 11) Another ed: 251 (2401 11)]
                                                      (TP 169; YF 9/465)

Chi-yang (hs) 吉陽        CHI-YANG, Kuang-nan W.  *Hsia.
                          When Yai chou abol 1073, this hs made a chen, name changed to
                          T'eng-ch'iao; tr as chen to CH'IUNG in 1136. Re-est as Chi-yang hs
                          att to chün in 1143.
```

Figure 3: The *Alphabetical List* entries for Jiyang *jun* prefecture and Jiyang county in Guangxi circuit. This place was also known as Ningyuan, Linchuan, Yai, Zhuyai, and Tengqiao at various times during the Song dynasty. This figure illustrates the *Alphabetical List* format from which the DGSD was developed as well as the spatial complexity of the Song political landscape.

The pre-release version of the DGSD organized all of this information according to Numeric Key Value 32730 in the Entity table, which was linked to nine separate entries with three separate names in the Historical Instance Table, 10 items concerning rank, population, and dependent markets and cantons in the Attribute table, as well as 2 items of spatial information in the Point Location table.

The current version of the DGSD divides the information about Ningyuan into two complex entities. The first entity (Numeric Key Value 46260) began the Song as Yai 崖 *zhou*, and persisted in the form of various rank 2 entities (both *jun* and *zhou*), its name changing to Zhuyai 朱崖 and Jiyang 吉陽. For a time it was demoted into a county known as Ningyuan. The second entity (Numeric Key Value 32720) began the Song as Ningyuan county under the jurisdiction of Yai *zhou*. It was subsequently demoted to a market (*zhen*) and renamed Linchuan 臨川, then transferred, renamed and promoted in accordance with the numerous changes of entity 46260, and finally restored as Ningyuan county once again.

The DGSD attempts to reconcile historical ambiguities that Hope Wright, other authors of reference works—and indeed Song bureaucrats and authors themselves—were often able to elide.

D. Data Structure

A. An Overview of the Entities in the Database

The DGSD divides data into four categories. These are Entities, Historical Instances, Point Locations, and Attributes. In addition, five Data Definition tables record the categories of information modeled in the main tables.
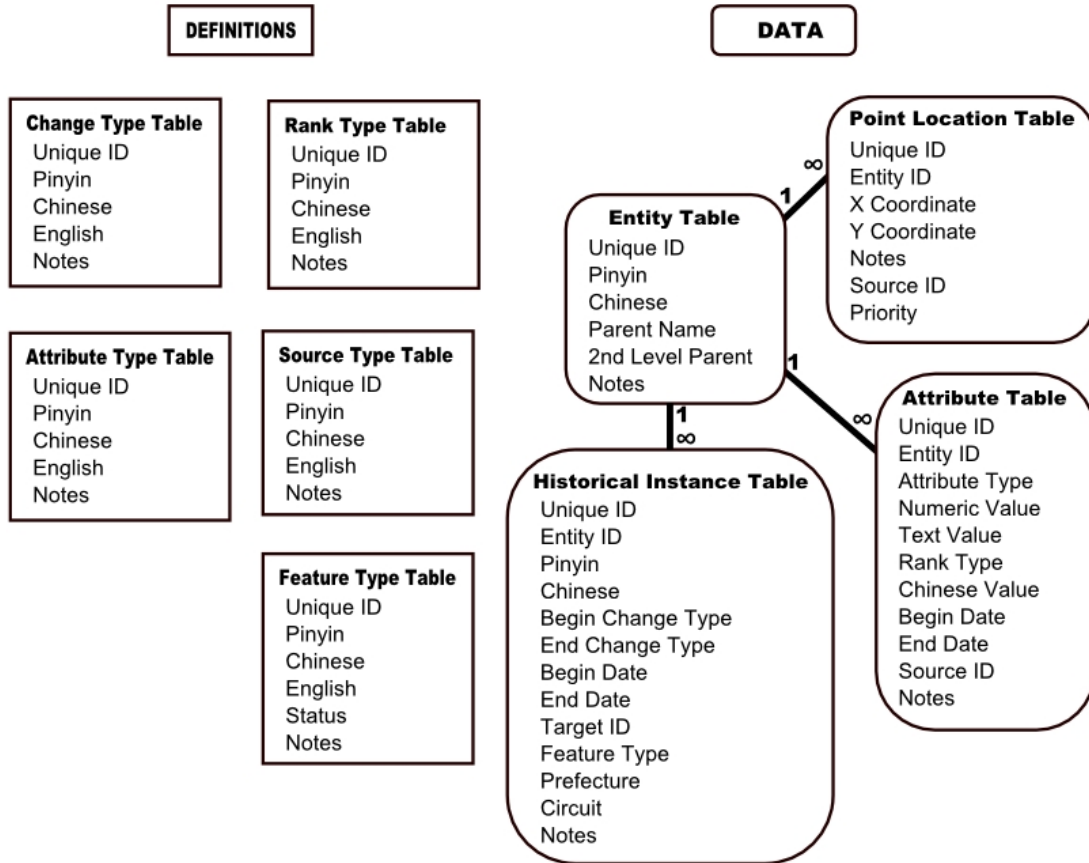

Figure 4: The DGSD Data Model

1. Entities

The DGSD table that lists named places is called the Entity table. The DGSD tracks political entities that changed, sometimes dramatically, over time. Therefore, it utilizes a numeric key value as a stable identifier for each unique place. Numerous items of data, representing multiple names, ranks, and parent-child relationships, can be linked to the same numeric key value so long as they are all associated with an entity that can be considered to be a single place. All of the tables in the database are linked to the Entity table.

