Mosaics based on the Russian Topographic Map Series

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1 Russian Topographic Maps

In the 1960's, the Russian Military created a Topographic mapping series at 1:200k and 1:100k for much of China (East View Cartographic, 2005). It was based on aerial photography acquired during the period of China-Soviet Russia cooperation. These maps form a useful geographic base for mapping persistent Shu Roads as, at the time, the main changes since the 1930's had mainly been the construction of the Chengdu to Baoji Highway and the provision of some new railways. Many dams and highways were not yet built so that locations of towns and villages were also much as they had been for many years. The Shimen, Bailong, Shiquan and Ankang Dams (for example) did not yet exist and many of the provincial roads were apparently still only upgrades of paths used for many years. Towns that have since been flooded can be located in the Russian maps as they had been prior to 1930. The maps therefore provide an especially useful reference and source of reasonable estimates of the former roads and secondary tracks as well as locations of secondary towns prior to the major road and highway expansion that occurred after 1976.

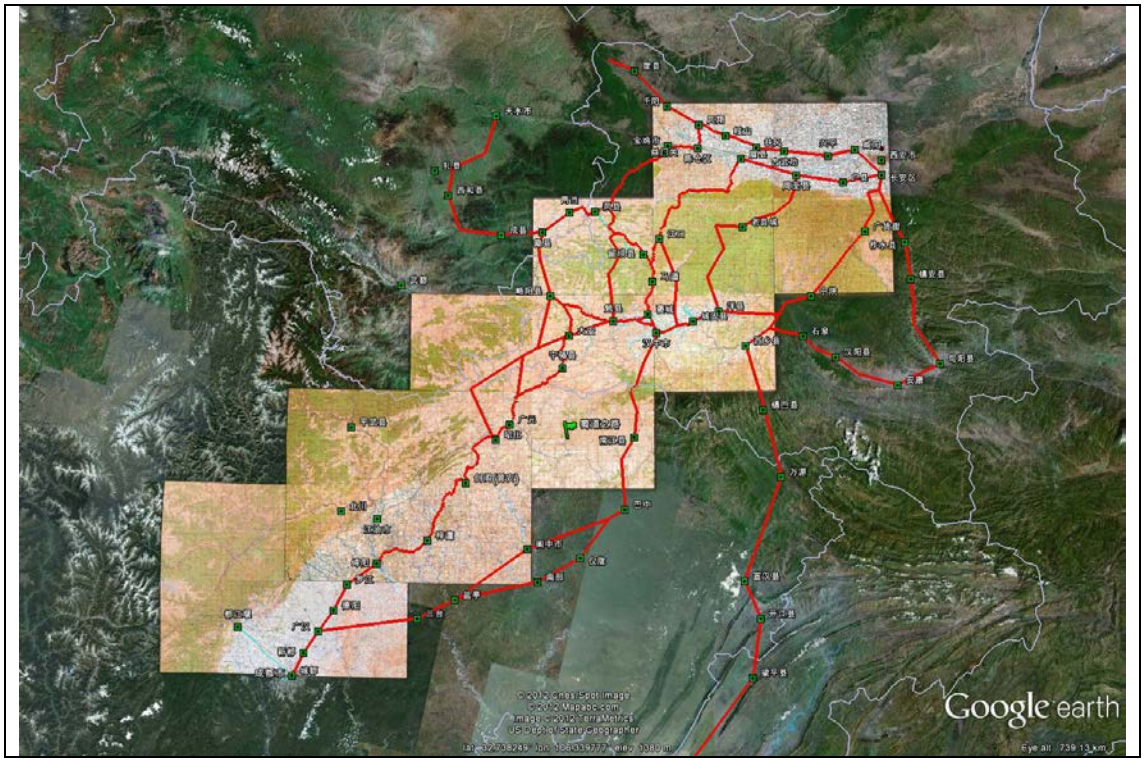
In addition to the intrinsic value of the maps they have filled a major need in our work. For much of this part of China, at the time many of the presentations were being developed, Google Earth had an excellent broad scale background Terrametrics image set and in selected places where high resolution data are available from satellites such as Quickbird or WorldView the images were also detailed and accurately registered to the ground. However, at scales between, the background images at that time based on SPOT imagery were very poor in quality and in registration. It was very risky to try and identify the location of features from this background. The Russian maps have in this situation provided a way to locate tracks and places accurately when modern high resolution background images were not yet provided for China. Thankfully, as of the beginning of 2013, the background images in the Qin Ling Mountains have been greatly improved and now provide an additional tool with which to locate tracks and paths.

1.1 The Base Mosaics

The base 1:200k map series comprises map sheets using the Gauss Kruger projection (zones 18 and 19 for the Shu Roads) based on the Pulkovo 1942 Datum and Krassovsky spheroid. They are Topographic Maps and so the emphasis is on a background of terrain contours and delineation of rivers and streams, gulleys and ridges. Across this landscape the communication and settlement patterns are placed to form useful reconnaissance maps. The 1:100k series divides each 1:200k map sheet into four. There is an excellent book describing these and other members of the map

series published in English by East View Cartographic (East View Cartographic, 2005) in which it is stated that the difference between the 1:200k and 1:100k for military purposes is that the 1:200k series were primarily for general reconnaissance and mission planning whilst the 1:100k maps were primarily for operational use, including in the field. The 1:100k series has many more unpaved and secondary roads, more detail in human land use and greater detail in terrain such as in rivers, gullies, ravines and streamlines. The annotations are finer and so places can be located with greater accuracy as well.

The map sheets selected were digitised at 400 dpi and geocoded by East View Cartographic (now called East View Geospatial, http://www.geospatial.com/). For the work we are doing in the Shu Roads area we have made use of some presentations in which 4 map sheets are grouped into super-mosaics. These can be viewed in Google Earth as network linked super overlays. In the case of the 1:200k maps, the digitised map sheets had a basic pixel size of near 12.5 metres. For the 1:100k series the pixel size was about 6.25m. This is over-sampled to preserve annotations and line work and the resolution was changed to 25m for the operational 1:200k (4 map sheet) mosaics we constructed for the Shu Road area. To import the mosaics of maps into Google Earth, the projection was changed to Geographic with close to 1 second resolution (0.00025 degrees). Examples of the 1:200k based mosaics are shown below.



A base “backbone” set of maps for the Shu Road fieldwork has been developed using 1:200k map sheets grouped into four and with change in scale to 25m as described above. The mosaics overlap in one primary map sheet as indicated in the Google Earth screen shot above. In all at this time there are five (5) mosaics from Chengdu to Xi’an. The problem to be resolved was that the five 1:200k mosaics already consist of more than 300 MB of image data. These have been made accessible for anyone to view in Google Earth using network linked super overlays in which only the necessary data at the current scale are downloaded over the web at any one time. This

has been done for the set currently available on the web. More mosaics are planned until the whole Shu Roads area is covered but unfortunately the present web area is at a limit in size. At present only the main postal road from Xi'an to Chengdu, the Baoxie Road, the Tangluo Road and parts of others are fully covered.

As an indication of resolution available, if an image of the 1:200k mosaic is at full "zoom" in Google Earth it may look like:

Zoom of Mosaic in the vicinity of Guangyuan

The Google Earth KMZ files can be accessed HERE or as part of the general collection of background information about the Shu Roads HERE. The colour balance and resolution will also be improved in the future. Similar products can be created with 1:100k maps (where the resolution is much more detailed than the above) and it is planned for this option to be first used in the area between Guangyuan and Jianmen Guan where there are considerable differences between the old road and the modern roads since the motor road was built.

