Ni, James Fu, *Seismicity and Active Tectonics of the Himalayas and Tibetan Plateau,* Ph. D. Dissertation, Cornell University, 1984.

Abstract:

Available geophysical and geological data are analyzed with additional new data to further the understanding of the fundamental tectonic processes involved in the Himalayan-Tibetan continental collision zone. Seismicity of the Himalayas suggests that at present the Indian Plate underthrusts the Himalayas as a coherent unit along a shallow detachment. The geometry of this detachment beneath the Lesser Himalayas is constrained by well data and well-determined focal depths of moderate-sized earthquakes. This detachment surface, at or near the top of the downgoing Indian plate, dips at approximately a 15° angle from about 10-km to 20-km depth. This result supports a model of the active tectonics of the Himalayas as "thin-skinned" and analogous to the Paleozoic tectonics of the southern Appalachian Collision Zone.

New seismological observations of velocities and propagation characteristics of Pn, Sn and Lg waves beneath the Himalaya-Tibet and surrounding region can be interpreted, although not uniquely, to indicate the shallow-angle underthrusting of the Indian continental lithosphere beneath the Tibetan Plateau. The most significant observation is that, except beneath the northern part, high-frequency Sn waves propagate efficiently in the uppermost mantle beneath the Tibetan Plateau. Strong attenuation of Sn waves suggests the existence of a low-Q zone in the uppermost mantle beneath northern Tibet.

Analysis of Landsat imagery and fault plane solutions of shallow crustal earthquakes in both the Tethyan Himalayas and Tibet indicate that normal faulting and east-west extension are the dominant mode of deformation occurring in the late Cenozoic time. The normal faulting is due to an east-west deviatoric tensional stress within the elevated Tethyan Himalayas and Tibet.

Seismicity combined with structural elements mapped from digitally processed Landsat 3 Multispectral Scanner (MSS) data provide valuable information about neotectonic processes in the overthrusting western Himalayan blocks. The rhomboidal-shaped upper Sutlej River Basin consists of many NNE-trending fault blocks and is interpreted as a pull-apart basin. This pull-apart basin is explained as a result of oblique underthrusting of the Indian plate beneath Himalayas-Tibet.