KÜTLE YENİLMELERİ

(MASS WASTING)

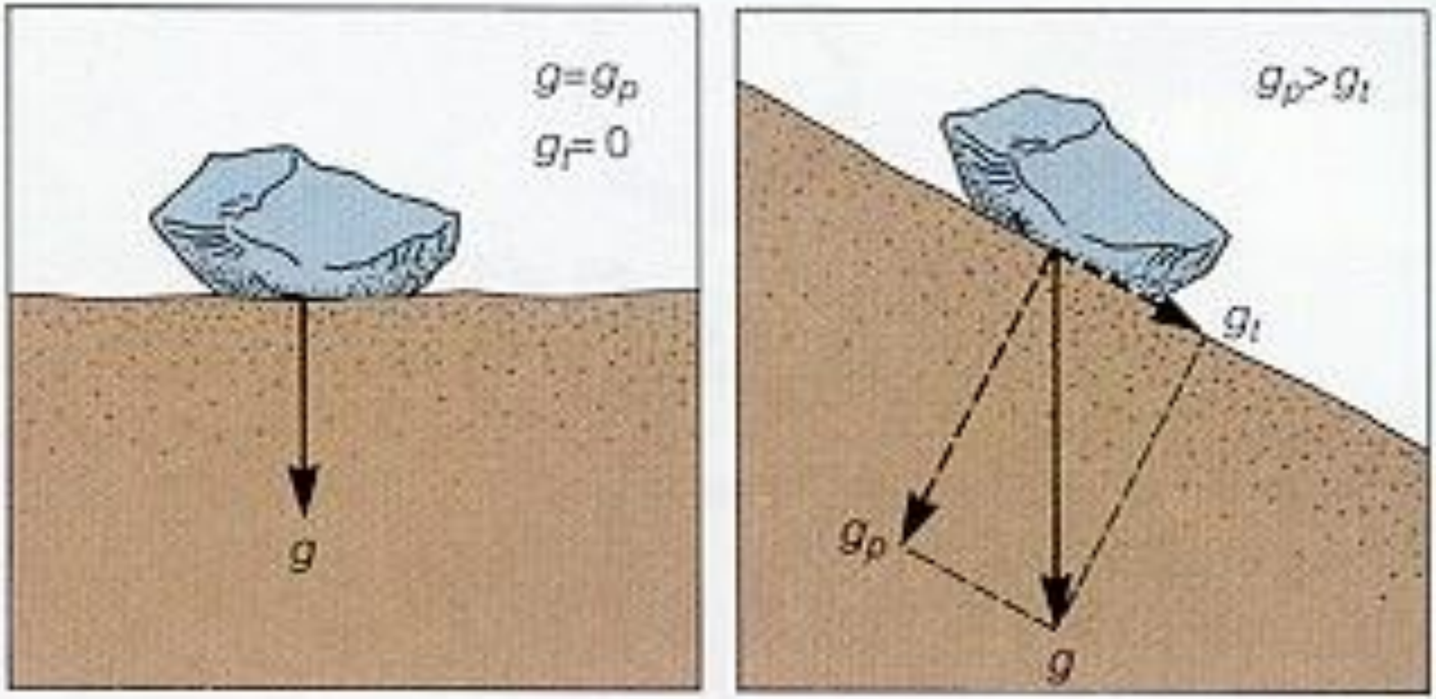


FIGURE 8.1 Effects of gravity on a rock lying on a hill-slope. Gravity acts vertically and can be resolved into two components. One is perpendicular (g_p) and one tangential (g_t) to the surface.

Figure 9.1 This Peruvian valley was devastated by a rock avalanche that was triggered by an off-shore earthquake in May 1970. A. Before. B. After the rock avalanche. (Photos courtesy of Iris Lozier)

A.

B.

Figure 9.2 The walls of the Grand Canyon extend far from the channel of the Colorado River. This results primarily from the transfer of weathered debris downslope to the river and its tributaries by mass wasting processes. (Photo by Michael Collier)

Figure 9.3 Various forms of mass wasting can be triggered by earthquakes. This home in Pacific Palisades, California, was destroyed by a landslide triggered by the January 1994 Northridge earthquake. In some cases, damages from earthquake-induced mass wasting are greater than damages caused directly by an earthquake's ground vibrations. (Photo by Chromo Sohm/The Stock Market)

age. Figure 9.5 illustrates this effect.