The mosiacs cover an extensive area at a range of levels of detail. They can provide default routes where there are no GPS data as well as indications of change between the original (1930's) motor road and modern highways. The lists of places visited by the travellers can also be used to find where the ancient roads moved away from the highways. The 1:100k series includes important but un-paved roads so it is the best option for the latter use. The mosaics can also be downloaded from the web site via the collated table of materials assembled for recent field work:

http://www.qinshuroads.org/dalu_fieldwork/DaLu_References.htm

1.2 List of Mosaics

The Mosaics can be downloaded in a Zip file which includes the five 1:200k mosaics as separate KMZ files. Since only the linking KMZ files are needed and not the actual data, the file size is very small. The 1:200k mapsheet of the Chengdu area needed for the mosaic super-overlay was not available in paper form to scan. East View Cartographic therefore provided scans of the four 1:100k maps making it up. Because

the lines and annotations are finer on the 1:100k maps, when it was aggregated to 25m pixel scale there are times when the detailed annotation may be a little hard to read. If it is important to decipher these annotations they can be seen to finer detail in a mosaic of the four 1:100k maps. It will be provided when more space is available to allow this and to demonstrate benefits of moving to 1:100k scale in places where local detail is critical.

1.3 Naming Convention

To understand some of the names, it is helpful to know what primary naming convention has been used for the maps. The structure is within that of the Russian national series which is published at 1:25k, 1:50k, 1:100k, 1:200k, 1:500k and 1:1000k scales. But no maps at 1:25k or 1:50k are available for China. At 1:500k and 1:1000k the nomenclature is based on latitude and longitude and divides the earth's surface into latitudinal zones that are four (4) degrees wide and indicated by a capital letter (A-V); and longitudinal zones are six (6) degrees wide and indicated by a number (1-60). At 1:200k and finer, the map projection changes to UTM with the 6 degree zones being the standard UTM zones.

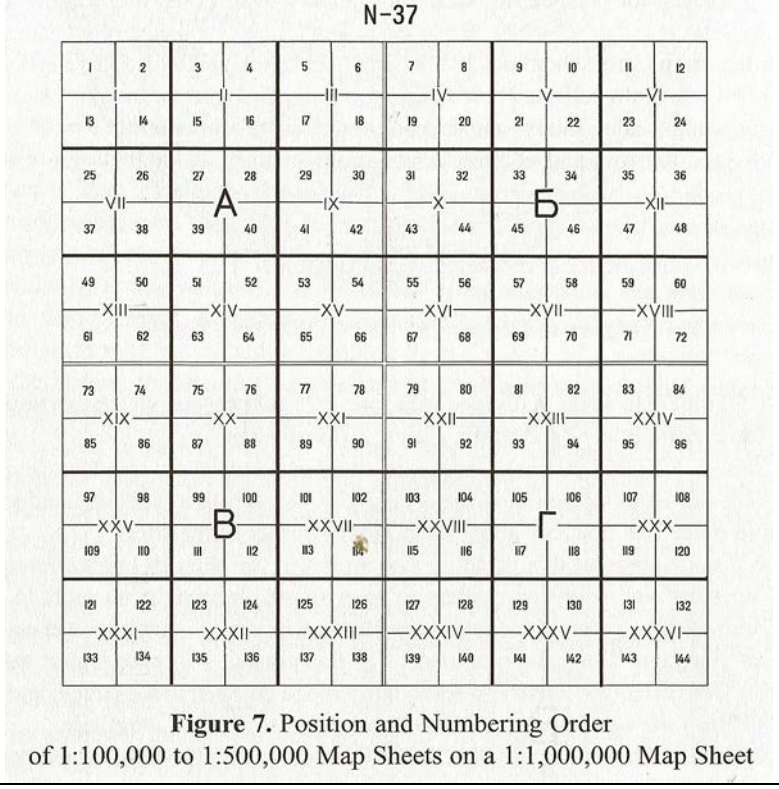


Figure 7. Position and Numbering Order of 1:100,000 to 1:500,000 Map Sheets on a 1:1,000,000 Map Sheet

Using an example from the maps we have, a 1:1000k map with label I-48 is a geographic projection bounded by latitudes 32 N and 36 N, whilst the longitudinal coverage is between 102 E and 108 E. This is a slice from UTM zone 48 bounded in the north by Latitude 36N and in the south by Latitude 32N. The 1:1000k map region is divided into four 1:500k maps which still have geographic projections and then 36 1:200k maps in 6 rows and 6 columns of maps. At the 1:200k scale the maps change to UTM metric projections with the data being within the 1 degree by 2/3 degree box

that subdivides the 1:1m map sheet I-48. Each 1:200k map sheet is also split into 4 1:100k map sheets with UTM projection rewsulting in a grid of 144 (12 by 12) 1:100k map sheets in the 1:1000k map region. The data are still bounded by the 1/2 degree by 1/3 degree box defined in the base rid. The above Figure from East View Cartographic (2005) illustrates the nomenclature.

To take another example, a missing 1:200k map sheet occurred just north of Chengdu. It is in the 1:1000k block called H-48 and in the 1:200k series the sub-box was denoted H-48-IX. The four 1:100k map sheets within it are called H-48-020, H-48-030, H-48-041 and H-48-042. This can be confirmed using the scanned Figure above. The problem is that when images are named it is easier to use Arabic numerals rather than Roman. So the 1:200k map sheet may be in a file called h4809.img which can be confused with a 1:100k file. This has not turned out a big problem yet but it is mentioned in case there is a case where it is ambiguous.

1.4 Projection Information

The 1:200k series and the 1:100k series are both presented in the Gauss-Krüger projection with Pulkovo 1942 (S-42) datum for the Krassovsky 1940 spheroid. This is (at almost all scales) identical to the standard Universal Transverse Mercator (UTM) projection with the same 6 degree zones that divide the world.

The longitude zones are numbered from 1 to 60 and start at longitude 180 E (ie the same place as 180 W), going east they number sequentially. In the Shu Roads work the main zones used are 48 and 49. Calculations will show that zone 48 will be between the longitudes of 102E and 108E with central meridian at 105 degrees. For zone 49, the bounding longitudes are 108E and 114E with central meridian 111 degrees east. It is possible to calculate the zone of any longitude quite simply. If we use the convention that -100 degrees means 100W and +100 degrees means 100E we can write:

$$N_{zone} = \left[\frac{\phi + 180}{6} \right] + 1$$

In this expression, ϕ is longitude in degrees with the above sign convention for east and west of the base longitude in Greenwich. The square brackets indicate the integer part of the result. For example, the longitude of Xi'an is about 108.94 degrees E and the longitude of Baoji is about 107.13 degrees E. Using the formula we find that the zones numbers for Xi'an and Baoji are 49 and 48 respectively. Canberra in Australia is at about 149.125 degrees E and the calculation yields a zone of 55 which is the correct UTM zone.

