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A New Source of the Mekong

The discoverers believe they have found the true one at last

In July 2013 Luciano Lepre and Pieter Neele traveled to the sources of the Mekong river. They found that the Gaodepu, the longest branch of the Zayaqu that is in turn the longest branch of the upper Mekong, does not originate at Jifu Mountain as previous explorers have stated. Instead it flows from an unnamed neighbouring mountain. Near the top they found a new source that is further away from the Mekong's mouth than any other. They believe in identifying this source they have at long last discovered the Mekong's real source.

History of the search for the Mekong's source

The discovery of a source of the Mekong was first claimed in 1894. For a full century it was not disputed. Then a series of expeditions set out to accurately pinpoint the source. Long drawn-out debate followed. A summary.

1894 – Dutrueil de Rhins and Grenard

In 1894 Frenchmen Jules-Léon Dutrueil de Rhins and Fernand Grenard were the first to identify a source of the Mekong. They had attempted to reach Lhasa, but as was the fate of every westerner in the second half of the 19 th century who tried to do so Tibetan authorities had turned them back, in their case near Nam Tso Lake with only just over a hundred kilometers to go. They traveled east, then north into the basin of the Salween, crossed the Tanggula Mountains to the basin of the Yangtze, crossed yet another divide and understood they had entered the Mekong basin. Dutrueil de Rhins did not live to claim their discovery of the Mekong's source. Shortly after a conflict with local Khampas got out of hand, guns were leveled and he was fatally wounded. Grenard subsequently made their discovery public. Dutrueil de Rhins's name is still associated with it.

1994 – The Ganasong confluence: the Japanese and Michel Peissel

It took exactly one hundred years until people aspiring to accurately pinpoint the source of the Mekong traveled to the upper reaches of the river again. In fact, ironically after such a long interval, two expeditions with this aim got underway almost simultaneously. Both set out from Moyun, a tiny settlement on one of the main branches of the upper Mekong locally knows as Zanaqu.

First to arrive was the team of Tokyo Agricultural University headed by Junichi Nakanishi and Masayuki Kitamura and accompanied by people from the Chinese Academy of Sciences (hereafter CAS), Zhou Changjin among them. From Moyun they went eastward and downstream along the Zanaqu to the confluence with a river branch flowing from the north named the Zayaqu. The place where Zanaqu and Zayaqu join each other is called Ganasong. The team measured width, depth and water discharge of both rivers. All these indicators were much higher for the northern Zayaqu. They concluded the Zayaqu had to be the source river of the Mekong. One week later they pinpointed the source of the Zayaqu and the Mekong at the foot of Guosongmucha Mountain, at longitude 94 41 37E, latitude 33 42 41N and altitude 5,160 meter.

While the Japanese were in the Zayaqu valley a French-British group led by Michel Peissel arrived in Moyun. They traveled westward up the Zanaqu, a decision based on a map that suggested the Zanaqu to be longer than the Zayaqu. (It would later turn out the map the Japanese were using was more reliable). The source identified by Dutreuil de Rhins was also in that direction. But they found a stream longer than Dutrueil de Rhins's, and Peissel claimed that in finding the head of this stream they had discovered the source of the Mekong. As its location he gave 93 52.929E, 33 16.534N, altitude 4,975 meter, at the foot of Rupsa mountain pass.

Though the Japanese had done a better searching job, Peissel did a much better public relations job. He managed to get all the (western) press. The prestigious British Royal Geographical Society accepted his claim to have reached the source. In 1997 he published his book The Last Barbarians, confidently subtitled The Discovery of the Source of the Mekong in Tibet. In the eyes of the western public it was Peissel who had discovered the source of the Mekong. It is telling in this respect that when in 1999 American white-water rafting organisation Earth Science Expeditions led by Pete Winn was planning an expedition along the upper Mekong they initially took it for granted Peissel was right and intended to start their trip along the Zanaqu. Only after consultation with people of CAS who had access to the most detailed maps of the area they chose the Zayaqu as their starting point.

1999 – The Yeyongsong confluence: two Chinese expeditions

In this confusing situation the Chinese stepped in. This was after all taking place on Chinese soil, and finding the source of one of the world's greatest rivers is a major geographical discovery. They wanted to be invloved.