2. Historical Instances

5

The Historical Instance table records the events that resulted in changes to named entities and the relationships between them.

3. Point Locations

The locations of entities are recorded using decimal longitude and latitude, referred to within the tables as x/y coordinates. Following the practice of the China Historical GIS and the conventions of Song sources, the DGSD records point locations for prefectures rather than polygonal boundaries. Circuits have fully polygonal boundaries based on the CHGIS.

4. Attributes

All of the other information that Hope Wright recorded about entities is held in the Attribute table. The Attribute table includes information about an entity's military ranks, demographic profile, and non-georeferenced constituent places such as cantons, mines, and markets. The DGSD records all of the attributes that appear in the *Alphabetical List*.

5. Data Definitions

In addition to the four tables of the main database, five additional tables record detailed information about the data types tracked in the main database. These tables record 12 feature types, 45 attribute types, 12 change types, 32 military and civil rank types, and 8 sources from which the information in the DGSD was derived.

B. Details of Tables and Fields

1. Entities

1.a Numeric Key Value

From a data management point of view, the unique "name" of each entity is a numeric key value that is linked to all of the information about its attributes and history in each table of the database.

1.b. Place Name

In order to improve the human readability of the database, we have recorded a default name in Chinese characters and *pinyin* transliteration in addition to the Numeric Key Value. The default entity names are normally the names that appear as headwords in the *Alphabetical List*. However, the default name may represent only one of many monikers that a particular place held during its history. The additional names that an entity held during its Song existence are listed in the Historical Instance table.

1.c. Parent Place Name

The DGSD records the name of each entity's parent and the parent's parent entity for purposes of disambiguation. For instance, there are eight counties or towns known as Anhua (安化). The parent and second level parent fields clearly distinguish them based on their unique location in the Song spatial hierarchy. Parent-child relationships changed frequently during the Song, and the full information appears in the Historical Instance table under the Prefecture and Circuit fields.The Parent Place Name information in the Entity table, based on Hope Wright's original entries, is strictly for disambiguation purposes.

1.d. Notes

The Notes field of the Entity table preserves the original Hope Wright entry for each entity. This improves fidelity to the original reference work, aids in disambiguation, and facilitates error checking.

2. Historical Instances

2.a Unique ID

A 6-digit unique numeric identifier for each historical instance.

2.b Entity ID

The numeric identifier of the entity associated with each historical instance.

2.c Feature Type

The type of administrative unit that described each entity during any period of its existence. The complete list of feature types is listed in Section 5 of this document.

2.d Change Types

We use the term historical instance to refer to each state of affairs that associated with any entity. An entity that was stable during the course of the dynasty has a single historical instance. Every additional historical instance represents a change of state with regard to that entity and has a date range and a type of change. The DGSD change-type categories, based on those defined in the China Historical GIS, are listed in Section 5 of this document.