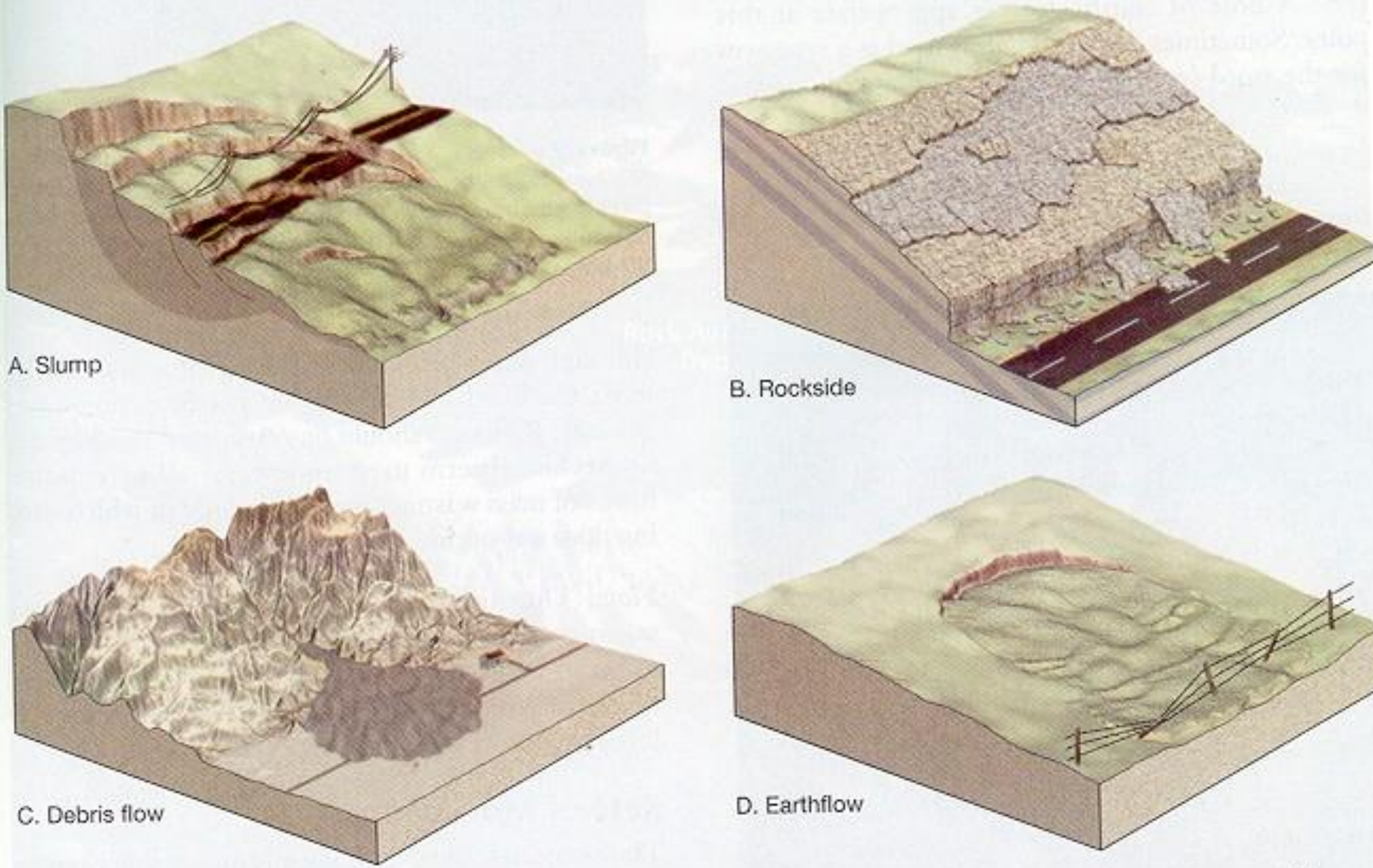


Figure 9.4 The four processes illustrated here are all considered to be relatively rapid forms of mass wasting. Because material in slumps A. and rockslides B. move along well-defined surfaces, they are said to move by sliding. By contrast, when material moves downslope as a viscous fluid, the movement is described as a flow. Debris flow C. and earthflow D. advance downslope in this manner.