In July 1999 two expeditions were dispatched under different wings of CAS. This time around domestic Chinese debate would ensue. Measurements at the Ganasong confluence confirmed the findings of the expedition initiated by the Japanese in 1994: the source of the Mekong had to be up the Zayaqu, the branch coming from the north. But the discussion now shifted to yet another confluence, 77 kilometers upstream. At a spot called Yeyongsong two streams join each other. The Gaoshanxigu flows from the east, its head is at the foot of Guosongmucha Mountain and this is the place identified by the Sino-Japanese expedition five years earlier as the source of the Mekong. The Gaodepu flows from the north at first and then from the east as well.
The two expeditions came up with conflicting research data. According to the group of the Commission for Integrated Survey of Natural Resources the Gaoshanxigu was the longer river by 0.97 km and it had a 20 percent higher discharge. But the team of the Institute of Remote Sensing Application led by Dr. Liu Shaochuang measured the Gaodepu to be 2.1 km longer and the discharge more or less equal.
As a result they also came up with conflicting claims about the Mekong's source. According to CISNR it had to be the head of the Gaoshanxigu, location 94 41 44E and 33 42 31N, near the Japanese source of 1994; according to Liu it had to be the head of the Gaodepu at Jifu Mountain, location 94 41 12E and 33 45 35N.(Liu was to shift the location of his Jifu/Gaodepu source from the glacier on the east side of Jifu Mountain to the valley west of Jifu in 2002. New coordinates: 94 40 52E and 33 45 48N.)

Since 1999 – Satellite measurements and debate, but no new discoveries

Since 1999 no new discoveries have been made. Not that silence reigned on the topic of the Mekong's real source. There was heated debate. But it was a discussion about the Guosongmucha/Gaoshanxigu and the Jifu / Gaodepu source. No new theory was launched, no alternative source was introduced.
An important development was the improvement in measuring river lengths with the use of satellite

images. This method had already been used at the end of the 1990's, but it became more accurate and reliable. By 2007 two men using satellite measurements had independently from each other determined that the Gaodepu is 1.6 km longer than the Gaoshanxigu. One of them was, again, Liu Shaochuang, the other Martin Ruzek of the Hongkong based China Exploration and Research Society, the organisation of China explorer Wong How Man. It is now undisputed that the Gaodepu is the longer branch.

In the absence of new discoveries the debate concerned the criteria that should decide which is the Mekong's true source. By international geographical convention, the source of a river is the furthest source of water from its mouth. So the length of river branches is the deciding factor in pinpointing a river's real source.
However, other criteria haven been brought up. Most heard in the Mekong source debate is the discharge of river branches: the one with the largest volume of water has to be considered the source river. But this is a flawed criterion. When we compare the length of river branches the difference between them is static, as these lengths don't change. But the discharge varies, and crucially it does not vary in the same degree and at the same time for each branch. So the difference in discharge also varies: it can not be credibly established. Two heavy showers in the valley of the Gaoshanxigu that don't make it across to the valley of the Gaodepu may tip the balance in favor of the Gaoshanxigu or vice versa. Indeed as we have seen discharge measurements at the Yeyongsong confluence at different moments provided different results. Water discharge is unsuitable as a criterion.
Other criteria that have been put forward are altitude of the source, area of the river basin, direction of flow at the confluence.
After it was established beyond doubt that the Gaodepu is longer than the Gaoshanxigu, Wong How Man argued it is only so because it meanders a lot. He suggested the Gaoshanxigu might also meander more if it had a less forceful flow, making it longer than the Gaodepu. These remarks seem unhelpful to me. It is all hypothetical. Besides, meandering of a river is not just influenced by the forcefulness of its flow but also by factors as softness of terrain. It must also be added the Gaodepu meanders during only a relatively short part of its total length – and probably it is not a coincidence that is exactly the part where it flows through soft grassland, while it flows straight when the terrain is rocky.
In 2007 Kitamura asked Liu Shaochuang his view on the criteria-debate. Liu responded that only river length should be considered when determining the true source, adding 'that accuracy of the satellite imagery has improved prominently. A decade ago it was difficult to measure river length exactly, and therefore they must take into account such factors as flowing water volume and area of river basin for the determination. Now as we can measure accurate river length, we should apply only river length.'And once more as an expert on mapping and survey work he stresses: 'I insist on length'. (Japanese Alpine News, Vol. 10, 2009, p. 126)