If the zone number is known, its central longitude meridian can be calculated as:

$$CM = (N_{zone} - 1) * 6 - 177$$

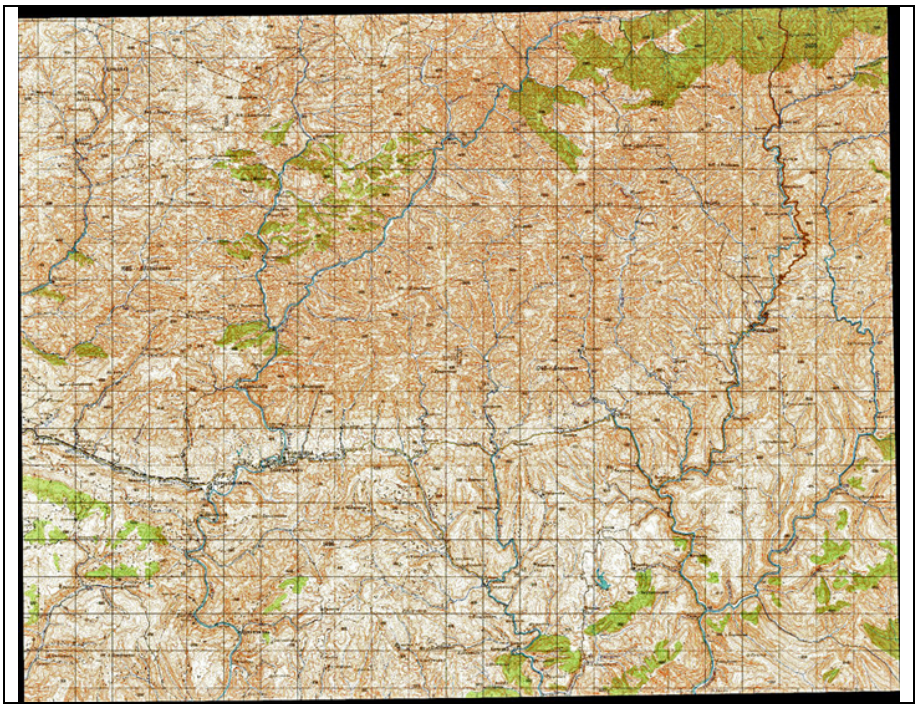
For zone 48 we find that the CM is 105 deg, for 49 it is 111 deg and for 55 it is 147 deg. These are all correct. The zone boundaries extent +- 3 deg either side of CM.

The latitude zones used for the Russian maps are different from those used in the west for UTM projections. They only apply to the northern hemisphere and start at the equator going north in steps of 4 degrees. In the same way as the longitude, a formula for the latitude zone number (ie 1 is A, 2 is B, … 14 is N etc) is:

$$N_{Lat} = \left[\frac{\lambda}{4} \right] + 1$$

In this expression, λ is latitude north in degrees. So, if we take the latitude of Xi'an to be about 34.26 degrees and that of Chengdu to be about 30.67 degrees we find that the latitude zone letter for Xi'an will be I (number is 9) and that for Chengdu will be H (number is 8). Since the letters A-V are used in the Russian series, it is clear that there are no maps above 82 degrees latitude North. These calculations allow you to define the 1:1000k map sheet in which any place in the northern hemisphere is located. Similar formulae can be used to refine the calculations to include the numbers for the 1:200k and 1:100k mosaic within that sheet. A spreadsheet is very useful.

The UTM projection is close to metric and "flat" within the zone. It is fully conformal at the central meridian and least conformal at the zone boundaries. But any errors are unimportant except perhaps for the most detailed surveying applications. As noted above, the Russian Topographic maps used here generally, after scanning at 400 PPI, had grid cell sizes of about 12.5 metres for the 1:200k maps and 6.25m for the 1:100k map. Distances are measured in metres and are metric and true to a high accuracy.



The edges of the UTM projected map are not square within the boundary of the map sheet. For example, the above image shows one of the scanned topographic maps (I-48-XXXV) and its rotated bounding box in the UTM projection. The black areas are outside of the bounds are defined using latitude and longitude but if the black areas

can be made “transparent” by a mosaicking program the map sheets can mosaic accurately without any “black” pixels in between.

An alternative is to convert the maps to geographic projection. In general, for a single map sheet we have used a grid cell size of 0.000125 degrees (a bit smaller than half a second) for 1:200k maps and half this for 1:100k maps. The result is that the data bounds are restored to a rectangular form and the borders can be easily cropped. For the 4 map mosaics, a geographic grid cell of 0.00025 degrees (a bit smaller than 1 second) is suitable. The maps in geographic coordinates are best for importing into Google Earth as super mosaics. At all of these resolutions, the text remains readable. This is important to interpret the maps and transcribe the Russian names.

1.5 Currently Available Maps and Mosaics

The currently available Russian Topographic Maps as images for the Shu Roads web site are as follows:

Original Example data set	
Shimen	Example Image near Shimen cut out of 1:100k data at full scale. Not a Super Overlay.
1:200k Mosaics - GE Super Overlay Mosaics	
RU200k_Xian_Mosaic_I48_18_24_I49_13_19_SO	New northern end mosaic 1:200k maps (includes Xi'an): I-48-XVIII, I-48-XXIV, I-49-XIII, I-49-XIX
JinNiu_BeiZhan_GE	Set of three superoverlays for 3 mosaics of 4 1:200k each between Xian and Chengdu. Two new end mosaics listed below. 1:200k Map sheets listed in following Table.
RU200k_Chengdu_H48_2_3_8_9_SO	New southern end Mosaic of 1:200k mosaic groups down to the “north gate” of Chengdu: H-48-II, H-48-III, H-48-VIII, H-48-IX

Figure – Complete 1:200k Holdings (current mosaics in green)

		I-48-XVI	I-48-XVII	I-48-XVIII	I-49-XIII	I-49-XIV	I-49-XV
		I-48-XXII	I-48-XXIII	I-48-XXIV	I-49-XIX	I-49-XX	I-49-XXI
I-48-XXVI	I-48-XXVII	I-48-XXVIII	I-48-XXIX	I-48-XXX	I-49-XXV	I-49-XXVI	I-49-XXVII
	I-48-XXXIII	I-48-XXXIV	I-48-XXXV	I-48-XXXVI	I-49-XXXI		
H-48-II	H-48-III	H-48-IV	H-48-V				
H-48-VIII	H-48-IX	H-48-X	H-48-XI				

Figure – 1:100k Holdings as yellow highlight of 1:200k mapsheets – each has 4

		I-48-XVI	I-48-XVII	I-48-XVIII	I-49-XIII	I-49-XIV	I-49-XV
		I-48-XXII	I-48-XXIII	I-48-XXIV	I-49-XIX	I-49-XX	I-49-XXI
I-48-XXVI	I-48-XXVII	I-48-XXVIII	I-48-XXIX	I-48-XXX	I-49-XXV	I-49-XXVI	I-49-XXVII
	I-48-XXXIII	I-48-XXXIV	I-48-XXXV	I-48-XXXVI	I-49-XXXI		
H-48-II	H-48-III	H-48-IV	H-48-V				
H-48-VIII	H-48-IX	H-48-X	H-48-XI				

You are welcome to download the KMZ files comprising the 5 mosaics and view the data, its form and content. They are accessible along with other Google Earth presentations at:

http://www.qinshuroads.org/Google/GE_KMZ_Files.htm

The mosaics can also be downloaded via the collated table of reports and background materials arising from recent field work that made extensive use of the information they provide:

http://www.qinshuroads.org/dalu_fieldwork/DaLu_References.htm

2 Map Interpretation

The main highway in the above Guangyuan map section is the thick orange line. It often differs locally from the modern Highway G108 which is the road used by provincial and local traffic today and different again from the main interprovince routes and tollways. But they are all obviously just different "generations" of the same road that was built (in this area) during or after 1935. The railway is shown in the Russian map but the Bailong Shui dam (like the Shimen Dam) is not yet built. The accuracy seems good apart from a possible small "datum shift". The datum shift is more relevant in 1:100k maps as accuracy is a prime factor in their use. Small townships and villages are also indicated by clusters of buildings interpreted from aerial photography and many are only indicated in Russian as "*поселок*" or "dwellings". The river systems are clearly depicted and are fully consistent with terrain and the stream levels are more detailed than that in many modern maps of the same scale.

