d22 Neotectonics < present-day scenery >

> ... not worried about the demise of Eyak. The elder's advice is to learn the common syntax and grammar of another Athabaskan language, such as Dine, and to return to the land where "the words will be available in the surroundings." — Stocker, Michael, 2005.[1]

Neotectonics is the name given to all tectonic movements that have resulted in the present-day scenery. Invigorating the study of structures and tectonic processes within the crust is information from emerging technologies such as STRM, ASTER, Lidar, GPS Total Station, reflectorless laser rangefinders, digital topographic data and an understanding of morphotectonics (***Figure d22.1***).

Relief features of Earth's scenery can be categorized, from largest to smallest, as:

First-order relief features called the *geotecture*, include: shields, continental platforms, crystalline massifs, orogenic belts, passive margins, and oceanic basins.

Second-order relief features called the *morphostructure*, include: plateaus, uplands, lowlands, ridges, and mountains of continents and ocean floors. These features originate by below the surface tectonic movements, by denudational unloading and depositional loading, and by volcanism. Types of mountains can be fault, fold, broad-arch erosional, and volcanic. Negative movements can form grabens (rift valleys between horsts) and basins.

Third-order relief features called the *morphosculpture*, include: river valleys, lake basins, karst, caverns, dunes, yardangs, blowouts, and Pleistocene glacial features.

The morphosculpture scenery, in particular the profile of hill slopes, is determined by the rate of uplift with respect to base level and by the climate which affects regolith production:

Slow rates of uplift, of no more than 0.5 to 1 mm/yr, allow the climate to be revealed by the scenery. Wet tropical to wet temperate climatic zones—where soil is produced by weathering in equilibrium with an erosion rate of 0.058-0.083 mm/yr—are characterized by convex-upward vegetated slopes adjusted to soil creep and slope wash.[2] Semiarid climatic regions are characterized by concave-upward hill slopes (of mesas and buttes) adjusted to slope wash. Where stream incision rates exceed 0.5-1.0 mm/yr, Douglas W. Burbank has reported that landsliding almost exclusively determines slope profiles (between 20° and 40° with a mean of 32°). In the Himalayas, where rivers are generally underloaded, rapid uplift has developed a scenery where the elevation is determined by the spacing of the rivers and the internal friction strength of the bedrock.[3] Himalayan uplift has intensified monsoonal rains locally and there, rapid river erosion feeds back via unloading to produce faults (unmapped as yet)[4] that further the uplift of that locale.[5] ❑

Figure d22.1 [6] **Morphotectonics (tectonics-climate-erosion system)**

The geosphere, atmosphere, hydrosphere and biosphere interact in diverse ways at a variety of spatial and temporal scales. The principal interface between these spheres is the Earth's surface. Tectonic activity creates the surface relief that amplifies these interactions. Surface processes destroy relief by redistributing mass. These processes are coupled insofar as there is a deformational response to surface change and the resultant gravitational forces. Rates of surface processes are modulated by climatic factors, primarily precipitation rate and distribution which determines discharge levels in rivers. Interactions between tectonic and surficial processes are complex and involve coupling with feedback through diverse mechanisms. —Sean Willett.[7]