Pete Winn, mentioned above in connection with rafting organisation Earth Science Expeditions, is the main historian of the debate about the Mekong source. His website makes maps, references and articles available, including translations from the Chinese by Tamotsu Nakamura, and has been of great help in writing this paragraph. See: http://www.shangri-la-river-expeditions.com/1stdes/mekong/mekongsource/mekongsource.html

2013 – The first confluence of the Mekong

I was intrigued by the search for the Mekong's source and traveled to the Zayaqu region in 2012. Due to mishaps and delays I did not reach the head of the Gaodepu. But it provided me with valuable insights and information.
Luciano Lepre's plan was to walk the length of the Mekong. While he was doing research we

exchanged a couple of emails. We decided to team up for his last leg and go to the Mekong sources together.
Separately included is a short diary of our trip and it can be traced on the map of fig. 1.
Here I will focus on the discoveries we made at the upper reaches of the Gaodepu.

The last junction and a new source

In the morning of July 12 th we set out from our tent halfway up the Gaodepu, aiming to reach its source. It wasn't difficult going, the gradient of the valley is gentle. After three hours we reached what we would later find to be the very first confluence of the Mekong, at location 94 40.562E and 33 46.083N and altitude 5,078 meters (fig. 2).
Going upstream a confluence becomes a junction.Turn left or right? In this case it was easy. The obvious choice was the low stream from the left, clearly the bigger one today, just as it was the bigger stream when I was here the year before. Interestingly, Luciano seemed to hesitate and kept looking at the high stream – as if intuitively drawn to it. But for him too there was no real doubt. We should follow the lower bigger stream.
We reached the source of this stream at 94 40.825 E, 33 45.735 N and 5,218 meters. There is a Tibetan style marker of piled up stones and some prayer flags (fig. 3). It is not clear who put it there and when.
We made our first discoveries here. Dr. Liu Shaochuang, who first claimed the Gaodepu (and not the Gaoshanxigu) is the longest river branch draining in the Mekong and its head therefore is the Mekong source, in 2002 published as source location 94 40 52E and 33 45 48N. He repeated this location in his March 2007 article in Geo-spatial Information Science. He also reiterates that 'it is the spring furthest away from the sea'. That 'the Mekong originates from the foot of Mountain Jifu'. And that it is 'on the boundary of Zaduo county and Zhiduo county' – that means on the divide of the Mekong and Yangtze basins which indeed Jifu Mountain is a part of (quotes from pag. 54). But it is clear from fig. 3, photo taken in the direction of Jifu, that this spring is on the slope of the mountain neighbouring Jifu. It is not at the foot of Jifu, and it is not on the Yangtze-Mekong divide but inside the Mekong basin. Fig. 4, with the slope of Jifu visible at the far left of the image, clearly illustrates the same.
Note that the location of Liu is spot-on in this stream, but 140 meters downstream from this spring with the marker. Why his location is lower is not clear. It can not be attributed to glacial retreat, because there is no glacier anywhere near, it is not a glacial spring.
The discovery aside, it was a disappointing spot. We were at the lower reaches of a bare rocky slope. It hardly felt like a source. Surely water gathering here and seeping out from between the stones had to come from somewhere higher up.
We moved higher up the slope. Intermittently tiny trickles of water were visible. We got to a patch of melting ice, then a second, then a third. Felt more like it. We shot our source pictures. But now the edge of a glacier had come in sight, high above us still. We climbed on. We now realized water from the glacier we were approaching formed the stream that was running down to the confluence where we had been that morning. We reached the foot of this small glacier and the source of this stream at 33 45.677 E, 94 40.562 N, altitude 5,374 m. It is by far the highest of all Mekong sources. And it is not seasonal – it will not dry up at any time of year. We descended following the stream to the confluence. From our gps-tracks we know it is longer than the stream that we followed in the morning and that led to the source of Liu Shaochuang. So the source we found is the Mekong source furthest away from the sea. We believe we have discovered, at long last, the true source of the Mekong.

