

Notes on the updated Qinling Shu Road maps and the two super-overlay images

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URL: <http://www.qinshuroads.org/>

1 Introduction

The original draft of the Shu Roads map that was originally made available on the Project Web Site has been updated and extended a number of times using information and opinions gathered and offered since the material was first put there. The updates have come about by using added translated references (eg Li, Zhiqin, 1986), gathering comments and corrections provided by people in China and from recent field visits with GPS observations. It has also included additional information in form of material provided by Hanzhong Museum, the extensive work by Herold Wiens reported in his Thesis and paper (Wiens, 1949a&b), a Qing scroll map preserved by the US Library of Congress (see the translations and material on the [Project Web Site](#)), the ChinaW Data Set (Skinner et al., 2008) made available through Harvard University and other sources such as the recent interesting book by Hope Justman (Justman, 2007).

Recently, an extensive and detailed map presentation has been provided for the ancient Tangluo Road with added detail to the main map. It identifies the route taken by Sir Eric Teichman in 1917 as well as the ancient network through which it went. It is the first example of a detailed look at local sections of the Qinling Roads to Shu.

The result of the various updates to the main Shu Road presentation is now accessible through the Project Web Site as a four item ZIP file called:

“Three_Shushu_Road_GE_KMZ_Files.zip”.

The file contains this document, the revised (but still changing) Google Earth KML file for the presentation, a Super-Overlay image showing digital terrain information for a part of the area and a companion Super-Overlay section from a Russian 1:100K Topographic Map showing information based on aerial photography taken in the 1960's.

The GE KML file for the main presentation displays the places, relics, tracks and routes making up the current Shu Roads data base. This document describes the data base, the three data sets and lists some of the issues and questions that need to be addressed in order for a final system to be created and made available.

2 Updated Shu Roads Map

The main Shu Roads map is a Google Earth (GE) presentation in KML language and using features such as regions and network links to provide access to the most current versions without reloading the primary file.

2.1 Primary Data Base

The current Primary Data Base is simple but flexible. The places (main towns, detail towns and relic sites) are maintained in an Excel spreadsheet where they can be sorted as needed to divide the sets into regional groups for scaling. The first two lines and seven information columns of the Main Towns set are:

Name,Lat(deg),Lon(deg),Alt(m),PY_Name,CH_Name,Comment
安康,32.691774,109.019234,255.0,Ānkāng,安康,This is the present City
location.
Qing period name was Xing'an Fu (兴安府)

The “Name” is taken from another area and could be the PY_Name (Pinyin Name). Other information columns are available such as sub-region, URL etc and a “Romanised name” column is intended later. The naming conventions used here and future needs are discussed later. The Comments use simple HTML formatting and link tags as they are later merged into an information “Description” tag for display in Google Earth. Procedures are available to create basic CSV (text) files from the information in the spreadsheet and convert the text files to KML places using GPSBabel software. The GE Styles are then modified to the Shu Roads styles and structures such as network links and regions are added to create the KML form of the data base.

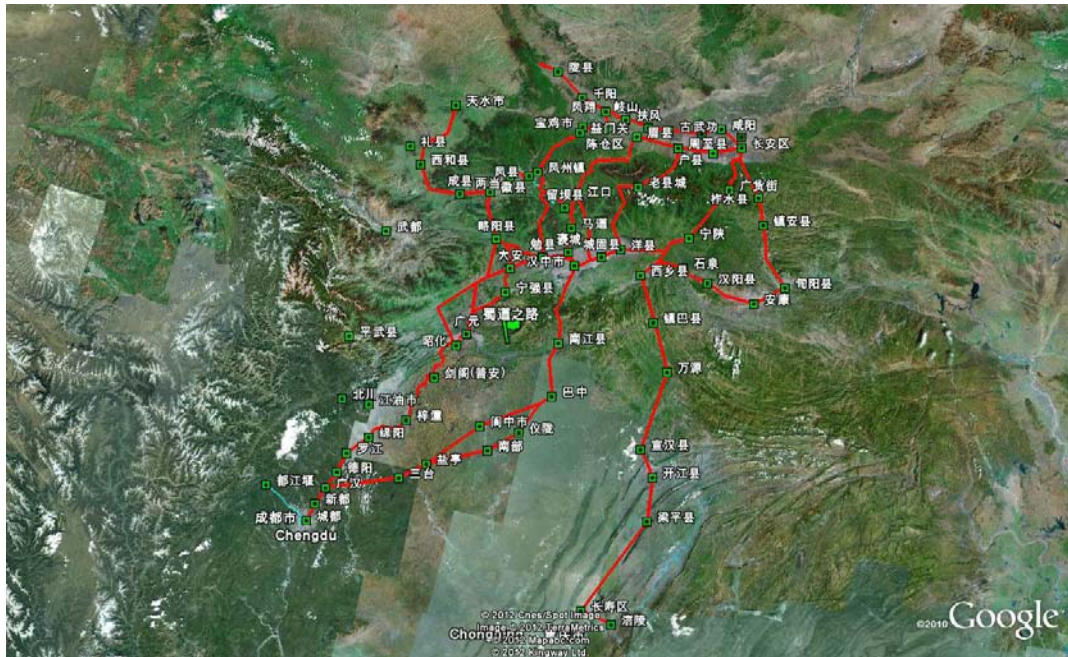
The potential paths and roads in the Shu Road region are managed as either GPS Track segments (originally obtained by GPS and now simply geocoded paths) or as Routes. The base information is stored in files in GPX format. The Routes are defined by strings of places that are joined to form the linestrings for mapping. The places can be any of those in the main data base. The GPX files are converted to KML by batch scripts using GPSBabel.

