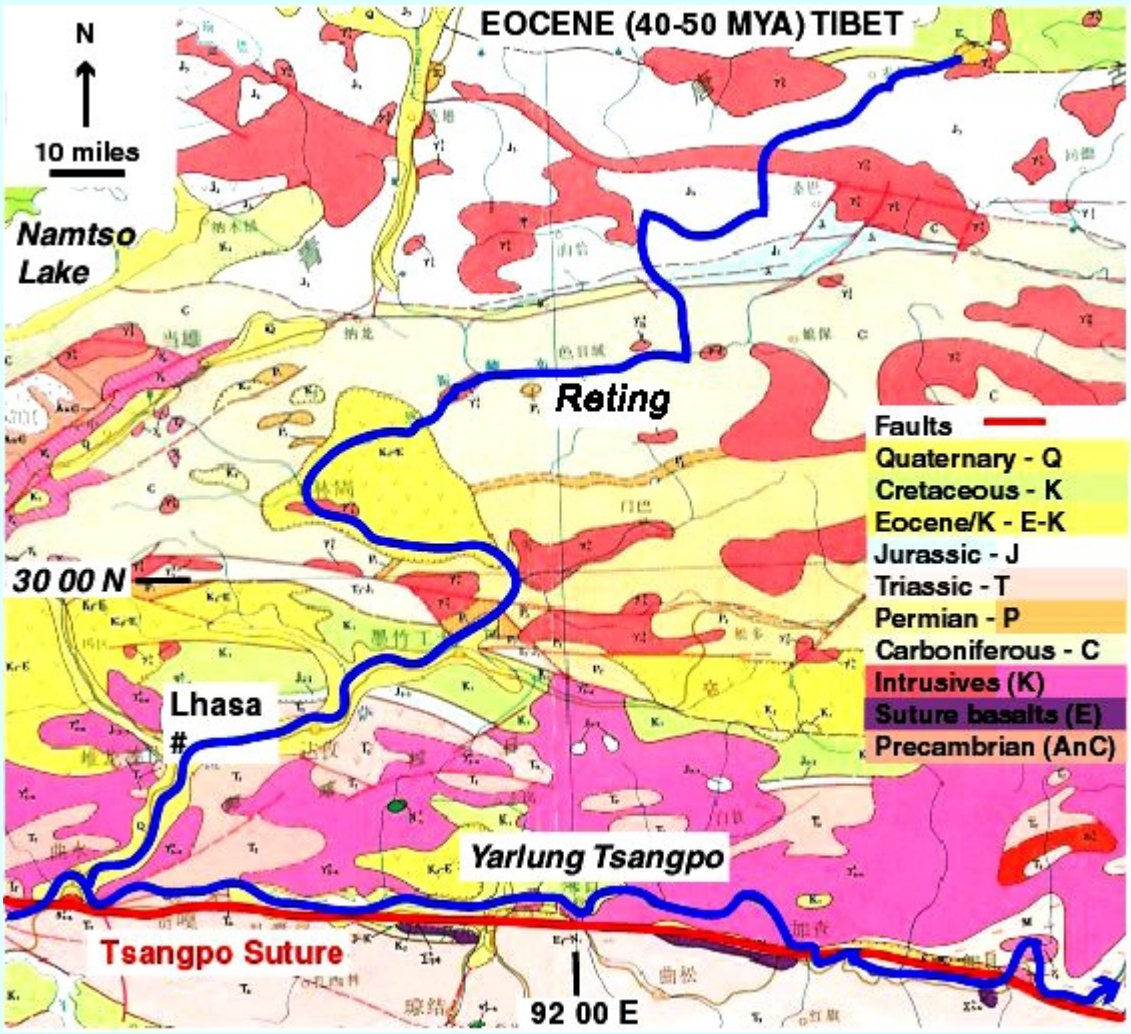
Geology and Geography of the Reting Tsangpo and Lhasa River (Kyi Qu) in Tibet

Geologic Map of the Reting and Lhasa Rivers Area



Map produced by the Chinese Ministry of Geology and Mineral Resources
Original scale 1:1,000,000

The Reting Tsangpo is the headwaters of the Kyi Qu, which flows through Lhasa, the capital of Tibet. They flow south from the Chenthangula Mountains (called the East Tibetan Alps by foreign mountain climbers). The river's source is at an elevation of about 5500 meters and the gradient averages about 11 feet per mile (typical of Tibetan Plateau Rivers). It is about 400 km from source to its confluence with the Yarlung Tsangpo. It flows through a canyon that is up to 2000 meters deep.

The river is located in the east central part of the Eocene block of Tibet, between the Tsangpo Suture to the south and the NW extension of the Ailao Shan Fault to the north. The area is characterized by subhorizontal Paleozoic and Mesozoic sedimentary rocks which have been intruded by significant quantities of Cretaceous granite, metamorphosed and deeply eroded to produce a rugged terrain. Faults generally trend E-W. The average elevation is about 16,000 feet, typical of the Tibetan Plateau.

The rocks exposed in the river canyon range in age from about 400 million years old to about 50 million years old (excluding gravel deposits less than 12,000 years old). The rocks are highly faulted so very young rocks are often next to very old rocks. Geologists believe that the Indian continent was part of Antarctica about 200 million years ago. It separated and moved north for 150

million years. Prior to this time, there were 400 million year old limestone deposits on the ocean floor between what is now India and Tibet and 200 million year old delta sediments along the southern coast of Tibet. As India moved north toward Tibet, the ocean floor between India and Tibet was subducted below Tibet and melted, ejecting large volumes of red volcanic rock on the surface and large volumes of granite at depth. The igneous rocks are 50 to 125 million years old.

