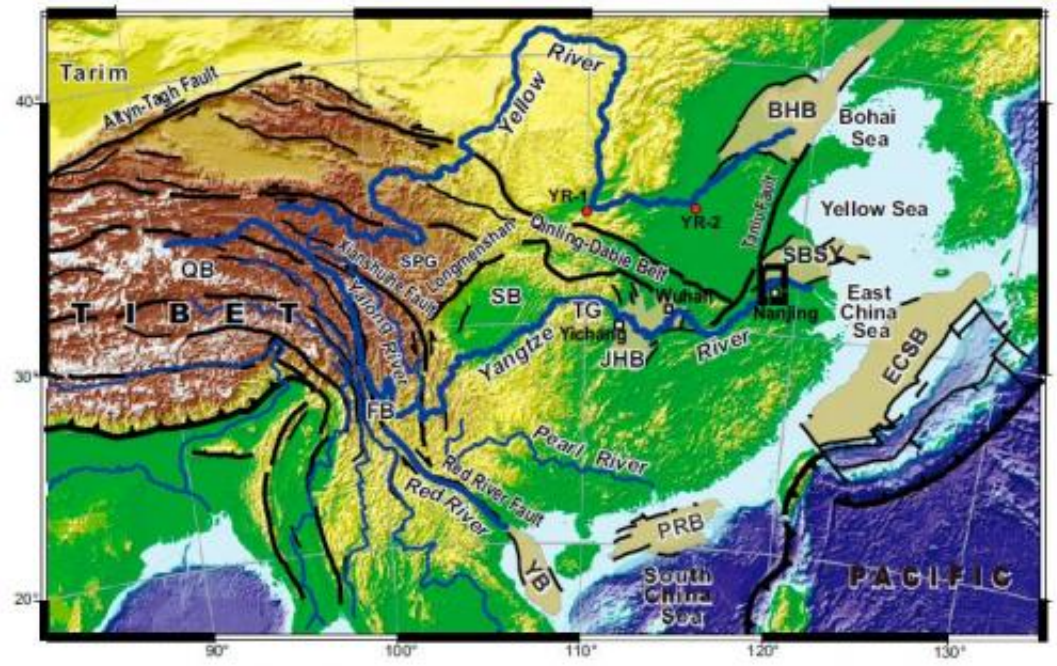
New research suggests Yangtze River is at least 23 million years old

April 23 2013, by Bob Yirka



Topographic map of East Asia, showing major rivers and the locations mentioned in the text. SBSYB, Subei–South Yellow Sea Basin; BHB, Bohai Basin; ECSB, East China Sea Basin; PRB, Pearl River Mouth Basin; YB, Yinggehai Basin; SPG, Songpan Garze; QB, Qiangtang Block. Red circles show locations of Yellow River samples (31). Major faults marked are taken from Replumaz and Tapponnier (59). Credit: (c)2013 *PNAS*, Published online before print April 22, 2013, doi: 10.1073/pnas.1216241110

(Phys.org) —An exhaustive study conducted by a combined team of Chinese, Japanese, American and Australian researchers has found that

the third longest river in the world, the Yangtze, located in China, is at least 23 million years old, but no older than 36.5 million years old. The team describes their research and results in their paper they've had published in the *Proceedings of the National Academy of Sciences*.

The Yangtze (Long River, in Chinese) has a long and varied history, going back thousands of years. But until now, no one has been able to say just how long the river has been in existence. To find out, the researchers studied Lower Miocene sediments and compared them with sediments that came about in modern times. They found virtually no differences between the two which the teams suggests, means that a river very much like the one that exists today, existed as far back as 23 million years ago. The river flows from the mountainous glaciers of the Tibetan plateau 3,988 miles across China to the East China Sea at Shanghai and is responsible for draining a fifth of the runoff that occurs in that country.

Most research to date has suggested that the river changed direction during an uplifting of the Tibetan Plateau following an India-Eurasian plate collision millions of years ago. Still, estimates of the river's age have varied from 45 million years ago, to just 2 million years ago. To get a better estimate, the team studied rocks taken from the Jianghan Basin, downstream from the Three Gorges Dam. The rocks there were virtually indistinguishable from rocks found in the modern era, and because such rocks can only form in the presence of moving water, the researchers concluded that the river must have existed in close to its present state, approximately 23 million years ago—the age of the rocks they examined. And because no such rocks could be found that were dated older than 36.5 million years, the researchers used that number to estimate the earliest possible date of formation of the river.

The researchers note that their estimation of the age of the river coincides with both the Tibatan Plateau uplifting timeframe and a

permanent increase in summer monsoon rains, which would of course have fed more water to the river contributing to both its size and the path it forged to the sea.

More information: Pre-Miocene birth of the Yangtze River, *PNAS*, Published online before print April 22, 2013, doi: 10.1073/pnas.1216241110

Abstract

The development of fluvial systems in East Asia is closely linked to the evolving topography following India–Eurasia collision. Despite this, the age of the Yangtze River system has been strongly debated, with estimates ranging from 40 to 45 Ma, to a more recent initiation around 2 Ma. Here, we present 40Ar/39Ar ages from basalts interbedded with fluvial sediments from the lower reaches of the Yangtze together with detrital zircon U–Pb ages from sand grains within these sediments. We show that a river containing sediments indistinguishable from the modern river was established before ~23 Ma. We argue that the connection through the Three Gorges must postdate 36.5 Ma because of evaporite and lacustrine sedimentation in the Jianghan Basin before that time. We propose that the present Yangtze River system formed in response to regional extension throughout eastern China, synchronous with the start of strike–slip tectonism and surface uplift in eastern Tibet and fed by strengthened rains caused by the newly intensified summer monsoon.