Sometimes, a single complex historical change must be modeled using multiple change types, resulting in multiple historical instances associated with a particular date. For example, in 1005, entity 40260, Tanglin (唐林), was abolished, and its territory was merged into entity 20340, Guo, (崞). The DGSD records this as two events, resulting in two historical instances associated with Tanglin. One begins at the inception of the Song in 960 and ends in 1005 with the change-type Abolished. Another begins and ends in 1005 with the change-type Merged. Disaggregating the two components of the event

makes it possible to conduct queries by change type. However, when performing queries and data analysis, it is important to remember that historical instances that relate to a particular entity and that have matching begin-dates or end-dates may represent multiple simultaneous components of a historical event that might best be reaggregated.

2.d.i Begin Change Type

The Begin Change Type field records events that initiated particular historical instances: the Begin Change Type field marks events that brought a state of being into effect. If a Begin Change Type date is identical to an End Change Type date, it also indicates that two changes were simultaneous. Establishment, Reestablishment, Regained and Split events are specific to the Begin Change Type field. In data processing it is often advisable to aggregate several types of events together as Establishment Events. Demotion or promotion events will appear as both the Begin Change Type of a new historical instance and the End Change Type of an old historical instance.

2.d.ii End Change Type

The End Change Type field records events that brought an end to particular historical instances. Changes that are specific to the End Change Type field are Abolishment, Reabolishment, Lost and Merged. As with Establishment Events, it is often advisable to aggregate these as Abolishment Events.

2.e Dating

Even though MM-DD-YYYY accuracy is possible for some Song dynasty historical change events, the DGSD follows Hope Wright in tracking only years of events. All events are currently presumed to begin on January 1 of the year in question.

2.e.i Begin Date

The date of the Begin Change event.

2.e.ii End Date

The date of the End Change event.

2.f Target ID

When an entity was transferred, merged or split into one or more other entities, the target entity or entities appear in the Target ID field. The updated parent entity is listed in the requisite field—county for rank 4 entities or prefecture for rank 3 entities.

2.g Feature Type

The feature type of the selected entity during the time period is displayed as a numeric value.

2.h Prefecture

An entity's parent prefecture during a period defined by given begin and end dates, for entities of county rank or lower.

2.i Circuit

The parent circuit of a given entity.

3. Point Location

The point location table establishes spatial references that correspond to Hope Wright's original designations while more accurately locating entities with reference to other digital historical gazetteers: the China Historical GIS, the Chinese Civilization in Time and Space Project, and the Robert Hartwell China Historical Studies GIS. Because of frequent changes in the names and ranks of Song jurisdictions, records in the DGSD and the other three digital gazetteers did not always correspond. This was, therefore, a rather painstaking process.

For DGSD 1.0, first we recorded the locations of prefectures based on Hope Wright's designations. She provided latitude and longitude coordinates to only degree precision, yielding a possible spatial location anywhere within roughly 10,000 square kilometers. We also used print and digital reference works to identity the locations of prefectures for which Hope Wright neglected to provide any coordinates. Then, we compared the names, political ranks and approximate locations of prefectures with the corresponding and more precisely georeferenced entries from CHGIS, CCTS, and Hartwell.

From the prefecture point locations, we extrapolated the geolocation of counties based on Hope Wright's information about the distance and bearing from their prefectural seat. We compared those approximated coordinates with those of the relevant entities in CHGIS, CCTS, and Hartwell, and used the best location from one of those sources wherever possible.

The small number of counties that could not be located within their parent prefecture based on the available data are located at a purely random point within a set radius from the prefectural seat based on the average distance from that prefecture seat of its other constituent counties. These point locations, and others that are not based on historical records, are labeled in the Notes section as "Extrapolated."

When different coordinates for a single entity existed in CHGIS, CCTS, and Hartwell, we selected the best possible estimate based on our assessment of the precision of each gazetteer. We prioritized CHGIS first, followed by CCTS, and finally Hartwell. In

DGSD 1.0, 20.5% of the prefecture coordinates could not be readily be identified with locations in any of the other gazetteers, and we have continued to use Hope Wright's approximations or our own research. The source of each coordinate is identified in the Notes field.

The DGSD 1.1 release improves the alignment between DGSD geolocations and CHGIS geolocations. First we matched DGSD data with data in the CHGIS database gis_info table. We identified matches that shared Chinese characters, feature type, and were within 5 total degrees of latitude and longitude. Next, we matched DGSD data with CHGIS shapefiles for prefectures and counties. We identified entities that shared Chinese characters and feature types and were within 10 total degrees of latitude and longitude. We included five outlying matches which were more than10 degrees distant but which matched change dates as well as Chinese characters and feature types. 805 DGSD entities now use georeferences established by CHGIS.