Additional places, additional Tracks and new Routes are easily added and existing places can be deleted or updated in the Spreadsheet and added to the KML base. The Tracks and Routes can be edited and modified (eg split, simplified or merged) in the GPX files using Garmin Mapsource software. The KML files for the Places, Tracks and Routes are maintained as separate KML files and are stored on the web. They are linked to the KMZ file provided and downloaded from the web site each time it is activated so that whenever the basic files are updated the updates will be in place when the Shu Road maps are next viewed in Google Earth.

2.2 Updated Shu Roads Presentation

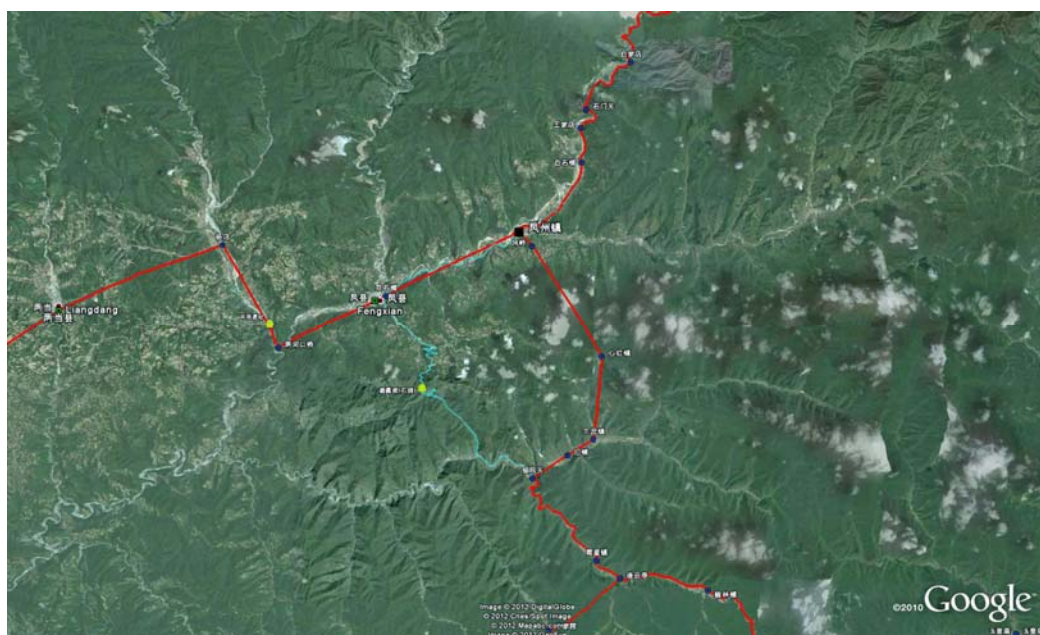
The Shu Roads presentation is in a KMZ file called “Shu_Roads_Web_Link.kmz”. When activated (by double clicking if GE is linked to KMZ format files, or by opening in GE or when GE opens when it has been saved into your “My Places” area) it downloads the relevant data from the web site and displays it.

At the main entry point it views the whole region and shows only a selection of the main Towns. It should look similar to the following:



The red lines are main tracks and routes comprising the assumed paths of the major Shu Roads. The towns displayed were all at County (District) level or above in the late Qing period as indicated in the ChinaW data set (Skinner et al., 2008). In places you will see some local “blue” lines. These are tracks called “Tours” and were collected during field investigations. They will be even more useful when you zoom in to that section of the data.