After the Ganasong junction then, that Peissel misjudged using an inaccurate map and that sent him the wrong way in 1994; and after the Yeyongsong junction that has wrongfooted everybody but Liu who went up the Gaodepu in 1999; there was this last junction only a kilometer or so before the source that apparently has misled Liu and the few who may have ventured here after him, as indeed it fooled

us at first. As if this junction were a final trick of the Mekong, its last defense against those trying to unveil its true source.

Numbers and measurements

In fig. 4 the yellow line is a projection on a Google Earth image of my 2012 gps-track, the red line of our 2013 gps-track. The distances in the image accurately represent the distances we walked between the respective spots. Near the confluence of the two streams (A), the source with the Tibetan marker (D) and our new source (E) we walked around a bit and took photos. Care has been taken this lingering around is not included in these distances. We didn't exactly follow the banks of the stream between A and B (the spot where I turned around in 2012), so here the distance we walked is not identical to the length of the stream. In 2013 we took a slight shortcut, in 2012 I made a slight 'detour'. If the length of the stream between A and B is 769 m (it is less) that would make the stream from A to C (the source of Liu) 900 m, and the stream from A to D (the source with the Tibetan marker) 1,040 m.
Google Earth also has its own measuring tool. When applied on the stream (not the tracks) A – C, it measured only 850 m. But this method is less reliable than taking the distance from the gps-track. We can conclude that the stream from Liu's source to the confluence is shorter than 900 m and from the source with the Tibetan marker to the confluence shorter than 1,040 m.
Walking down from the new source (E) to the confluence (A) we hardly deviated from the stream. So our distance walked (1,100 m) will just about correspond with the length of the stream. When applying the less reliable Google Earth tool on the projected gps-track (not directly on the stream, because in the image it is invisible under a snow cover), the length of the track comes in at 1,070 m. (So results using the Google Earth tool are shorter for both the low and the high stream.) We can conclude that the stream from the new source down to the confluence is longer than 1,070 m.
It means then that the stream running from the new source is at least 170 m longer than the lower stream when measured from Liu's source, and at least 30 m longer than when measured from its 'Tibetan marker' source. Given the above, realistic differences would be 220 m and 80 m respectively. It is beyond doubt that the source we identified is the source of the Mekong furthest away from the sea.

Conclusion

Dr. Liu Shaochuang claims the Gaodepu originates from Jifu Mountain at the Yangtze-Mekong divide. But we have found the two uppermost streams of the Gaodepu both originate at the unnamed mountain neighbouring Jifu to the west, inside the Mekong basin.
Liu pinpointed the source of the Gaodepu / Mekong at the head of the lower of these two streams. However we discovered the higher of these two streams, while seemingly smaller at the confluence of the two, is in fact longer. Near the top of the mountain at the foot of a small glacier the location of its source is 33 45.677 E, 94 40.562 N, altitude 5,374 m. This source of the Gaodepu/Mekong is the source furthest away from the Mekong's mouth. It is also by far the highest source.
So we believe in identifying this source we have at long last discovered the true source of the Mekong.

A short diary

July 10
Set out from Zaduo, within one hour car breaks down. Limp back to town, wait for repairs. At dusk reach Ganasong. Heavy hail storm when pitching tent, dash for shelter in the car. Then stay in tent nomads left behind. Lonely dog lives here.

July 11
Stunning views near Tuoji He and Zayaqu confluence. See group of kiang, wild Tibetan ass – beautiful. Meet Tibetans on their way to Gaodepu valley with new provisions. Team up with them. Cars take turns getting stuck. Get halfway up the Gaodepu, share photos with the nomads I met here last year, stay next to their small encampment. At night horrendous weather, hail and snow. Nothing to do but sit up straight in a sleeping bag and hope tent holds out.
July 12
We find a new source of the Gaodepu and believe this is the real source of the Mekong. Return to last night's camp.
July 13
Move down to Yeyongsong, then halfway up the valley of the Gaoshanxigu. Walk to its head below Guosongmucha Mountain. Dramatic with glacier, gushing water, dark clouds gathering. Heading back clear view, see Fig. 5, of Jifu Mountain on the Mekong-Yangtze divide (right) and its western neighbour inside the Mekong basin. Seen from this angle the new Mekong source is at the back side of the mountain at the left.
July 14
Move to the Zaxiqiwa source. This spring of the Zayaqu is revered by indigenous Tibetan nomads, a spiritual people to whom a river, lake, rock, mountain can be holy. In literature about the Mekong source it is refered to as the legendary or spiritual source, as opposed to the geographical or scientific source that is pinpointed based on rational criteria. Moving place to be. July 15 Move back to Zaduo.

