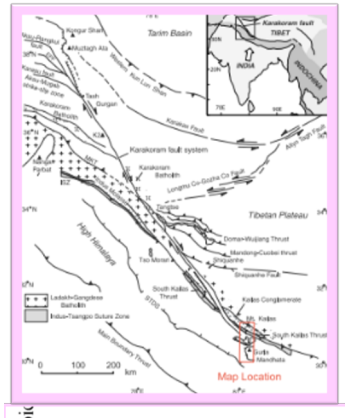
Tethyan Fold-Thrust Belt and Indus-Yalu Suture Zone, Southwest Tibet

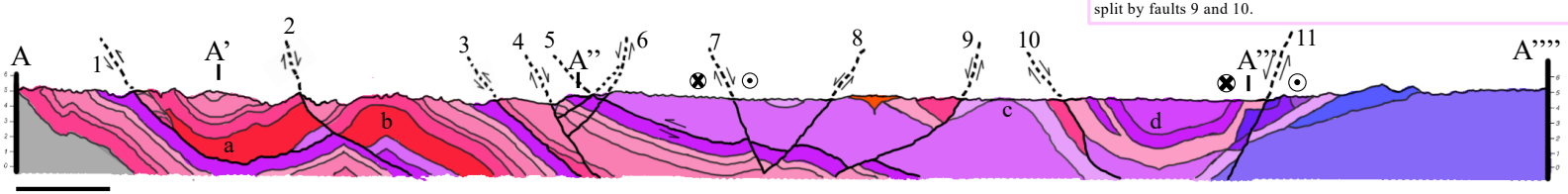
By Anya Kadlubowski

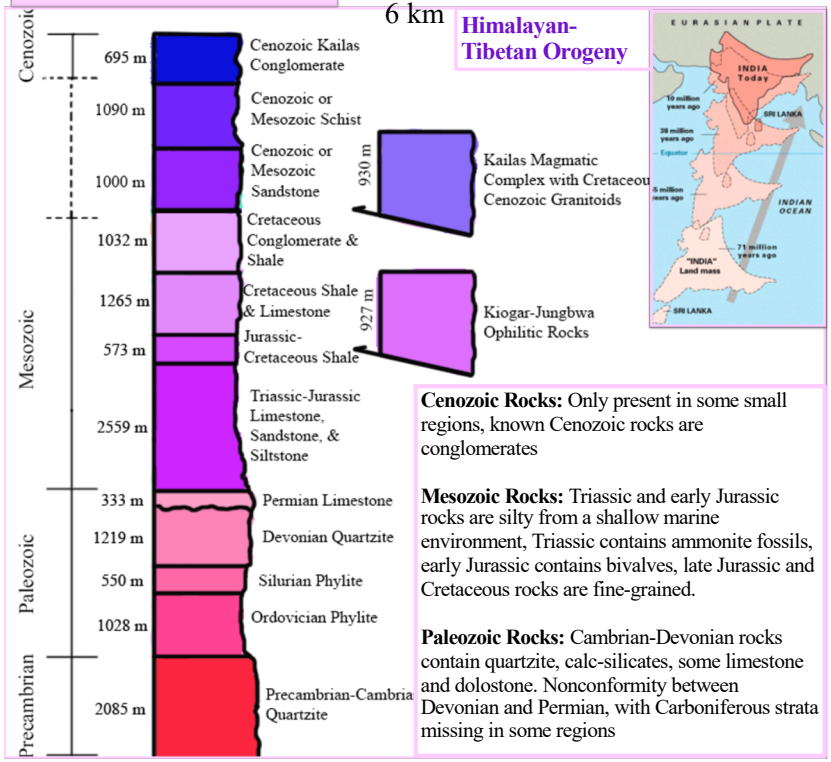
Murphy, M. A., & Yin, A. (2003). Structural evolution and sequence of thrusting in the Tethyan fold-thrust belt and Indus-Yalu suture zone, southwest Tibet. *Geological Society of America Bulletin*, *115*(1), 21-34.



System of Structures

Fault 1 overrides the sedimentary rocks at 45 degrees, doubling sedimentary layers thickness, fault 2 splits fold ab as a normal fault as a normal fault. Large offset from fault 3. Faults 4-8 show less offset (however as fault 5 is directly along a contact it is hard to tell the offset), though faults 7 and 11 have most of their movement from right-lateral strike slip faulting. Shortening is accommodated by fold cd, which is split by faults 9 and 10.





Himalayan-Tibetan Orogeny

Cenozoic Rocks: Only present in some small regions, known Cenozoic rocks are conglomerates

Mesozoic Rocks: Triassic and early Jurassic rocks are silty from a shallow marine environment, Triassic contains ammonite fossils, early Jurassic contains bivalves, late Jurassic and Cretaceous rocks are fine-grained.

Paleozoic Rocks: Cambrian-Devonian rocks contain quartzite, calc-silicates, some limestone and dolostone. Nonconformity between Devonian and Permian, with Carboniferous strata missing in some regions

Tectonic Reconstruction

130-66 ma

Early-Late Cretaceous: Tethys ocean lithosphere subducts under Eurasian plate, arc related magmatism occurs.

66-56 ma

Late Cretaceous-Paleocene: Ophiolitic complex thrusts southward onto sedimentary rock below it, resulting in 51 km of shortening (minimum of 53 km of total displacement). Nearby Himalayas begin to form. Plate moves

56-30 ma

Eocene-Early Oligocene: 31 km of shortening from two southern thrust faults and one northern normal fault forming (though the normal fault may have formed as early as the Permian). May have shifted Tethyan sedimentary rocks north and exposed Precambrian-Cambrian rocks. A thrust fault causes 30 km of shortening (40 km of slip), doubling the thickness of the Mesozoic sedimentary layers. Two northern normal faults and one inferred southern thrust fault cause less than 1 km of shortening. Potassium-rich volcanism ends 40 ma.

30-16 ma

Late Oligocene-Early Miocene: More thrusting occurs southwardly; 30-25 ma granite is emplaced at 400°C and quickly cools, forming the current appearance of the Kailas magmatic complex from the magmatic arc.

16-11 ma

Early-Middle Miocene: Northward thrusting layers stack Cretaceous basin deposits, accretionary wedge material, and Triassic rocks, 20 km of shortening accommodated by fault at Permian boundary. North-dipping thrust extends deep into crystalline rock layers

Minimum of 176 km of shortening in total

Table of Structures

Faults

Name	Type	Orientation	Slip Direction	Offset
1	Thrust	240,45		6000 m
2	Normal	275,68		3500 m
3	Reverse	275,50		6000 m
4	Normal	275,65		1000 m
5	Thrust	298,40		?
6	Normal	118,62		250 m
7 Southern Karakoram Fault	Normal	298,60	N70°W, 30°	250 m
8	Normal	118,52		7500 m
9	Normal	118,58		2000 m
10	Normal	298,60		2250 m
11 Northern Karakoram Fault	Normal	120,70	N80°W, 20°	2000 m

Folds

Name	Type	Tightness	Height	Orientation
a	Syncline	85°	6500 m	55° NE
b	Anticline	40°	6500 m	95°SE
c	Anticline	75°	9000 m	119°SE
d	Syncline	87°	9000 m	125°SE