However, to fully use the maps, it is clear that the icons and annotations need to be understood. The icons are explained in full in Psarev (2003) which can be obtained in an English translation by East View Cartographic (2005) through their web site. But it is clear it is not the icons and symbols but rather the Cyrillic text on the maps that is the greatest barrier to complete use of the Russian maps! Many Chinese have said that the maps are too hard to understand, but (in fact) we will show how it is possible with the right supporting tools to make good progress and convert all important names from the Cyrillic into Pinyin. The step from Cyrillic into characters requires them to be identified in maps with Chinese characters from the Pinyin name.

The key to the first step (Cyrillic to Pinyin) is to realise that the Chinese names have been transliterated to Russian using a well defined Chinese to Russian transliteration that can be mapped to Pinyin. It was devised originally by a Russian Orthodox Priest called Petre Ivanovitch Koporoff (1817-1878) whose religious name was Palladius. So, the system is called the "Palladius System". The consistency of use of the Palladius system in these maps was established by transliterating many examples. There are a few differences as these maps use some older forms (the older and modern Palladius systems have a few minor differences) but they are easy to identify and most confusions are due to errors in transliteration than in mapping rather than any difficulty in the conversion. The Russian text uses the printing form for main place names and the cursive form for villages, rivers etc. A Table has therefore been set up to help understand the Russian names by matching both printing and cursive forms of the Palladius system with pinyin. It is included here as an Appendix and is also available as a separate PDF file on the web site.

There are also a few Russian language annotations on the map. Not all have been identified in the areas of interest. One that occurs quite often in these maps is "**ХРЕБЕТ**" meaning "Mountain Ridge" or "Mountain Range" and below we will come across an example of the abbreviation "*Кан.*" used to indicate that the item is a "canal" (in this case an irrigation canal). Others found so far include the abbreviation "*пер.*" for a pass in mountains and a common expression in rural areas is the annotation "*поселок*" which usually indicates a few huts for which the name on the

map is not known. It is Russian for “dwellings”. On the Guangyuan subset above you can also see the abbreviation “*тун.*” for tunnel and it refers to the tunnels in the nearby railway. As more examples of these standard Russian expressions are found they will be recorded. The current extent of the Table is as follows:

Russian Abbreviations or phrases found on maps to date

Map	Full printed form	Meaning
ХРЕБЕТ	**хребет**	Mountain Ridge/Range
КАН. or ***Кан.***	**канал**	Abbreviation for Canal (includes irrigation canals)
поселок	**поселок**	Settlement or dwellings
пер.	**перевал**	Abbreviation for Pass in mountains.
горный проход	**горный проход**	mountain pass (gate)
г.	**горный**	Mountain (peak)
тун.	**туннель**	Abbreviation for Tunnel

To give an example of the process of transliteration, on the zoomed map section above, the main town shown is written “ГУАНЬЮАНЬ” which should be looked at as two characters “Гуань-Юань” or (using the Table) Guan Yuan. It should actually be “ГУАНЮАНЬ” or Guangyuan (广元). This is an example of an error in the transliteration. I have purposely used this example as a warning and it illustrates a common mistake of the person making the conversion including or leaving out a Cyrillic “–ь” (soft tone). Usually, however, the transliteration is good and also when there are mistakes they are usually one of a number of common errors that can be recognized with a little experience. The plain area under the main city is called “ЖУНШАНЬ”. Using the table this can first be separated as “Жун-Шань” and interpreted as Rong Shan. Further south and west is “ХЭСИ” or “Хэ-Си” interpreted as He Xi. These names are not on my current map but that is how they convert.

A common pattern in the Cyrillic is that “–нь” is “-n” and “–н” is “-ng”. So, that Гуа is Gua, Гуань is Guan and Гуан is Guang (the case here), Ся is Xia, Сянь is Xian and Сян is Xiang, Цзи is Ji, Цзинь is Jin and Цзин is Jing, Ша is Sha, Шань is Shan and Шан is Shang etc. The “ь” is not a primary letter but softens the preceding syllable. A person using the Table for a while will soon get used to typical pinyin elements and the patterns and to the more common transcription errors like the ones described above.

As a second example, the next extract is from an area near Hanzhong:

Zoom of Mosaic in the vicinity of Chenggu

The main town is “ЧЭНГУ” which is two characters as “Чэн-Гу” and using the Palladius-Pinyin table this translates as Cheng-Gu or Chenggu (城固). The river from left to right is the Han River. There is a tributary entering the Han from the north-west with the name (in cursive script) of *Сюйшуй* or Сюйшуй in printing script or Сюй-шуй as characters giving us Xu Shui. Today the river is the Xushui He or 湑水河.

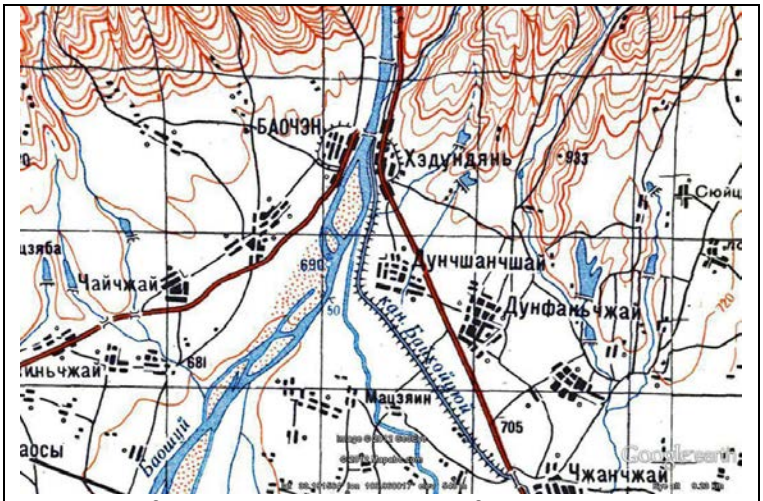
There is a bridge crossing the Han and the next township south-east is called Циньцзяба or Цинь-цзя-ба giving us Qin Jia Ba, or Qinjia Ba. On the other side of the river from Qinjia Ba is Чисюйцунь or Чи-сюй-цунь which using the Palladius-Pinyin Table maps to Chixu Cun. Neither of these seems to be on current general maps but next to Qinjia Ba is an annotation: Лунванмяо or Лун-ван-мяо which maps to Longwang Miao (龙王庙) or the Dragon King Temple. There is such a place on current maps but the area has been significantly affected by a modern freeway so there may also have been changes to the townships. Northeast of Chenggu is a village called У лан мяо or Wulang Miao (五郎庙, Five Bridegrooms Temple). This is the name of a village at the same place today. On the railway at the eastern end of the sub-image is Се цунь or Xiecun (谢村) which is a station on the railway today. However, it does not look as important on the Russian map as some other places that cannot be found on modern maps. Note, цунь or “cun” is a common designator for a village although in the case of this village, “cun” has become part of its name and it has been promoted to a township or “zhen” (镇). After a while the common designators can be collected in a Table or simply remembered.