There are 3,827 entities in the DGSD 1.1 release. 2,070 entities –provincial circuits, and fourth rank entities such as markets and stockades – do not have a point location. The 1,757 counties and prefectures are all georeferenced. Of these, 46% (805) are referenced to the CHGIS, 35% (615) are referenced to CCTS, 1% (26) are referenced to Hartwell, and 18% (311) are extrapolated from Hope Wright data.

3.a Unique ID

A four-digit numerical identifier unique to each point location entry.

3.b Entity ID

A six-digit numerical identifier that designates the entity associated with the geo-data.

3.c X/Y Coordinates

The longitude and latitude of the location. Data precision ranges from 0 decimal places for Hope Wright-sourced data to 4 decimal places for CHGIS-sourced data.

3.d Notes

Information about the source of the geodata. Data created by the DGSD is identified with a particular reference or noted as extrapolated.

3.d Source ID

The original source of each piece of geodata.

3.d Priority

The DGSD maintains the original Hope Wright point location data even when we have reference to more accurate point locations from other sources. This facilitates error-checking and review. However, where there is superior data, it will be listed as Priority 1, and the Hope Wright data as Priority 2. When creating shapefiles from this data, queries will need to account for data priority preferencing.

4. Attributes

A single entity may have multiple instances of a single attribute. For instance, a change in rank will result in multiple rank attribute entries distinguished by different dates. The same information recorded in multiple sources is also recorded in the form of multiple instances of an attribute.

4.a Unique ID

A six-digit numerical identifier unique to each attribute entry.

4.b Entity ID

The six-digit numerical identifier that designates which entity this attribute refers to.

4.c Attribute Type

A numeric identifier indicating the type of attribute. There are 45 different attributes tracked in the DGSD, ranging from population values, to the distribution and types of markets, to political and military ranks. They are listed in Section 5.3 of this document.

4.d Numeric Value

This field contains number data for attributes with associated numeric values, such as population figures. This data can be compiled and processed with quantitative functions.

4.e Rank Type

This field contains the numeric identifier for political or military rank types. They are listed in section 5.4 of this document.

4.f Text Value

This field contains string data for attributes, such as names of military establishments.

4.g Chinese Value

This field contains string data for Chinese characters that relate to attributes, such as Chinese names of military establishments.

4.h Begin Date

The date at which an attribute began to be applied to its linked entity, if applicable.

4.i End Date

The date at which an attribute ceased to be applied to its linked entity, if applicable.

4.j Source ID

Attribute data is often associated with specific historical sources. If applicable, the numeric tag for that source is listed here. The sources are listed in Section 5.5 of this document.

4.k Notes

Any additional data that may apply to this attribute but which does not fall under the previous fields.

5. Data Definition Tables

5.1 Feature Types

The DGSD records the following feature types:

Pinyin	Chinese	Definition	Rank
Lu	路	Circuit	1
Fu	府	*Fu* prefecture	2
Zhou	州	*Zhou* prefecture	2
Jun	軍	*Jun* prefecture	2
Jian	監	*Jian* prefecture	2
Xian	縣	County	3
Zhen	鎮	town	4
Jian	監	Industrial center	4
Chang	塲	Market	4
Cheng	城	Walled town	4
Zhai	寨	stockade	4

5.2 Change Types

The DGSD records the following change types:

Established	Declares that an entity came into existence for the first

	time during the Song Dynasty but does not reference the territory from which it was created.
Reestablished	Declares that an entity came into existence after a period during which it had been Abolished or Merged.
Name Change	Declares that an entity had its official name changed.
Split	Declares that an entity has been subdivided into multiple entities (As an end change) or has come into existence as the result of such a subdivision. The entity or entities related to the one in question are listed in the Target ID field.
Regained	Declares that an entity rejoined Song political control through some type of international event, such as war.
Promoted	Declares that an entity was moved up in rank either from town to county or from county to prefecture, or that it was moved up in prefecture rank.
Abolished	Declares that an entity was removed from political existence for the first time during the Song Dynasty but does not reference demotion to another feature.
Reabolished	Declares that the entity was removed from political existence after having been previously abolished and re-established during the Song Dynasty.
Merged	Declares that an entity was joined with another entity and now is considered to be under the jurisdiction of an entity listed in the Target ID field.