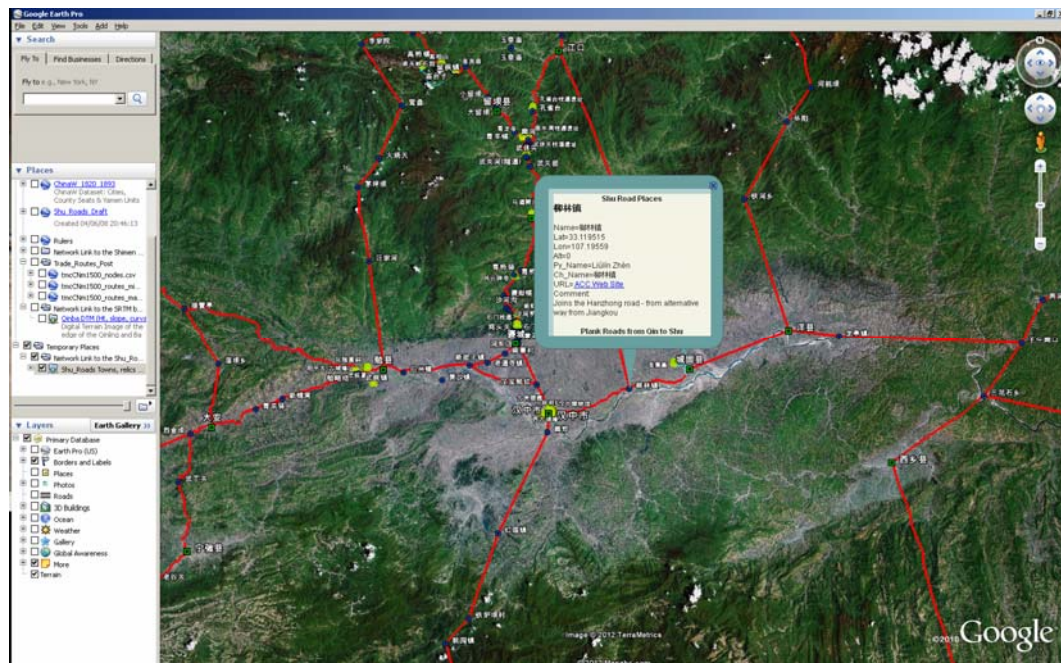
When you zoom in and pan at about a zoom level of 4 or more from the initial settings you will see additional points appear. These are the “detail” towns and places as well as relic sites. The display will look something like:



The smaller blue places are the detail towns. They are usually at the level of Township or Village. Relic sites are marked by yellow-green pagoda icons. In the

image above, the road from Fengzhou to Liufeng Guan via present day Fengxian (formerly Shuangshi Pu) is shown in light blue as a “tour” to the Stele commemorating the successful completion of that section of the Baohan road in the 1930’s. The older road took another path from Fengzhou to Liufeng Guan and that is in red.

By clicking on the highlighted names in the sidebar, or on the places, you will get further information. For example, if you click on a place name you will obtain an information box similar to the following:



The information from the main data base is displayed. Many places in the current presentation will not have complete “comments” or links to further information but that is intended to change when the present review of the structure and content has been completed. The blue “link” can be accessed in a window in Google Earth.

In the side bar you can also investigate the folders making up the presentation. The main folders are:

Shu Road Town Places	Main places (County and above)
Shu Road Town Details	Smaller places (Townships and Villages)
Shu Road Relics	Relic sites GPS waypoints
Main Shu Road Routes	Routes (linked places) for the Shu Roads (not travelled)
Shu Road Tours to Relics	Local GPS tracks near relics
Main Shu Road Tracks	Main set of GPS Tracks of roads obtained in the field
Main Shu Nu Tracks	Shu Roads based on Russian Topo Maps and Qing Period Maps.
Outer Shu Road Back Tracks	Lesser used paths

You can turn these “on” and “off” and select or de-select individual components to see what they are. Individual places may be found by double “clicking” on their waypoint names.

2.3 Some questions to be asked of the presentation

As mentioned above, the “comment” fields provide a means for adding information or providing links for each place. The eventual provision of a “Romanised” name that can be used for a version more comfortable for English speakers is certainly planned. But before these are done, the present version has been sent out to help obtain answers to the following questions:

- (i) Are the paths of all major (and minor) Shu Roads and Plank Roads included (at least as linked sub-segments) in the red and nu paths on this presentation?
- (ii) Are the towns and places shown in the presentation all on former Shu Roads and important and/or useful in the history of the roads?
- (iii) Are there any important and/or useful places that missing?
- (iv) Are there any errors in the names, locations, routes, tracks or any information provided?

If you have any information that may help answer the questions you are welcome to contact David Jupp (David.Jupp@csiro.au).

3 Super-Overlay of a Russian Topographic Map

The next file in the pack is called “Shimen_Web_Link.kmz”. It is a geocoded image (originally a Geo-Tiff file) based on a scanned Russian 1:100K Topographic map of a part of the Shu Roads area. It is provided as an example and demonstration. It needs to be slightly shifted for accurate registration due to some local baseline issues. In the future a significant area of the main Postal Road will be covered by such maps after baseline adjustment.