Finally, we will look at differences between the 1:100k and 1:200k maps and their levels of detail using an area near the area where the Bao River leaves the mountains and comes to the Han Basin. First, the 1:200k, which is now zoomed in further than the above examples to match the extent of the 1:100k to come next:

Zoom of Mosaic in the vicinity of Baocheng 1:200k

In the north there are two paired places; one is Баочэн or Бао-чэн which translates to Bao Cheng or Baocheng (褒城). This is a well known place on the Shu Roads. Across the river is Хэдуньдянь or Хэ-дунь-дянь which becomes He Dun Dian which is NOT correct. There is an obvious error and it should be transliterated Хэ-дун-дянь or Hedongdian (河东店). дунь is dun as there is no “don” in pinyin, and дун is dong with the pattern based on the soft tone pattern “–ь” as discussed earlier. There are clearly mistakes hidden among the transliterations which make identifying the Pinyin harder. South of Hedongdian there are two towns. One is written Дун чшан чшай but this is not a correct construction in the modern Palladius system (there is no чш). What is more likely is Дун чжан чжай which in separated form is Дун-чжан-чжай or Dong Zhang Zhai. The other town is written Дун фань чжай or Dong Fan Zhai. There are certainly villages called Zhangzhai (张寨) and Fanzhai (范寨) on modern maps. The “dong” could be “east” (东) meaning the east side of the river. At the bottom of the screen is Чжан чжай or Zhang Zhai. It certainly looks even more likely that the east Zhangzhai was transliterated wrongly. On the other side of the river to Hedongdian (same side as Baocheng) is Чай чжай or Chai Zhai (柴寨). There is a place on the road to Mianxian in the same place today. The need to interpret “чш” as “чж” has been noted in the Palladius Table to help prevent confusion. It is most likely to be an older construct (there are others noted in the Table) but it is certainly not modern useage. As people gain experience with the interpretations it is hoped some consistent checks for “errors” and variations will emerge and be documented to make the task easier.

If the 1:100k map is used, most of the same towns and villages appear (with the same errors) but there is greater detail and map accuracy is higher at the same scale. In theory, important but un-paved roads are included. The towns above are identified more precisely on the equivalent 1:100k sub-set below:



Zoom of Mosaic in the vicinity of Baocheng 1:100k

This map names the river as *Баошуй* or Bao Shui (褒水) and the irrigation channel on the right is called *Кан. Байхойцюй*. "*Кан.*" is Russian and not pinyin and is an abbreviation of the Russian for "canal". The Russian *хой* is an old form of Palladius which is today represented as *хуэй* (or хуэй in printing script). The change is noted in the Table. The pinyin is "hui". Baihuiqu seems to be the correct Chinese name but it is not on maps I have. In the bottom centre is Ма цзя ин or Majia Ying. This is a name you can expect for a village here (perhaps 马家营) but it cannot be found on my maps. On the other hand, Чай чжай or Chai Zhai (柴寨) Cun is certainly still in the place where it is shown.

We can conclude that 1:200k maps are sufficient for major towns such as county centres and main roads and 1:100k will be better for village level towns and secondary roads which can (according to the Book) be un-paved. The 1:100k series must also be used if you wish to make use of the contours – such as by digitizing them. However, errors in transliteration and possible changes in name at village level make the task of interpreting the name more difficult than using roads and terrain information. It is simple enough to recognize and transliterate names of mountains, rivers and other geographic features, but the names at village level are more difficult to determine since they may have changed. This is true even today as they are still changing in modern maps. But perhaps towns today at "Zhen" (镇) and higher level have not changed as much and can be usefully transliterated. This needs to be investigated as it would help our task. Despite the nuisance of mistakes, it is possible to interpret the maps from Cyrillic to Pinyin, even without knowing Russian, and there are many fixed forms (such as –цунь or "cun" for village (村) that quickly become known to a person undertaking the task. Perhaps all of the commonly occurring designators can be put into a table to help the process and the Tables have quick index options. This will become more important later after the primary use – providing routes for the older roads – has been completed.

3 Work Plan for present and future Mosaics

As indicated in the previous lists of map sheets scanned and held by this project, the coverage is much wider than that of the central set of mosaics currently provided on the web. The plan is to extend the coverage to all of the areas where there is data. To keep data downloads down in size, it is planned to change the mosaics to non-overlapping groups. This may make a few small gaps appear at times between maps or mosaics – especially in mountains, but will be more efficient in download time. It is also planned to improve the colour balance of the images and provide mosaics of 4 1:100k maps making up the area of the 1:200k map sheets where these are available. A number of important areas will therefore have much motre detailed terrain and road network data available.

A primary use of the maps at the present time is to identify places on older roads and ancient routes and to provide reasonable estimates of older tracks where they seem to coincide with secondary roads and paths in the maps. The terrain and hydrological information is also very good. This information has already been used in an investigation of the Tangluo Road as reported by Sir Eric Teichman during a journey he made in 1917 and by Chinese scholars from older references. The Russian names were transliterated and paths used to provide a modern interpretation of the various tracks of the road network in the past. The result is available as a Google Earth presentation and a full description can be found HERE. It is anticipated that similar exercises will be done along other sections of the old road.

4 References

East View Cartographic (2005). *Russian Military Mapping: A Guide to using the most comprehensive source of global geospatial intelligence*. Translation from Russian. (Russian edition edited by Maj. General Valery N. Filatov), East View Cartographic, Minneapolis, 188p.

Project Material, http://www.qinshuroads.org/dalu_fieldwork/DaLu_References.htm

5 Appendix: Palladius-Pinyin Conversion Table

Material from http://en.wikipedia.org/wiki/Cyrillization_of_Chinese was used but re-ordered and arranged, and older forms found in our maps added for convenience to our task. The above article should be read by people making serious attempts to convert the maps to Pinyin.

Palladius (Petre Ivanovitch Koporoff, 1817-1878). Transliteration between Cyrillic and Pinyin. Yellow highlight indicates older forms or expressions sometimes used in the 1960's Russian maps.

Cyrillic (Cap at front)	Cyrillic (LC)	Cyrillic (Cap Cursive	Cyrillic (LC Cursive)	Pinyin
А	а	*А*	*а*	a
Ай	ай	*Ай*	*ай*	ai
Ан	ан	*Ан*	*ан*	ang
Ань	ань	*Ань*	*ань*	an
Ао	ао	*Ао*	*ао*	ao
Ба	ба	*Ба*	*ба*	ba
Бай	бай	*Бай*	*бай*	bai
Бан	бан	*Бан*	*бан*	bang
Бань	бань	*Бань*	*бань*	ban
Бао	бао	*Бао*	*бао*	bao
Бе	бе	*Бе*	*бе*	bie
Би	би	*Би*	*би*	bi
Бин	бин	*Бин*	*бин*	bing
Бинь	бинь	*Бинь*	*бинь*	bin
Бо	бо	*Бо*	*бо*	bo
Бу	бу	*Бу*	*бу*	bu
Бэй	бэй	*Бэй*	*бэй*	bei
Бэн	бэн	*Бэн*	*бэн*	beng
Бэнь	бэнь	*Бэнь*	*бэнь*	ben
Бянь	бянь	*Бянь*	*бянь*	bian
Бяо	бяо	*Бяо*	*бяо*	biao
Ва	ва	*Ва*	*ва*	wa
Вай	вай	*Вай*	*вай*	wai
Ван	ван	*Ван*	*ван*	wang
Вань	вань	*Вань*	*вань*	wan
Во	во	*Во*	*во*	wo
Вэй	вэй	*Вэй*	*вэй*	wei
Вэн	вэн	*Вэн*	*вэн*	weng