When to search for a river source?

An explorer can only credibly pinpoint a river source at a time when the actual snow line is at its highest level, so as to avoid streams and sources remain hidden underneath snow. And indeed all expeditions to the Mekong headwaters have taken place in summer. Not only the right season matters. Even in summer snow can temporarily 'contaminate' the search area.
The photo below was taken on 23 July 2012 near spot B in Fig. 4. It shows an almost bare mountain side. But the Google Earth image of Fig. 4, dated 16 July 2011, has just about the whole mountain covered by snow. This is probably the result of a recent hail or snow storm. They are common in July. We experienced several in both 2012 and 2013. Snow and ice usually thaw within a few hours.

When we explored in July 2013 the actual snow line was at its required highest level. See this photo. There is no snow cover until the small glacier near the top:

The precondition of the highest level of the actual snow line also exists when searching for a river source by studying satellite images.
A question arises regarding the 2007 article of Liu Shaochuang. He reproduces a satellite image dated 30 November 1999, with more snow reaching deeper into the valley then when we visited in July (p. 55). It is not clear from his article if this is indeed the image used for his determination of the Gaodepu source. But if so it would explain why he overlooked the source we introduce here.
Luciano Lepre holds a Swiss and an Italian passport. Pieter Neele is from Holland.
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Acknowledgements

This article would not have been possible without cartographer Jaap Vinke. His help in sorting out gps-tracks, working out distances and other technical matters has been invaluable. He also made the illustrations.
We are aware that in identifying this new source of the Mekong we are standing on the shoulders of the exploreres and researchers who have traveled to the region before us. Their names are in the history paragraph.

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Wong How Man, MEKONG SOURCE, and the DEBATE goes on…. July 2007, Jpg-file on website below.

http://www.shangri-la-river-expeditions.com/1stdes/mekong/mekongsource/mekongsource.html
Maintained by Pete Winn this website makes maps, references and articles about the Mekong source debate available, including translations from the Chinese by Tamotsu Nakamura.

