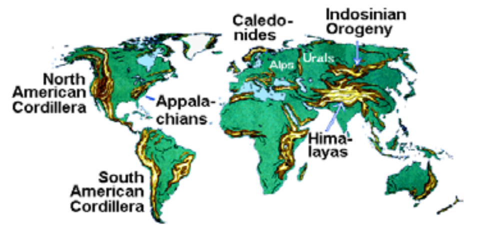
Mountain Belts and the Continental Crust

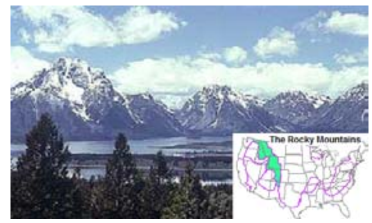
The major mountain belts worldwide

- are long and continuous chains that comprise numerous mountain ranges or groups of closely spaced parallel to sub-parallel ridges (e.g., from the Aleutian Islands to Coastal Ranges and Rocky mountains in the North American Cordillera);
- often (though not necessarily always) tend to be
  - younger than the surrounding continental and/or oceanic regions, and
  - taller the younger they are;
- usually comprise thick sedimentary layers, mostly marine, compared to the thinner sedimentary cover of the rest of the continent;
- commonly have metamorphosed, often granitized, cores and intensely folded and faulted sections; and
- overlie appreciably thicker crust than the average continent.

World's major mountain ranges (below) were created by convergent tectonics. A ~400 Ma old North America-Africa collision probably created the Appalachians for instance, much like the way Himalayas, now the world's tallest mountains, formed 55-70 Ma ago when the northerly moving Indian plate collided with rest of Eurasia.

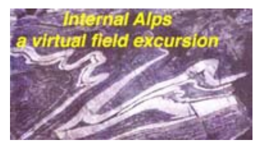


Shown below is a view of the Northern Teton Range in Rocky Mountains. Clicking on the picture will take you to the USGS/ National Park Service site that this picture is taken from.



Try these virtual excursions

The bottom right picture shows the Nanga Parbat range of Himalayas. Click on it to access the University of Leeds, U.K., site for a virtual excursion. Likewise, click on the left picture for a virtual trip to the Alps.



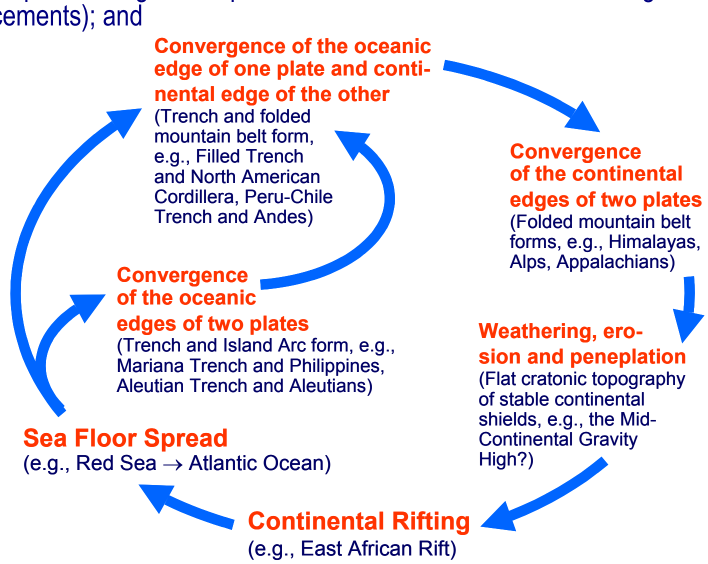
Himalayas display all these. Of the two Himalayan peaks shown on the right, the one on left is Mt. Annapurna. It is made up of limestones with ~200 Ma old Ammonites, suggesting that a deep ocean then existed here. The peak shown on the right is Mt. Everest, the world's tallest peak. It is a gneissic dome. Gravity and seismic studies confirm Himalayan crustal thickness to be ≤70 km.

Folded mountain belts are believed to evolve in three main stages:

- the *accumulation* stage creates a thick pile of mostly marine sediments and volcanics;
- the *orogenic* stage of intense deformation made up of folding accompanied with reverse and thrust faulting and followed by metamorphism and/or plutonic emplacements); and
- the *uplift* or *block-faulting* stage of *"isostatic readjustment"* and normal faults and block faulting.

Plate tectonics ascribes mountain building to convergent plate tectonics, which provide the necessary compressive forces in the orogenic stage, and thus distinguishes between

- the *collision* mountains like Alps, Himalayas and Urals, which involve the convergence of continental edges of plates; and
- the *cordilleran* mountains like the Andes which involve convergence of the continental edge of one plate and the ocean edge of the other.



The Wilson Cycle, shown alongside, thus identifies mountain building as the closure of a process that begins with continental rifting, so completing a cycle that lasts for 250-400 Ma or longer, judging from the example of the Appalachians that probably closed a >400 Ma old version of the present Atlantic ocean.

Click here to learn more about Wilson Cycle