Вэнь	вэнь	*Вэнь*	*вэнь*	wen
Га	га	*Га*	*га*	ga
Гай	гай	*Гай*	*гай*	gai
Ган	ган	*Ган*	*ган*	gang
Гань	гань	*Гань*	*гань*	gan
Гао	гао	*Гао*	*гао*	gao
Го	го	*Го*	*го*	guo
Гоу	гоу	*Гоу*	*гоу*	gou
Гу	гу	*Гу*	*гу*	gu
Гуа	гуа	*Гуа*	*гуа*	gua
Гуай	гуай	*Гуай*	*гуай*	guai
Гуан	гуан	*Гуан*	*гуан*	guang
Гуань	гуань	*Гуань*	*гуань*	guan
Гуй	гуй	*Гуй*	*гуй*	gui
Гун	гун	*Гун*	*гун*	gong
Гунь	гунь	*Гунь*	*гунь*	gun
Гэ	гэ	*Гэ*	*гэ*	ge
Гэй	гэй	*Гэй*	*гэй*	gei
Гэн	гэн	*Гэн*	*гэн*	geng
Гэнь	гэнь	*Гэнь*	*гэнь*	gen
Да	да	*Да*	*да*	da
Дай	дай	*Дай*	*дай*	dai
Дан	дан	*Дан*	*дан*	dang
Дань	дань	*Дань*	*дань*	dan
Дао	дао	*Дао*	*дао*	dao
Де	де	*Де*	*де*	die
Ди	ди	*Ди*	*ди*	di
Дин	дин	*Дин*	*дин*	ding
До	до	*До*	*до*	duo
Доу	доу	*Доу*	*доу*	dou
Ду	ду	*Ду*	*ду*	du
Дуань	дуань	*Дуань*	*дуань*	duan
Дуй	дуй	*Дуй*	*дуй*	dui
Дун	дун	*Дун*	*дун*	dong
Дунь	дунь	*Дунь*	*дунь*	dun
Дэ	дэ	*Дэ*	*дэ*	de
Дэй	дэй	*Дэй*	*дэй*	dei
Дэн	дэн	*Дэн*	*дэн*	deng
Дэнь	дэнь	*Дэнь*	*дэнь*	den
Дю	дю	*Дю*	*дю*	diu
Дя	дя	*Дя*	*дя*	dia
Дянь	дянь	*Дянь*	*дянь*	dian

Дяо	дяо	*Дяо*	*дяо*	diao
Е	е	*Е*	*е*	ye
Ё	ё	*Ё*	*ё*	yo
Жан	жан	*Жан*	*жан*	rang
Жань	жань	*Жань*	*жань*	ran
Жао	жао	*Жао*	*жао*	rao
Жи	жи	*Жи*	*жи*	ri
Жо	жо	*Жо*	*жо*	ruo
Жоу	жоу	*Жоу*	*жоу*	rou
Жу	жу	*Жу*	*жу*	ru
Жуа	жуа	*Жуа*	*жуа*	rua
Жуань	жуань	*Жуань*	*жуань*	ruan
Жуй	жуй	*Жуй*	*жуй*	rui
Жун	жун	*Жун*	*жун*	rong
Жунь	жунь	*Жунь*	*жунь*	run
Жэ	жэ	*Жэ*	*жэ*	re
Жэн	жэн	*Жэн*	*жэн*	reng
Жэнь	жэнь	*Жэнь*	*жэнь*	ren
И	и	*И*	*и*	yi
Ин	ин	*Ин*	*ин*	ying
Инь	инь	*Инь*	*инь*	yin
Ка	ка	*Ка*	*ка*	ka
Кай	кай	*Кай*	*кай*	kai
Кан	кан	*Кан*	*кан*	kang
Кань	кань	*Кань*	*кань*	kan
Као	као	*Као*	*као*	kao
Ко	ко	*Ко*	*ко*	kuo
Коу	коу	*Коу*	*коу*	kou
Ку	ку	*Ку*	*ку*	ku
Куа	куа	*Куа*	*куа*	kua
Куай	куай	*Куай*	*куай*	kuai
Куан	куан	*Куан*	*куан*	kuang
Куань	куань	*Куань*	*куань*	kuan
Куй	куй	*Куй*	*куй*	kui
Кун	кун	*Кун*	*кун*	kong
Кунь	кунь	*Кунь*	*кунь*	kun
Кэ	кэ	*Кэ*	*кэ*	ke
Кэн	кэн	*Кэн*	*кэн*	keng
Кэнь	кэнь	*Кэнь*	*кэнь*	ken
Ла	ла	*Ла*	*ла*	la
Лай	лай	*Лай*	*лай*	lai
Лан	лан	*Лан*	*лан*	lang

Лань	лань	*Лань*	*лань*	lan
Лао	лао	*Лао*	*лао*	lao
Ле	ле	*Ле*	*ле*	lie
Ли	ли	*Ли*	*ли*	li
Лин	лин	*Лин*	*лин*	ling
Линь	линь	*Линь*	*линь*	lin
Ло	ло	*Ло*	*ло*	luo
Лоу	лоу	*Лоу*	*лоу*	lou
Лу	лу	*Лу*	*лу*	lu
Луань	луань	*Луань*	*луань*	luan
Лун	лун	*Лун*	*лун*	long
Лунь	лунь	*Лунь*	*лунь*	lun
Лэ	лэ	*Лэ*	*лэ*	le
Лэй	лэй	*Лэй*	*лэй*	lei
Лэн	лэн	*Лэн*	*лэн*	leng
Лю	лю	*Лю*	*лю*	liu
Люй	люй	*Люй*	*люй*	lü
Люэ	люэ	*Люэ*	*люэ*	lue
Ля	ля	*Ля*	*ля*	lia
Лян	лян	*Лян*	*лян*	liang
Лянь	лянь	*Лянь*	*лянь*	lian
Ляо	ляо	*Ляо*	*ляо*	liao
Ма	ма	*Ма*	*ма*	ma
Май	май	*Май*	*май*	mai
Ман	ман	*Ман*	*ман*	mang
Мань	мань	*Мань*	*мань*	man
Мао	мао	*Мао*	*мао*	mao
Ме	ме	*Ме*	*ме*	mie
Ми	ми	*Ми*	*ми*	mi
Мин	мин	*Мин*	*мин*	ming
Минь	минь	*Минь*	*минь*	min
Мо	мо	*Мо*	*мо*	mo
Моу	моу	*Моу*	*моу*	mou
Му	му	*Му*	*му*	mu
Мэ	мэ	*Мэ*	*мэ*	me
Мэй	мэй	*Мэй*	*мэй*	mei
Мэн (prev. Мын)	мэн (prev. мын)	*Мэн (prev. Мын)*	*мэн (prev. мын)*	meng
Мэнь (prev. Мынь)	мэнь (prev. мынь)	*Мэнь (prev. Мынь)*	*мэнь (prev. мынь)*	men
Мю	мю	*Мю*	*мю*	miu
Мянь	мянь	*Мянь*	*мянь*	mian