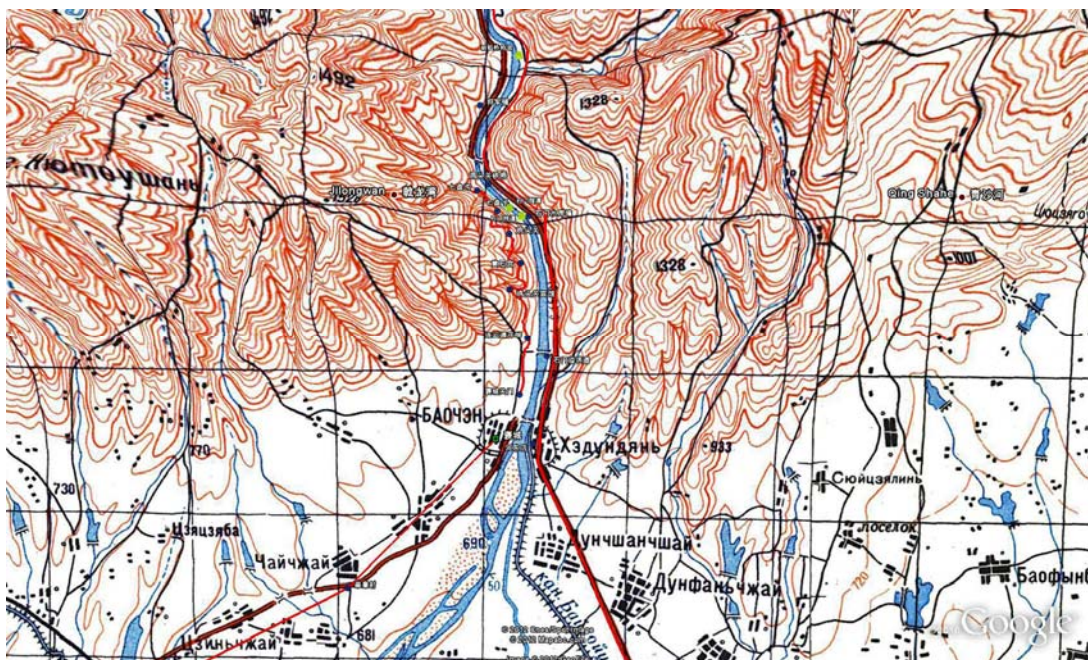
The interest in this map series is that it is potentially accurate (when the datum shift is made) and was based on Russian aerial photography of the 1960’s. The photography was carried out before the Shimen Dam was completed and when many older roads were still not replaced by modern roads using extensive tunnelling. It can therefore provide information about the presently flooded terrain and about older roads and tracks as well as estimates of their routes.

A “Super-Overlay” is a feature in Google Earth in which an image is split into sections at different scale so that the resolution changes as you “zoom” in and out of the data. It allows very large and fine resolution images to be displayed across the web in Google Earth. The actual data is maintained on the Project Web Site. When activated (by double clicking if GE is linked to KMZ format files, or by opening in GE or when GE opens when it has been saved into your “My Places” area) it downloads the relevant data from the web site and displays it.

When displayed, the screen should appear as follows:

