

# Yangtze River's ancient origins revealed

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Yangtze River. Image credit: NASA

The Yangtze River in China is 40 million years older than was previously thought, according to new research.

A study of minerals by a team led by Durham University reveals that the Yangtze River began to cut the Three Gorges area around 45 million years ago, making it much older than previously believed.

The Yangtze River, the third-longest river in the world, has played a central role in the development of Chinese culture, and the Three Gorges, which separate the Sichuan Basin in the west from the lowlands of central and eastern [China](#) to the east, have particular historical, cultural, and geomorphological significance.

Without the transport pathway created by the Three Gorges, south-western China - including the rich agricultural area of Sichuan Province, known as China's 'rice bowl' - would have remained cut off from the rest of the country by the otherwise inaccessible mountains that surround the region.

The new findings, published in *Geology*, show that sediments from the Three Gorges, previously analysed by researchers and dated as being only 1-2 million years old, must have been deposited long after the Three Gorges were cut.

The research team, led by Dr Alexander Densmore from the Institute of Hazard, Risk and Resilience, Durham University, determined the onset of incision in the Three Gorges by looking at the cooling of minerals in the granite that underlies the Three Gorges Dam at Sandouping in Hubei Province. The granite containing these apatite grains was cooled to lower temperatures as the river cut down through it.

Prior work on the origin of the Three Gorges has shown that the Yangtze River most likely began as a set of small, non-descript streams that drained both west and east, out of a range of low mountains in central China.

It was argued that the merger of these streams gave rise to the progressive development of a much larger, east-flowing river system that became the Yangtze River. Many scientists agreed that the most likely point of merger of the streams was in the Three Gorges area.

Dr Alex Densmore said: "The fact that erosion had removed all of the evidence of the old, pre-merger river courses made dating the river particularly difficult.

"Prior attempts to date the Three Gorges placed their age at only 1-2

million years but this was based on sediments found within the gorges. If this were the case, the river would have had to have been carved into the rocks very quickly, and this would have required extremely high incision rates.

"We used the number of damage trails in the mineral apatite to tell us when the rocks were cooled below a particular temperature and thus when gorge incision began."

The research team, which involved scientists from Durham, Chengdu and Victoria universities, and researchers in the UK and Germany, found that samples near the gorges showed that cooling began about 45 million years ago, whereas samples taken farther away from the river show no evidence of that cooling. Thus, the cooling must have been caused by gorge incision, rather than by more regional erosion, according to the scientists.

Dr Densmore added: "The Yangtze River is much older than previously thought and extremely high incision rates were not required to create the distinctive gorges. It formed slowly, over a much longer time-span."

The research, funded by the Swiss Federal Institute of Technology, also helped to explain a mysterious episode of erosion that affected the eastern part of the Tibetan Plateau. 45 million years ago, sediment shed from the rising Tibetan Plateau to the west was trapped in a large basin upstream of the future Three Gorges area.

Dr Densmore said: "As the Gorges were cut, they acted as like a plughole in a giant bathtub, allowing that sediment to be eroded and flushed down into the growing [Yangtze River](#) and out into the East China Sea, depositing the sediment in the lowland areas of eastern China."

Provided by Durham University

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