Мяо	мяо	*Мяо*	*мяо*	miao
На	на	*На*	*на*	na
Най	най	*Най*	*най*	nai
Нан	нан	*Нан*	*нан*	nang
Нань	нань	*Нань*	*нань*	nan
Нао	нао	*Нао*	*нао*	nao
Не	не	*Не*	*не*	nie
Ни	ни	*Ни*	*ни*	ni
Нин	нин	*Нин*	*нин*	ning
Нинь	нинь	*Нинь*	*нинь*	nin
Но	но	*Но*	*но*	nuo
Ноу	ноу	*Ноу*	*ноу*	nou
Ну	ну	*Ну*	*ну*	nu
Нуань	нуань	*Нуань*	*нуань*	nuan
Нун	нун	*Нун*	*нун*	nong
Нэ	нэ	*Нэ*	*нэ*	ne
Нэй	нэй	*Нэй*	*нэй*	nei
Нэн	нэн	*Нэн*	*нэн*	neng
Нэнь	нэнь	*Нэнь*	*нэнь*	nen
Ню	ню	*Ню*	*ню*	niu
Нюй	нюй	*Нюй*	*нюй*	nü
Нюэ	нюэ	*Нюэ*	*нюэ*	nue
Нян	нян	*Нян*	*нян*	niang
Нянь	нянь	*Нянь*	*нянь*	nian
Няо	няо	*Няо*	*няо*	niao
-О	-о	*-О*	*-о*	-o
-Оу	-оу	*-Оу*	*-оу*	-ou
Па	па	*Па*	*па*	pa
Пай	пай	*Пай*	*пай*	pai
Пан	пан	*Пан*	*пан*	pang
Пань	пань	*Пань*	*пань*	pan
Пао	пао	*Пао*	*пао*	pao
Пе	пе	*Пе*	*пе*	pie
Пи	пи	*Пи*	*пи*	pi
Пин	пин	*Пин*	*пин*	ping
Пинь	пинь	*Пинь*	*пинь*	pin
По	по	*По*	*по*	po
Поу	поу	*Поу*	*поу*	pou
Пу	пу	*Пу*	*пу*	pu
Пэй	пэй	*Пэй*	*пэй*	pei
Пэн (prev. Пын)	пэн (prev. пын)	*Пэн (prev. Пын)*	*пэн (prev. пын)*	peng

Пэнь	пэнь	*Пэнь*	*пэнь*	pen
Пянь	пянь	*Пянь*	*пянь*	pian
Пяо	пяо	*Пяо*	*пяо*	piao
Са	са	*Са*	*са*	sa
Сай	сай	*Сай*	*сай*	sai
Сан	сан	*Сан*	*сан*	sang
Сань	сань	*Сань*	*сань*	san
Сао	сао	*Сао*	*сао*	sao
Се	се	*Се*	*се*	xie
Си	си	*Си*	*си*	xi
Син	син	*Син*	*син*	xing
Синь	синь	*Синь*	*синь*	xin
Со	со	*Со*	*со*	suo
Соу	соу	*Соу*	*соу*	sou
Су	су	*Су*	*су*	su
Суань	суань	*Суань*	*суань*	suan
Суй	суй	*Суй*	*суй*	sui
Сун	сун	*Сун*	*сун*	song
Сунь	сунь	*Сунь*	*сунь*	sun
Сы	сы	*Сы*	*сы*	si
Сэ	сэ	*Сэ*	*сэ*	se
Сэн	сэн	*Сэн*	*сэн*	seng
Сэнь	сэнь	*Сэнь*	*сэнь*	sen
Сю	сю	*Сю*	*сю*	xiu
Сюань	сюань	*Сюань*	*сюань*	xuan
Сюй	сюй	*Сюй*	*сюй*	xu
Сюн	сюн	*Сюн*	*сюн*	xiong
Сюнь	сюнь	*Сюнь*	*сюнь*	xun
Сюэ	сюэ	*Сюэ*	*сюэ*	xue
Ся	ся	*Ся*	*ся*	xia
Сян	сян	*Сян*	*сян*	xiang
Сянь	сянь	*Сянь*	*сянь*	xian
Сяо	сяо	*Сяо*	*сяо*	xiao
Та	та	*Та*	*та*	ta
Тай	тай	*Тай*	*тай*	tai
Тан	тан	*Тан*	*тан*	tang
Тань	тань	*Тань*	*тань*	tan
Тао	тао	*Тао*	*тао*	tao
Те	те	*Те*	*те*	tie
Ти	ти	*Ти*	*ти*	ti
Тин	тин	*Тин*	*тин*	ting
То	то	*То*	*то*	tuo

Тоу	тоу	*Тоу*	*тоу*	tou
Ту	ту	*Ту*	*ту*	tu
Туань	туань	*Туань*	*туань*	tuan
Туй	туй	*Туй*	*туй*	tui
Тун	тун	*Тун*	*тун*	tong
Тунь	тунь	*Тунь*	*тунь*	tun
Тэ	тэ	*Тэ*	*тэ*	te
-Тэй	-тэй	*-тэй*	*-тэй*	-tei
Тэн	тэн	*Тэн*	*тэн*	teng
Тянь	тянь	*Тянь*	*тянь*	tian
Тяо	тяо	*Тяо*	*тяо*	tiao
У	у	*У*	*у*	wu
Фа	фа	*Фа*	*фа*	fa
Фан	фан	*Фан*	*фан*	fang
Фань	фань	*Фань*	*фань*	fan
Фо	фо	*Фо*	*фо*	fo
Фоу	фоу	*Фоу*	*фоу*	fou
Фу	фу	*Фу*	*фу*	fu
Фэй	фэй	*Фэй*	*фэй*	fei
Фэн (prev. Фын)	фэн (prev. фын)	*Фэн (prev. Фын)*	*фэн (prev. фын)*	feng
Фэнь (prev. Фынь)	фэнь (prev. фынь)	*Фэнь (prev. Фынь)*	*фэнь (prev. фынь)*	fen
Ха	ха	*Ха*	*ха*	ha
Хай	хай	*Хай*	*хай*	hai
Хан	хан	*Хан*	*хан*	hang
Хань	хань	*Хань*	*хань*	han
Хао	хао	*Хао*	*хао*	hao
Хо	хо	*Хо*	*хо*	huo
Хоу	хоу	*Хоу*	*хоу*	hou
Ху	ху	*Ху*	*ху*	hu
Хуа	хуа	*Хуа*	*хуа*	hua
Хуай	хуай	*Хуай*	*хуай*	huai
Хуан	хуан	*Хуан*	*хуан*	huang
Хуань	хуань	*Хуань*	*хуань*	huan
Хун	хун	*Хун*	*хун*	hong
Хунь	хунь	*Хунь*	*хунь*	hun
Хуэй (or Хой)	хуэй (or хой)	*Хуэй (or Хой)*	*хуэй (or хой)*	hui
Хэ	хэ	*Хэ*	*хэ*	he
Хэй	хэй	*Хэй*	*хэй*	hei
Хэн	хэн	*Хэн*	*хэн*	heng

Хэнь	хэнь	*Хэнь*	*хэнь*	hen
Ца	ца	*Ца*	*ца*	ca
Цай	цай	*Цай*	*цай*	cai
Цан	цан	*Цан*	*цан*	cang
Цань	цань	*Цань*	*цань*	can
Цао	цао	*Цао*	*цао*	cao
Це	це	*Це*	*це*	qie
Цза	цза	*Цза*	*цза*	za
Цзай	цзай	*Цзай*	*цзай*	zai
Цзан	цзан	*Цзан*	*цзан*	zang
Цзань	цзань	*Цзань*	*цзань*	zan
Цзао	цзао	*Цзао*	*цзао*	zao
Цзе	цзе	*Цзе*	*цзе*	jie
Цзи	цзи	*Цзи*	*цзи*	ji
Цзин	цзин	*Цзин*	*цзин*	jing
Цзинь	цзинь	*Цзинь*	*цзинь*	jin
Цзо	цзо	*Цзо*	*цзо*	zuo
Цзоу	цзоу	*Цзоу*	*цзоу*	zou
Цзу	цзу	*Цзу*	*цзу*	zu
Цзуань	цзуань	*Цзуань*	*цзуань*	zuan
Цзуй	цзуй	*Цзуй*	*цзуй*	zui
Цзун	цзун	*Цзун*	*цзун*	zong
Цзунь	цзунь	*Цзунь*	*цзунь*	zun
Цзы	цзы	*Цзы*	*цзы*	zi
Цзэ	цзэ	*Цзэ*	*цзэ*	ze
Цзэй	цзэй	*Цзэй*	*цзэй*	zei
Цзэн	цзэн	*Цзэн*	*цзэн*	zeng
Цзэнь	цзэнь	*Цзэнь*	*цзэнь*	zen
Цзю	цзю	*Цзю*	*цзю*	jiu
Цзюань	цзюань	*Цзюань*	*цзюань*	juan
Цзюй	цзюй	*Цзюй*	*цзюй*	ju
Цзюн	цзюн	*Цзюн*	*цзюн*	jiong
Цзюнь	цзюнь	*Цзюнь*	*цзюнь*	jun
Цзюэ	цзюэ	*Цзюэ*	*цзюэ*	jue
Цзя	цзя	*Цзя*	*цзя*	jia
Цзян	цзян	*Цзян*	*цзян*	jiang
Цзянь	цзянь	*Цзянь*	*цзянь*	jian
Цзяо	цзяо	*Цзяо*	*цзяо*	jiao
Ци	ци	*Ци*	*ци*	qi
Цин	цин	*Цин*	*цин*	qing
Цинь	цинь	*Цинь*	*цинь*	qin
Цо	цо	*Цо*	*цо*	cuo