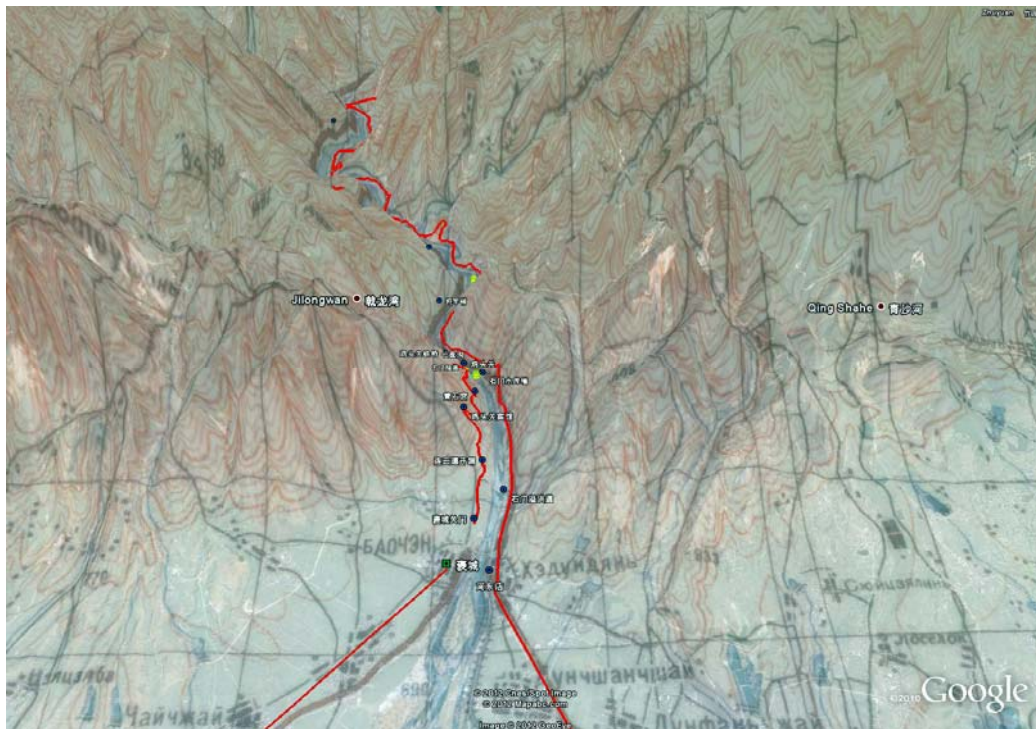


If you have the Shu Roads presentation activated and zoom into the Russian Topographic map is should appear similar to the following:



It can be seen that the data is annotated in Cyrillic and has great level of detail. More information about the Russian Maps used in various presentations, including a discussion of how to interpret the Cyrillic as Pinyin, can be found on the Project web site [HERE](#). The information from GPS points can be used with the terrain information to help define a baseline shift. It can also help define the vertical baseline shift but these are activities to be reported elsewhere and will not be followed here.

It is possible to compare the Shu Roads presentation, the Russian map and the background GE imagery by using the slider bar for “visibility”. If this is done here (for example, make sure the Russian Map is selected) you may see something like:



The above image combines 3D view, GPS Tracks, the Russian Topographic Map and the GE background imagery. The “GIS” task is to relate them, assess accuracy and register the Russian Map and the accurate background images. Eventually they are best brought fully to the same base but some GE background images are not well registered and other means are needed – as described in the next example image.

The Russian Topographic map image has been provided as a demonstration. The end objectives of the work are:

- (i) Provide information on the valley floor that is now flooded by the Shimen Dam;
- (ii) Bring different data sets into accurate registration with each other and with the GE background where it is accurate (this is so in many places – especially where there is GeoEye data);
- (iii) Create better routes for former roads where they followed the same paths as older roads before modern roads replaced many of them. The paths can be traced from the map where it is clear they are appropriate.
- (iv) Check land use change between the 1960’s and the present day in selected places.

4 Digital Terrain Map image for the Shimen area

The third example in the set is a digital terrain image generated from SRTM (Shuttle Radar Terrain Mapping) data for an area close to the extent of the Russian 1:100K

map above. The SRTM data available for China is 3 second data and is the same source as the background information used in Google Earth. The data were processed to create a 3 band image. The first band is elevation, the second slope and the third is the “slope of slope” (curvature). If the three bands are displayed as a colour image it presents terrain data graphically.

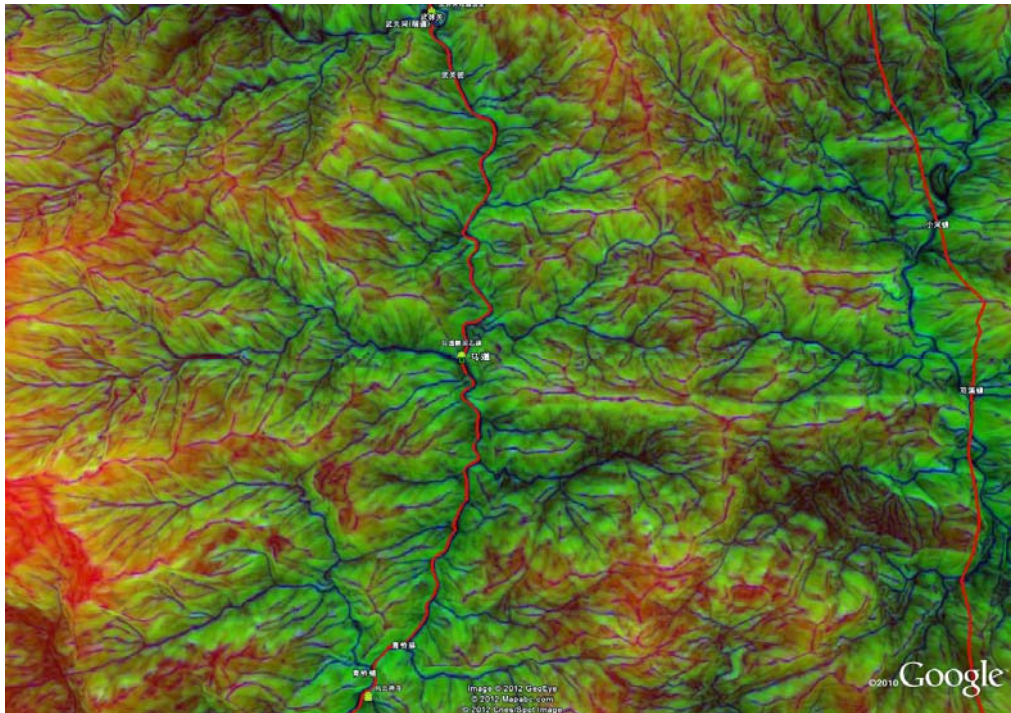
If the elevation is displayed as red, the slope as green and the curvature as blue then high elevation will be redder, high slopes will have more green and high curvature places have more blue. High curvature occurs at sharp peaks, along ridges, in streamlines and gullies and in sharper valley bottoms or river courses. Dark areas are basically, lower, flatter and smoother areas. The colour image was saved as a Geo-Tiff and imported into Google Earth. Being large it was broken into a Super-Overlay. When you use the image, zooming into it will uncover more information to the limit of resolution. The image has lower resolution than the Russian Topographic Map or the GeoEye images used in some areas in Google Earth. But it conforms to the GE background terrain and in 3D view different terrain types become easily recognised.