Lost	Declares that the entity was removed from political control due to some type of international event, such as war.
Demoted	Declares that an entity had its political rank reduced from prefecture to county or county to town or that it was reduced to a lower prefectural rank.
Transferred	Declares that an entity was placed under the jurisdiction of a new entity, indicated in the Target ID field.

5.3 Attribute Types

Following Hope Wright, the DGSD records 46 attribute types. They include information about the administrative subdivisions of counties; the existence of markets, resources, and manufacturing works, and information about rank, demography, and geography. An entity may be associated with any number of attributes, and many attributes have associated numerical data. The attribute types are:

Administrative subdivisions	has xiang 鄉, has zhen 鎮, has li 裏, has wu 務, has pu 鋪, has fang 坊, has dong 洞, has bao 堡, has zhai 寨, has cheng 城, has jimizhou 羈縻州
Markets, resources, and manufacturing	has iron market, has silver market, has tea

13

	market, has salt market, has lead market, has gold market, has aluminum market, has tin market, has copper market, has salt storage, has salt wells, has iron works, has copper coin work, has coin works, has iron coin works, has mercury works, has silver works, has silver, has horses, has cattle
Rank	has civil rank, has military rank
Demographic Information	has hu 戶, has kou 口, has ding 丁, has zhu 住, has ke 客, Chinese household, non-Chinese household
Geographical Information	has point location, has poly location, alternative civil name, alternative military name, metropolitan

5.4 Rank Types

Civil	Dongjing (東京), ji (畿), chi (赤), jin (緊), zhong (中), zhongfu (中府), zhongxia (中下), zhong dudu fu (中都督府), fu (府), xia (下), tongxia zhou (同下州), xiafu (下府), xia dudu fu (下都督府), shang (上), da dudu fu (大都督府), dudu fu (都督府). ci (次), ciji (次畿), cichi (次赤), cifu (次府), wang (望), fu (輔), jing (京),xiaojing (小京)
Military and Honorific	Xiong (雄), junjiedu (軍節度), junshi (軍事), fangyu (防禦), tuanlian (團練), shuaifu (率府), dafang fu (大藩府), weisi (尉司), jun (郡)

5.5 Source Types

Song shi	As referenced by Hope Wright
Taiping huanyu ji	As referenced by Hope Wright
Yuanfeng jiuyu zhi	As referenced by Hope Wright
China Historical GIS	Geolocations from CHGIS MySQL database v.4
Tan Qixiang	Geolocations from CCTS
Hartwell	Geolocations from the Robert Hartwell Historical Studies GIS hosted by the CHGIS
Hope Wright	Prefecture geolocations provided by Hope Wright
DGSD	Extrapolations or new research created in the course of building the DGSD

E. Revisions Between Release 1.0 and Release1.1

1. Improved the alignment between DGSD geolocations and CHGIS geolocations. 805 DGSD 1.1 entities have CHGIS correspondents.

2. Disaggregated *jun* 郡 from *jun* 軍 and added a *jun* 郡 rank type. Of the 263 郡 misidentified as Rank 3 軍 in DGSD 1.0, two are now designated as Rank 2 軍, 13 as counties, and the remainder as 郡-rank attributes of other prefectures.

F. Terms of Use

The DGSD is freely available for personal and educational use according to the terms of the [Creative Commons Attribution-Non-Commercial-Share Alike License](#).

If you use the database in any published work, please cite it as:

Ruth Mostern and Elijah Meeks, "Digital Gazetteer of Song Dynasty China v.1.1" (2010).

If you download and use the DGSD, please inform Ruth Mostern ([rmostern@ucmerced.edu](#)) and send feedback and information about your use of the database to her.

G. Limitations and Future Development

While every effort has been made to ensure that the database is accurate and complete, considerations of time and funding, as well as the dictates of the research questions of greatest interest to the authors, have imposed certain constraints. Several tasks will have to await the development of a future version, including:

1. Further reconciliation of entities and locations from multiple databases. The DGSD has been collated against the CHGIS, CCTS, and Hartwell sources. Given the differences in the structure and coverage of each database, it has been difficult to develop precise comparisons. Nevertheless, some generalizations are possible. 46% of the entities in DGSD 1.1 are in the Song subset of CHGIS Version 4; though this is largely a function of the incomplete coverage of the CHGIS. We performed the comparison using *pinyin* transliterations and Chinese characters, feature types, approximate geolocation (though precise spatial references varied between each source), and circuit designations where available. More systematic comparison between each of the available databases of Song political geography would involve statistically sampling each database, comparing entities to primary source references, comparing the parent-unit relationships designated in each database, and additional heads-up visual comparison between datasets visualized as layers in a GIS.