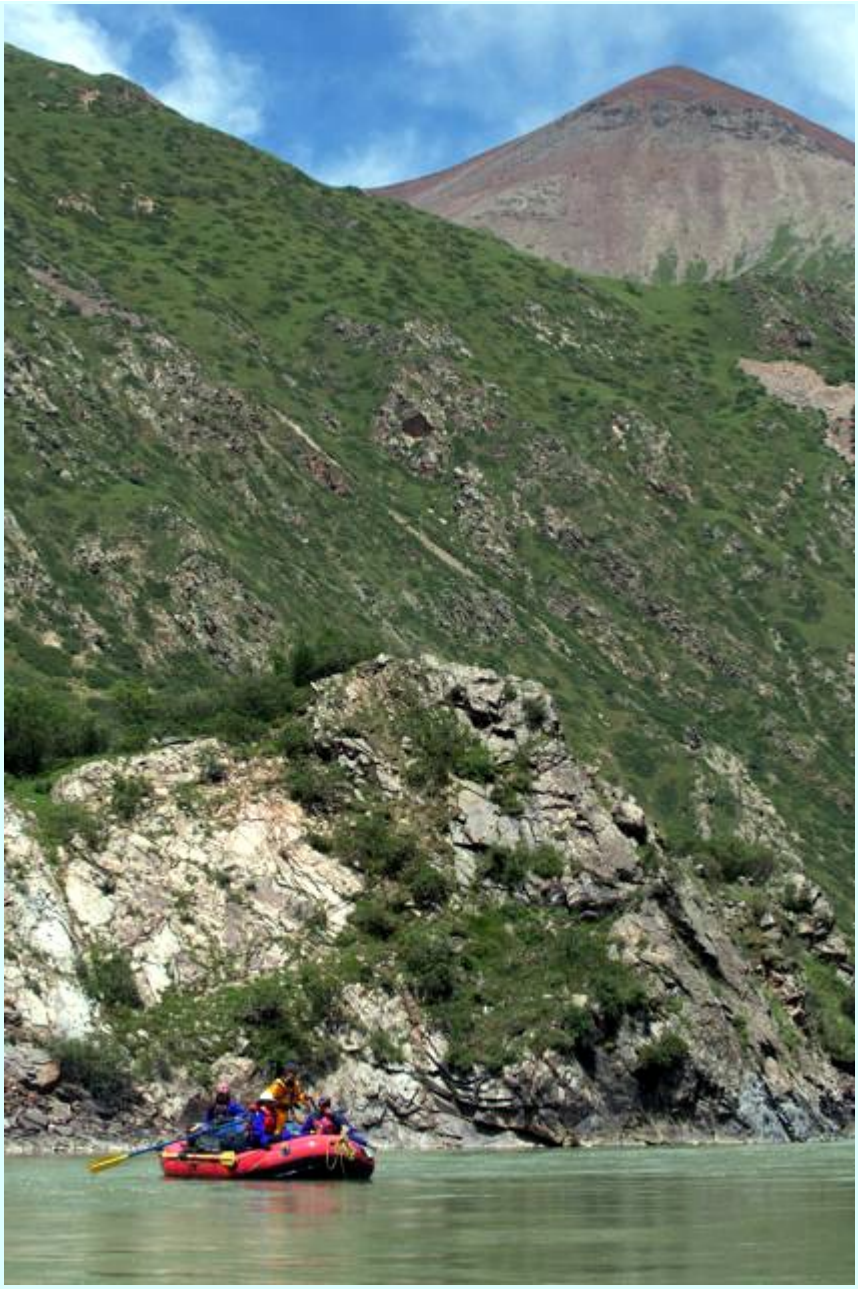
About 50 million years ago the Indian continent began to push into Tibet, forming the Himalaya Mountains. During this period, some of the limestone on the bottom of the ocean between Indian and Tibet was scraped off, pushed up and converted to marble and some of the silty sediments were pushed up and converted to slate. As a result there are 400 million year old sea floor fossils on the crest of Mt. Qomolomgma and in the Reting Tsangpo and Kyi Qu canyons and throughout this area there are abundant slates that are used in making roofs for houses.

Marble cliffs
Photo by Wei Yi

Black Slates
Photo by Wei Yi

Due to the massive size of India, as it pushed into Tibet it caused a lot a large faults to form (red lines on geological map above). The younger red volcanic rocks and the granitic rocks became mixed up with the older marbles and slates. As this happened, the river drainage pattern that existed before about 200 million years ago was disrupted. As India pushed into Tibet it not only caused the Himalaya Mountains to form but by about 8 million years ago it had caused the Tibetan Plateau to rise to its current elevation of about 5000 meters. The result was a major change in river drainage patterns. Rivers such as the Yarlung Tsangpo on the north side of the Himalayas began to flow east and around the mountain range to reach the Bay of Bengal near Bangladesh and tributaries to the Yarlung Tsangpo such as the Reting Tsangpo flowed south from newly formed mountain ranges such as the Chenthangula. The complex drainage pattern of the Reting is controlled by the large faults that developed during the past 50 million years.

Red Volcanics
Photo by Wei Yi



Granite
Photo by Wei Yi

About 2 million years ago, the north polar ice cap began to expand southward, eventually covering the Tibetan Plateau and Himalayas. This ice cap has expanded and melted four times during this period and is currently melting. The river canyons are typically filled with gravel from erosion caused by the glaciers - sometimes leaving gravel benches over 100 feet high. However, in a few places the river hs cut through the gravels and formed bedrock rapids. In a few places, large rock avalanches have blocked the river, forming boulder choked rapids.

River Gravels in Kyi Qu
Photo by Steve Swann

Bed Rock Rapid
Photo by Wei Yi

Land Slide Rapid
Photo by Wei Yi