When activated (by double clicking if GE is linked to KMZ format files, or by opening in GE or when GE opens when it has been saved into your “My Places” area) it downloads the relevant data from the web site and displays it.

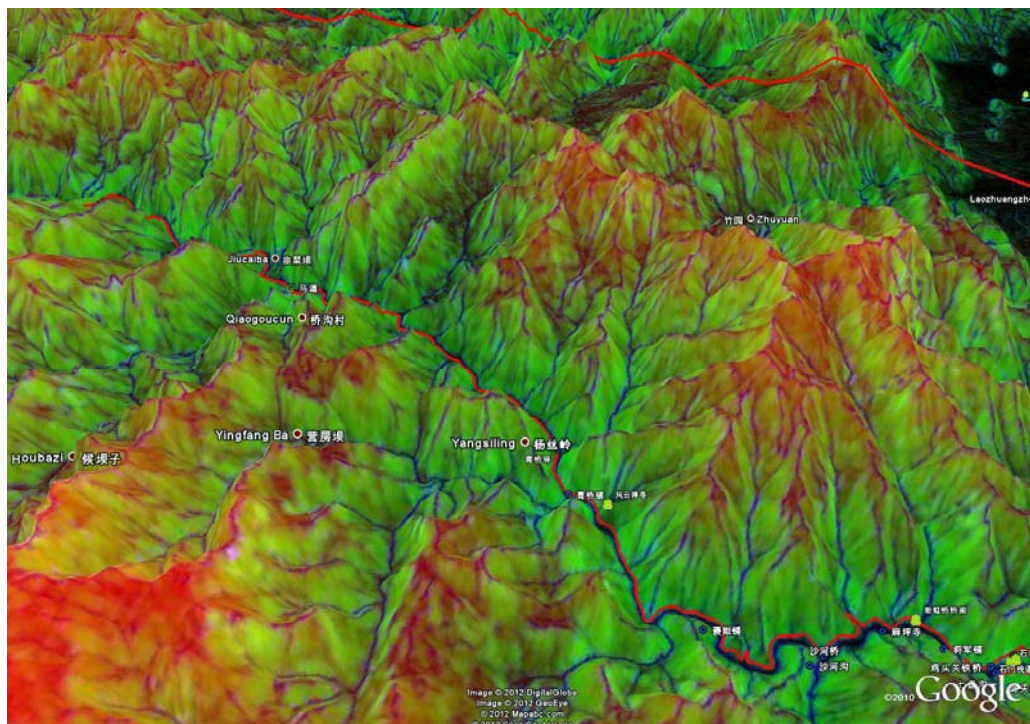
At that time, the screen should appear as follows:



The very dark areas are the Hanzhong Basin plain and the very red are the high mountain areas with green mid-slopes on the valley edges. By zooming in to areas of interest you will see something similar to:



In this image, the Shu Roads information has also been activated and shows the GPS track along the Bao River to be accurate. GPS and SRTM data align closely when the GPS is accurate. The lines of high curvature represent ridges and valleys with valleys being more “blue” and ridges more “red”. This can be confirmed by rotating the image to “3D” mode:



Since the Russian Topographic Map includes detailed interpretations of streamlines and ridges from the aerial photography, the DTM data are to be used to check the registration of the Topographic maps.

The overall objectives for these data are:

- (i) Use streamline and ridge information as well as stream branching to assess and estimate the registration shifts between the Russian Topographic maps and the terrain.
- (ii) Assess the error in the GE background where the registration is not good. This is in addition to GPS data where it is available.

The GE background images that are based on recent high resolution satellite data (especially GeoEye data) and on the recently updated TerraMetrics background at the general scale are usually very good. However, in the Shu Road areas, mid-resolution imagery provided by CNES/Spot Image have very poor contrast and are also often very poorly registered. They do not provide a useful background set of data. One use of the Russian Topographic maps is to provide a better base than the CNES/Spot data. A wider discussion of the use of these types of data in Shu Road research has been provided on the project web site and can be accessed [HERE](#).