2. Improving the accuracy of georeferences. The Digital Gazetteer is useful for data analysis at a provincial, regional or national spatial scale. In the present version, the georeferenced locations of entities are not sufficiently accurate to support mapping or analysis at a local scale. Excepting the 805 georeferences imported from the China Historical GIS, references have not been corrected with reference to modern co-locations or topographical features. With time and funding, individual locations could be more precisely plotted to achieve better spatial analytical accuracy. It would be feasible, though painstaking, to reference print gazetteers with modern co-locations

and to use more sophisticated extrapolation algorithms. Town geolocation could be extrapolated from parent counties and plotted individually as well. For this version of the database, the goal was to be able to visualize generalized phenomena on maps and to perform spatial analysis, not to create an accurate model of each Song jurisdiction.

H. Bibliographical Essay

Among paper sources, the most useful reference work other than Hope Wright's is Guo Li'an's 郭黎安 *Collected Interpretations of the Song History Geography Monograph* (*Songshi dilizhi huishi* 宋史地理志匯釋). For every county and prefecture named in the *Song History* geography monograph, the *Collected Interpretations* presents the *Song History* text, citations to other Song documents about it, the name of the contemporary entity that most closely corresponds to the location of the Song one, its population according to the *Treatise on the Nine Territories*, its military-ceremonial rank (if any), and its population. However, it does not include towns, markets, or any other Rank Four entities; and since its basis is the *Song History*, it does not include any jurisdictions that are not listed in that single source. Its format, organized around extensive quotations, makes it extremely valuable for tracing the history of particular entities, but difficult to use for quickly identifying and recording change types.

Another important source, the *Great Dictionary of Chinese Historical Place Names* (*Zhongguo lishi diminhg da cidian* 中國歷史地名大辭典), edited by Shi Weile 史為樂, Deng Zixin 鄧自欣 and Zhu Lingling 朱玲玲, is comprehensive with regard to source and rank and includes the modern co-locations of historical entities, but with more than 50,000 entries including the names of physical features and religious sites as well as administrative entities, and covering 2,000 years of Chinese history, there is no feasible way to extract only the relevant material. In any event, it does not include comprehensive or dated summaries about the spatial change history of any jurisdiction.

Three digital sources for Song geography have been essential: first, the China Historical GIS (CHGIS), second, the database developed from Tan Qixiang's *Historical Atlas of China* (*Zhongguo lishi dituji*) for the Chinese Civilization in Time and Space (CCTS) digital atlas, and finally, the Hartwell GIS. The CHGIS, launched in 2001, is an ongoing joint venture between Harvard University and the Fudan University Center for the Study of Chinese Historical Geography (*Lishi dili yanjiu zhongxin*) that is intended to provide continuous spatial change data in GIS format for the entire imperial era, from 222 BCE to 1911 CE. Currently in Version 4, it is the most careful work of historical scholarship among the digital projects. However, its coverage extends only to the county rank. In addition, the range of attributes that it records for each entity is more limited than those that Hope Wright has tracked. Finally, the time-series data is being completed province by province, and the Version 4 Song data does not extend to the entire realm.

Both the CCTS data and the Hartwell data include the jurisdictions that existed at two snapshot dates in the Northern and Southern Song: 1080 and 1200 for Hartwell, and 1111 and 1208 for CCTS. Unlike the DGSD, these sources map the Song realm at only two dates, each separated by a century and divided by a major regime change. These two

datasets also include very limited attribute information about each named place. Nevertheless, both of these datasets are invaluable. Comparing them with the Hope Wright data from the same date makes it possible to identify discrepancies and validate the degree of overlap among the datasets. In addition, while neither of them exhibits exemplary precision in its assignment of spatial coordinates, the ability to utilize spatially referenced datasets has been extremely helpful.

I. Images

The image files accompany Ruth Mostern's book *Dividing the Realm in Order to Govern: The Spatial Organization of Song China (960-1276 CE)* (Harvard University Press, 2011). Here you will find high resolution versions of all images appearing in the book. The file names include the reference number, caption, and page number of each image in the book.