Цоу	цоу	*Цоу*	*цоу*	cou
Цу	цу	*Цу*	*цу*	cu
Цуань	цуань	*Цуань*	*цуань*	Cuan, cun?
Цуй	цуй	*Цуй*	*цуй*	cui
Цун	цун	*Цун*	*цун*	cong
Цунь	цунь	*Цунь*	*цунь*	cun
Цы	цы	*Цы*	*цы*	ci
Цэ	цэ	*Цэ*	*цэ*	ce
Цэн	цэн	*Цэн*	*цэн*	ceng
Цэнь	цэнь	*Цэнь*	*цэнь*	cen
Цю	цю	*Цю*	*цю*	qiu
Цюань	цюань	*Цюань*	*цюань*	quan
Цюй	цюй	*Цюй*	*цюй*	qu
Цюн	цюн	*Цюн*	*цюн*	qiong
Цюнь	цюнь	*Цюнь*	*цюнь*	qun
Цюэ	цюэ	*Цюэ*	*цюэ*	que
Ця	ця	*Ця*	*ця*	qia
Цян	цян	*Цян*	*цян*	qiang
Цянь	цянь	*Цянь*	*цянь*	qian
Цяо	цяо	*Цяо*	*цяо*	qiao
Ча	ча	*Ча*	*ча*	cha
Чай	чай	*Чай*	*чай*	chai
Чан	чан	*Чан*	*чан*	chang
Чань	чань	*Чань*	*чань*	chan
Чао	чао	*Чао*	*чао*	chao
Чжа (**Чша** older form)	чжа	*Чжа*	*чжа*	zha
Чжай (“)	чжай	*Чжай*	*чжай*	zhai
Чжан (“)	чжан	*Чжан*	*чжан*	zhang
Чжань (“)	чжань	*Чжань*	*чжань*	zhan
Чжао (“)	чжао	*Чжао*	*чжао*	zhao
Чжи	чжи	*Чжи*	*чжи*	zhi
Чжо	чжо	*Чжо*	*чжо*	zhuo
Чжоу	чжоу	*Чжоу*	*чжоу*	zhou
Чжу	чжу	*Чжу*	*чжу*	zhu
Чжуа	чжуа	*Чжуа*	*чжуа*	zhua
Чжуай	чжуай	*Чжуай*	*чжуай*	zhuai
Чжуан	чжуан	*Чжуан*	*чжуан*	zhuang
Чжуань	чжуань	*Чжуань*	*чжуань*	zhuan
Чжуй	чжуй	*Чжуй*	*чжуй*	zhui
Чжун	чжун	*Чжун*	*чжун*	zhong
Чжунь	чжунь	*Чжунь*	*чжунь*	zhun

Чжэ	чжэ	*Чжэ*	*чжэ*	zhe
Чжэй	чжэй	*Чжэй*	*чжэй*	zhei
Чжэн	чжэн	*Чжэн*	*чжэн*	zheng
Чжэнь	чжэнь	*Чжэнь*	*чжэнь*	zhen
Чи	чи	*Чи*	*чи*	chi
Чо	чо	*Чо*	*чо*	chuo
Чоу	чоу	*Чоу*	*чоу*	chou
Чу	чу	*Чу*	*чу*	chu
Чуа	чуа	*Чуа*	*чуа*	chua
Чуай	чуай	*Чуай*	*чуай*	chuai
Чуан	чуан	*Чуан*	*чуан*	chuang
Чуань	чуань	*Чуань*	*чуань*	chuan
Чуй	чуй	*Чуй*	*чуй*	chui
Чун	чун	*Чун*	*чун*	chong
Чунь	чунь	*Чунь*	*чунь*	chun
Чэ	чэ	*Чэ*	*чэ*	che
Чэн	чэн	*Чэн*	*чэн*	cheng
Чэнь	чэнь	*Чэнь*	*чэнь*	chen
Ша	ша	*Ша*	*ша*	sha
Шай	шай	*Шай*	*шай*	shai
Шан	шан	*Шан*	*шан*	shang
Шань	шань	*Шань*	*шань*	shan
Шао	шао	*Шао*	*шао*	shao
Ши	ши	*Ши*	*ши*	shi
Шо	шо	*Шо*	*шо*	shuo
Шоу	шоу	*Шоу*	*шоу*	shou
Шу	шу	*Шу*	*шу*	shu
Шуа	шуа	*Шуа*	*шуа*	shua
Шуай	шуай	*Шуай*	*шуай*	shuai
Шуан	шуан	*Шуан*	*шуан*	shuang
Шуань	шуань	*Шуань*	*шуань*	shuan
Шуй	шуй	*Шуй*	*шуй*	shui
Шунь	шунь	*Шунь*	*шунь*	shun
Шэ	шэ	*Шэ*	*шэ*	she
Шэй	шэй	*Шэй*	*шэй*	shei
Шэн	шэн	*Шэн*	*шэн*	sheng
Шэнь	шэнь	*Шэнь*	*шэнь*	shen
-э	-э	-э	-э	-e
-эй	-эй	*-эй*	*-эй*	-ei
-энь	-энь	*-энь*	*-энь*	-en
-эр	-эр	*-эр*	*-эр*	-er
Ю	ю	*Ю*	*ю*	you

Юань	юань	*Юань*	*юань*	yuan
Юй	юй	*Юй*	*юй*	yu
Юн	юн	*Юн*	*юн*	yong
Юнь	юнь	*Юнь*	*юнь*	yun
Юэ	юэ	*Юэ*	*юэ*	yue
Я	я	*Я*	*я*	ya
Яй	яй	*Яй*	*яй*	yai
Ян	ян	*Ян*	*ян*	yang
Янь	янь	*Янь*	*янь*	yan
Яо	яо	*Яо*	*яо*	yao

Russian Abbreviations or phrases found on maps

Мар	Full printed form	Meaning
ХРЕБЕТ	**хребет**	Mountain Ridge/Range
КАН. or **Кан.**	**канал**	Abbreviation for Canal (includes irrigation canals)
поселок	**поселок**	Settlement or dwellings
пер.	**перевал**	Abbreviation for Pass in mountains.
горный проход	**горный проход**	mountain pass (gate)
г.	**горный**	Mountain (peak)
Тун.	**туннель**	Abbreviation for Tunnel