5 Future Activity

Each of the examples above provides some motivation for the current release to invite answers to questions and comments. The motivations are our objectives to generate similar maps and DTM images of other sections of the Shu Roads in greater detail. In the case of the overall Qin Shu Roads data base the primary objective is to review the contents, correct errors, add missing information and generate a final data base and presentation. At that time there will also be the need to consider a couple of other aspects that can have brief discussion here:

5.1 Place Names

The names in the current data base are Chinese characters and Pinyin. But occasionally the pinyin name is half translated to a Romanisation that perhaps means more to a western person. The Pinyin standard used is that of the “Hanyu Pinyin Cihui” (汉语拼音词汇, 1982) in which the “name” uses Pinyin for characters with no spaces between the components and the “designator” is separated so that (for example) 阆中市 has Pinyin Romanisation of Lángzhōng Shì (generally without tone marks). In this case, Lanzhong is the name and Shi (City) is the designator of its position. But it is arguable that it would be easier to understand for a western person if it was simply written “Lanzhong City”. In the names of relic places, people often use a similar half-way form such as using Qīnglóng Temple for 青龙寺 instead of Qinglong Si. The question is how far to go into a half-way name in other cases? It is not going to be resolved here, however, I have decided to introduce a third “name” called “RN_name” or “Romanised Name” in which these substitutions are made and keep the PY_Name (Pinyin Name) to be standard Pinyin only. A version may also be brought out where the main name in the GE presentation uses the Romanised Name and will be easier for western people to understand the basic names listed in the presentation.

The standard names in Google Earth itself are quite variable and often almost comical in this regard. They mostly follow the Pinyin standard but occasionally depart significantly from it¹. For example, near Hanzhong, if you zoom into the plain there is a village called 孟家店 or in Pinyin, Mèngjiā Diàn. The Romanised name provided by GE is Mengjia Shop. This translation is not really sensible as “Dian” is often used as a name at the village or small settlement level. It may have come from a time when a settlement arose around a “shop” but it is usually now just a name². The Romanisation should really be Mengjia Dian with Mengjia and Dian separated and if a translation is attempted then “Mengjia Settlement” would be better. But it is not a shop. The Local Names in GE are also not consistent such as when one village is written “Tiechangcun” and another nearby as “Zhuanghe Cun”. This would only be correct if in the first case “cun” was now just a name and not a designator for “village”. But it is much more likely to be a designator in both cases. In some cases the choice of name is rather “interesting” such as where a small place called 马场 or Machang is called “Racecourse”. There is no racecourse nearby and there is unlikely ever to have been one nearby. Most likely, these cases arise from dictionary translations. They add no value for western people.

A good reason to standardise is that it would be much better if people could search for the places in Google Earth when they are in the Shu Road collection and also find the place in a Provincial Gazetteer in standard Pinyin. If you search (for example) on “Mengjia Shop” you find there is a Mengjiaren Hong Kong Fashion Bridal Veil Chain shop in Hanzhong! If you search on 孟家店 you will find there is another village with the same name near Baoji in Shaanxi and that the one near Hanzhong is not even in the list. Another search comes up with one in Sichuan. Searching is difficult compared with (say) Australia or other western country where street addresses can be used in Google Earth or Google Maps. It seems that using characters is always best but it is still difficult and not an option for many (if not most) western people. I believe if pinyin Romanisation were standardised and consistently used it would help western people a great deal to search for places in China.

An objective is therefore to eventually to have the three “names” being characters (CH), standard Pinyin (PY) and a “Romanisation” (RN). This can possibly make it clearer to westerners what a place is – such as Tiechang Village, Hanzhong City etc. and also provide people with names that can be found in gazetteers.

6 The Shu Roads

When the data base is in place, maps of the major and minor Shu Roads need to be produced where the various roads can be designated by name and historical use. In the present system, the tracks and routes have been generated as track segments and routes and separated into sub-routes so that the roads can be generated as strings of

¹ Characters can be accessed by selecting the “local place name” under the “More” area of the Earth Gallery.

² Another case is a town called 旧司街 or Jiùsī Jiē that is given as “Jiusi Street”. “Jie” is also often used for small settlements at the village or smaller level. Maybe they started as a group of roadside stalls. However, the name has become a “name” and it is not a street as usually meant.

track segments and sub-routes. The main issue is to decide how to join up the elements of the data base and the places they pass near to form maps based on road, use or history.

The Shu Roads are often listed as seven main roads. There are four that are normally listed as being through the Qinling Mountains from the Guanzhong side and three that pass through the Ba Mountains on the Sichuan (Shu) side.