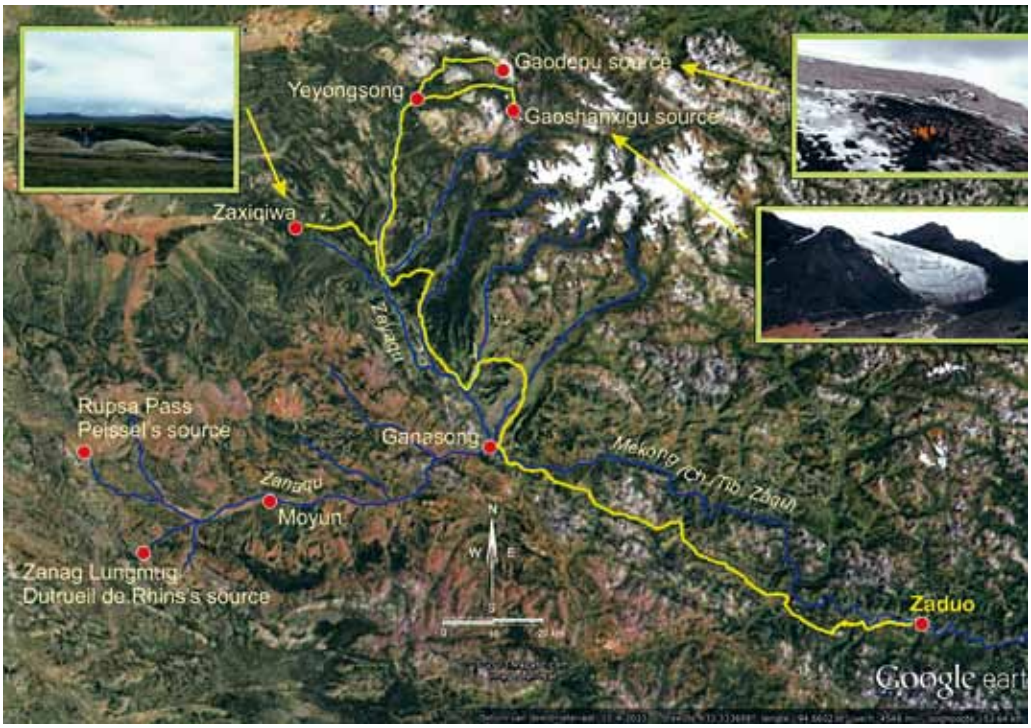

Fig. 1 Sources of the Mekong. Yellow line: gps-track of our route

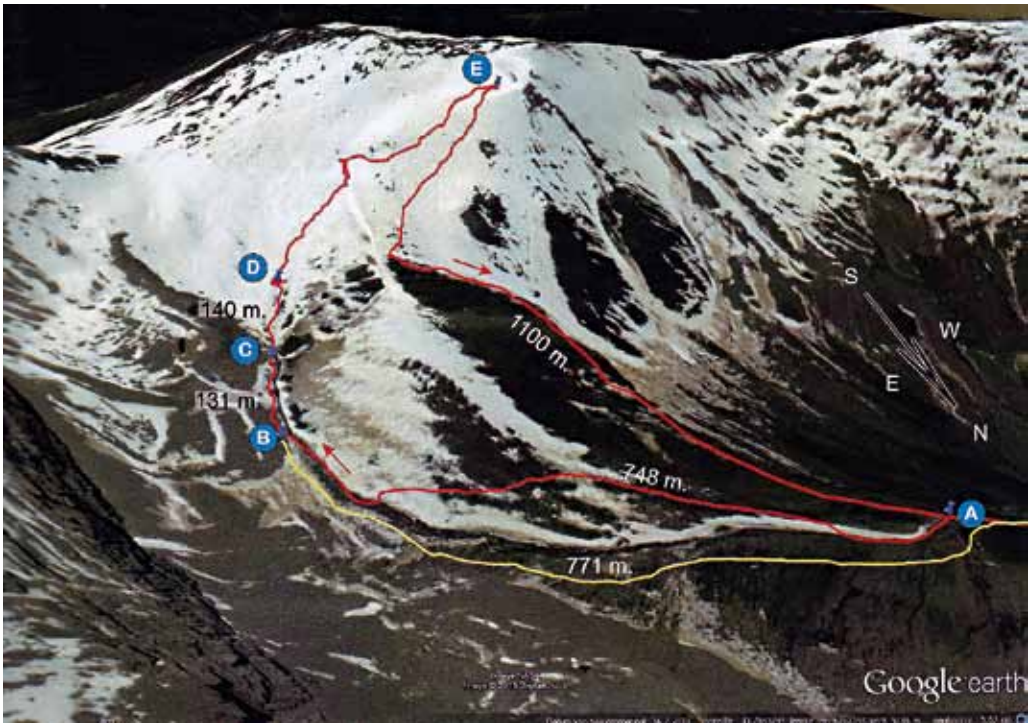

Fig. 4 Yellow line = 2012 gps-track Red line = 2013 gps-track
A = first confluence of the Mekong B = 2012 turn-around point C = location of Liu Shaochuang's source D = source with Tibetan marker E = location of the new Mekong source
Far left the slope of Jifu Mountain, the Mekong originates at the unnamed mountain to its west.

Fig. 2 The first confluence of the Mekong. The stream on the right flows from the Mekong source we discovered. *Photo by Luciano Lepre*

Fig. 3 Source of the lower stream. Photo in the direction of Jifu Mountain. *Photo by Luciano Lepre*

Bottom of the Glacier, left

Bottom of the Glacier, right

Stream from the new Mekong source flowing down to the first confluence. *Photo by Luciano Lepre*

Fig. 5 View from the Gaoshanxigu valley. Jifu Mountain on the right, at the Mekong-Yangtze divide. The Mekong originates at the back of the mountain on the left, inside the Mekong basin.