

THE HIMALAYAN COMPOSITE TERRANE

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The Himalayan composite terrane is composed of seven sub-terrane. They include Mount Qomolangma sub-terrane (MQ), Dinri sub-terrane (DR), Pulan sub-terrane (PL), Laguigangri sub-terrane (LG), Lazi sub-terrane (LZ), Gabo sub-terrane (GB) and Qusong sub-terrane (QS).

According to recent data, we divide the formerly named Dinri sub-terrane and Pulan sub-terrane into three sub-terrane of Mount Qomolangma sub-terrane (MQ), Dinri sub-terrane (DR) and Pulan sub-terrane. The formerly named Jiwugunba sub-terrane (JW) has now been incorporated into the tectonic unit of Yarlungzangbo river suture zone.

The Himalayan composite terrane is situated along the Himalayan Mountain range. The Yarlungzangbo river suture zone is situated in the northern side of the composite terrane. The siwalik A-type fault zone is situated in it's southern side. The main parts of the composite terrane is situated in Tibet, and small parts in India, Sikkim, Nepal, Bhutan and Kashmir regoins. It's length is nearly 2200 Km, from east to west, and the width is approximately 250 Km.

Mount Qomolangma sub-terrane (MQ). It is relatively widely dispersed over this region. The main part is situated in India, Nepal, Sikkim, Bhutan and Kashmir regions. It is composed by the metamorphic complex series of the Presinian system. Its lower part consists of biotite schist, garnet biotite quartzite schist, garnet hornblende, plagioclase granulitite, biotite plagioclase gneiss and intercalated garnet diopside marble. The thickness is approximately 4400 m. The upper part is consisted of biotite granulitite intercalated with biotite migmatite, biotite gneiss and marble, augen biotite migmatite and hornblende quartz schist. The thickness is 2097 to 5418 m. This Presinian metamorphic complex is named as Nielamu group and Sela group. Its protolith is parablasteresis, and there are a lot of sedimentary structures in the metamorphic complex.

The oldest isotopic age from the metamorphic complex is 2250 Ma. The terrane adjoins the Dinri sub-terrane and the Pulan sub-terrane by the north Himalayan thrust fault in its north side.

Dinri sub-terrane (DR). The Dinri terrane is situated northeast of MQ and is composed of Sinian and Cambrian epizonal metamorphic rocks and nearly continuous Ordovician to early paleogene sedimentary section that includes terrigenous clastic rocks and shallow-marine and carbonate facies. Carboniferous and Permian strata include glacio-marine facies typical of terranes of Gondwana affinity. The presence of *Stepanoviella* in the Carboniferous Jilong formation and *Glossopteris* flora in the Permian Selong group also support a Gondwana origin for the Dinri terrane. The terrane accreted at its present position during Eocene or Oligocene time.

Pulan sub-terrane (PL). The terrane is composed of Ordovician to Cretaceous marine clastics. Late Carboniferous conglomeratic slate contains Gondwana fauna which represents a Gondwana facies glacio-marine sequence. There is some evidences to suggest this terrane rifted away from Gondwana during the late Early Permian. Late Permian strata are absent.

Laguigangri sub-terrane (LG). The terrane is situated at the north side of DR and is composed of pre-Carboniferous to Cretaceous sedimentary rocks. Carboniferous and Permian strata are predominantly glaciomarine conglomeratic slate and include a cold-water *Stepanoviella* fauna characteristic of terranes of Gondwana affinity.

Lazi sub-terrane (LZ). The terrane is a tectonostratigraphic terrane composed of flysch-like sedimentary rocks that probably formed in a continental margin environment of the Tethys ocean. The terrane's northern boundary is the Yarlungzangbo river suture zone.

Gabo sub-terrane (GB). The basement of the terrane consists of migmatite, schist, marble, and other metamorphic rocks. The basement series are overlain by Late Triassic to Cretaceous shallow water and abyssal mudstone, limestone, and siliciclastic rocks.

Qusong sub-terrane (QS). The terrane is a tectonostratigraphic terrane composed of flysch-like clastic sedimentary rocks of Late Triassic age. The Yarlungzangbo river suture zone lies along the northern side of this terrane.

The amalgamation ages of sub-terrane in the composite terrane are the end of Late Cretaceous and Early Tertiary. The sub-terrane amalgamated successively from south to north. After amalgamation, the boundary regions of the sub-terrane are covered unconformably by sedimentary conglomerates of Tertiary age. The amalgamation of sub-terrane developed a series of high-angle thrust faults northward in the boundaries of terrane. The composite terrane accreted to Yarlungzangbo river ophiolite terrane during the Paleogene. After accretion, shearing action of a tough non-synchronous axis in the middle levels of the crust took place.

REFERENCES

- Gou Lingzhi, Shi Yangshen, Ma Ruishi, Lu Huaifu, Ye Shangfu, Ding Youwen, Chen Chengzao and Xia Bin, 1985. Plate movement and crustal evolution of the Jiangnan Proterozoic mobile belt, Southeast China. "Earth Science" (Chikyu Kagaku), the Journal of the Association for the Geological collaboration in Japan, v. 39, n°2, p. 156-166.
- Howell, D.G. et al., 1983, Tectonostratigraphic terranes of the frontier Circum-Pacific region: Bulletin of the American Association of Petroleum Geologists, v. 67, p. 485-486.
- Jones, D.L. et al., 1977, Wrangellia: a displaced terrane in north-western North America: Canadian Journal of Earth Sciences, v. 14, p. 2565-2577.
- Li Chunyu, Wang Quan, Liu XueYa and Tang Yaoging, 1982, Tectonic Map of Asia, 1:5000,000, Cartographic Publishing House, Beijing, 20 sheets, with Explanatory Notes to the Tectonic Map of Asia (in Chinese and English).
- Xia Bin, 1990, Terranes of Xizang (Tibet), China, Circum-Pacific Council for Energy and Mineral Resources, Earth Science Series, v. 13, p. 231-242.
- Xia Bin, 1991, Tectonostratigraphic terranes and crustal evolution of Xizang (Tibet) plateau, Abstracts-Symposium of important geological scientific research achievements of 1986 to 1990 of China, 16-21, May, 1991 Beijing, Geological Association of P.R. China (in Chinese).