The main Shu Roads are usually called:

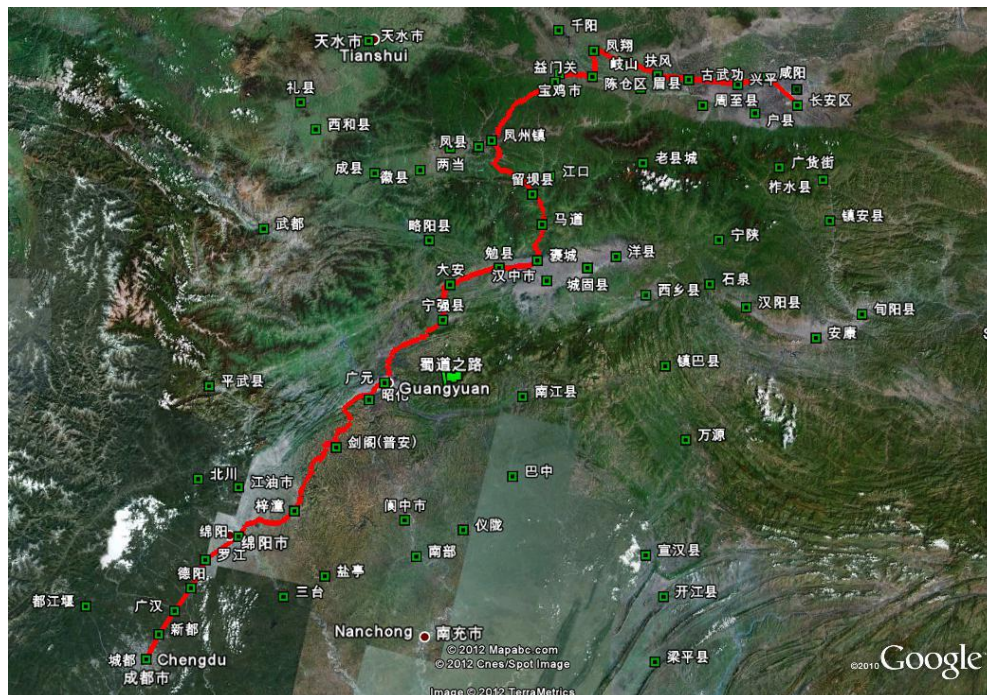
Qin Side:	Shu Side:
Chencang Road	Jinniu Road
Baoye Road	Micang Road
Tangluo Road	Lizhi (or Yangba) Road
Ziwu Road	

There are other roads such as the Old Road, the Lianyun Road, the main Post Road, the Lishan Road and the Kugu Road; but while they should not be neglected they also most likely belong to a second rank of ancient roads or provide variations made up of the same segments in different combinations.

The problem is to get a clear and accepted path, even for the seven main roads. For example, the “Chencang Road” has a number of possible routes and variations. Most of the roads had periods when the route varied due to wars and/or lack of repair. When you look into the history of the routes there are some extra paths and ways that it is hard to leave out. For this reason, the seven roads have not yet been separated or identified in this way on the current presentation. At this stage, all of the main routes and some alternative routes have been made traceable in the main (Red) paths shown at this time but not specifically identified.

The plan is to identify the primary and separate segments that can be linked together into major or minor routes and also identify the varying routes that occurred in different periods. Discussions regarding other routes as well as the finally accepted paths of the main “7” (such as how to separate the Postal Road, the Old Chencang Road, the Old Road and the Lianyun Road in the middle section of the Qinling roads) need to be concluded and then a version will be produced where the major roads can be identified. In more detail, the plan is presently to make the “Post Road” a “backbone” for the system. It was the primary route from the Yuan Period (when it was travelled by Marco Polo) to the end of the Qing (when its northern section was recorded in the Qing Period Scroll Map) and it is well established and mapped. Its name in the northern part is the Bei Zhan and in the south the Jinniu Road. It is also intended for East-West linking roads to be identified along the Wei and Han River corridors as horizontal paths to which the others link. There may also need to be a similar East-West corridor in Sichuan but it is not yet clear. Adding the important river routes, especially along the Han and Jialing Rivers, is also a possible and valuable plan. It is important also to have “linking roads” that link to others like the Silk Road in the north through Gansu or the Tea-Horse Route to the south in Yunnan and to be able to vary the routes in major ways as occurred in the past dynasties.

It is possible to implement any of these ideas in the present system but it needs people to define or decide the pathways in a way that will be acceptable to other people first. For example, for the Yuan-Ming-Qing Post Road which is basically well defined, it can be selected by itself and look similar to the following:



Until the time this study is complete, you are welcome to use and “play with” the present demonstration presentations and (hopefully) suggest improvements and opinions. To contact me, it is best to use the CSIRO address if the email is to include Chinese Characters in the text, Otherwise, Chinese characters must be in an attachment but in that case it is also fine to use the Ozemail address:

CSIRO Address: David.Jupp@csiro.au

Ozemail Address: dlbjupp@ozemail.com.au

David Jupp
February 2012

7 References

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