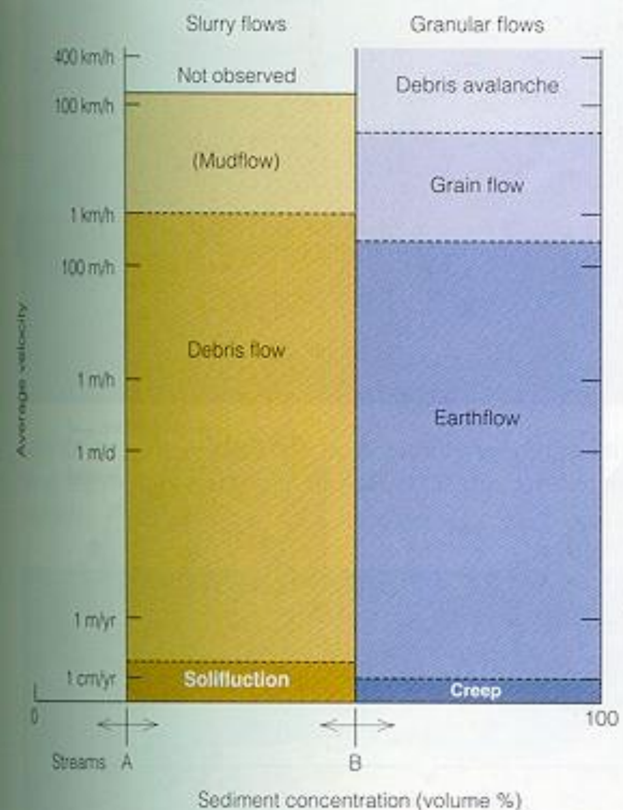


FIGURE 8.8 Classification of sediment flows on the basis of their average velocity and sediment concentration. The transition from a sediment-laden stream to a slurry flow occurs when the sediment concentration becomes so high that the stream no longer acts as a transporting agent; instead, gravity becomes the primary force causing the saturated sediment to flow. As the percentage of water decreases further, a transition from slurry flow to granular flow takes place. Now the sediment may contain water and/or air. The boundaries between muddy streams and slurry flows (A) and between slurry and granular flows (B) are not assigned sediment-concentration percentages because the position of the boundaries can shift to the left or right depending on the physical and compositional characteristics of the sediment + water + air mixture. Different types of slurry and granular flows are recognized on the basis of their mean velocity.

Figure 9.5 Rockfall in Big Bend National Park, Texas. (Photo by Jeff Foott/DRK Photo)

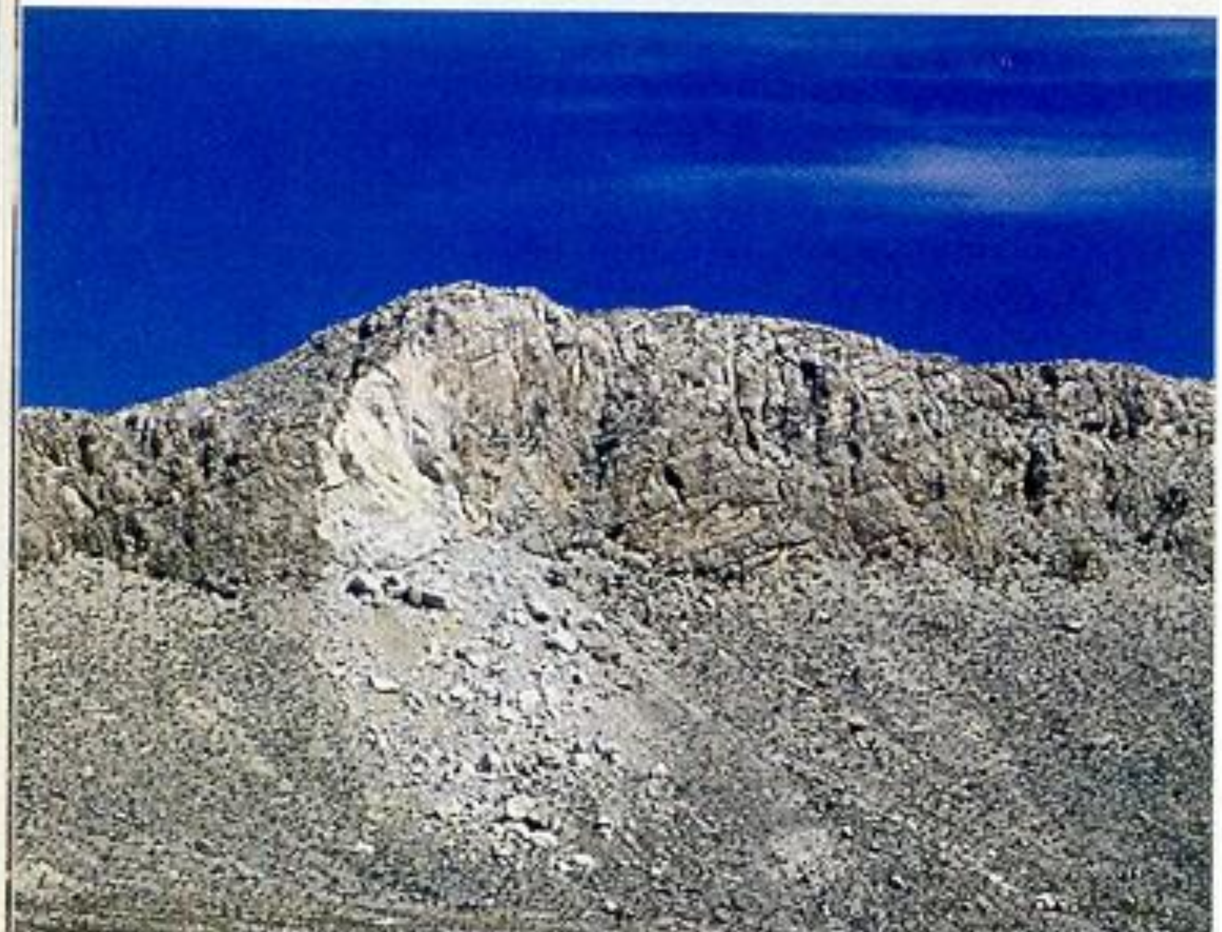


Figure 9.6 Talus is a slope built of angular rock fragments. Mechanical weathering, especially frost wedging, loosens the pieces of bedrock, which then fall to the base of the cliff. With time, a series of steep, cone-shaped accumulations build up at the base of the vertical slope. (Photo by Wolfgang Kaehler)

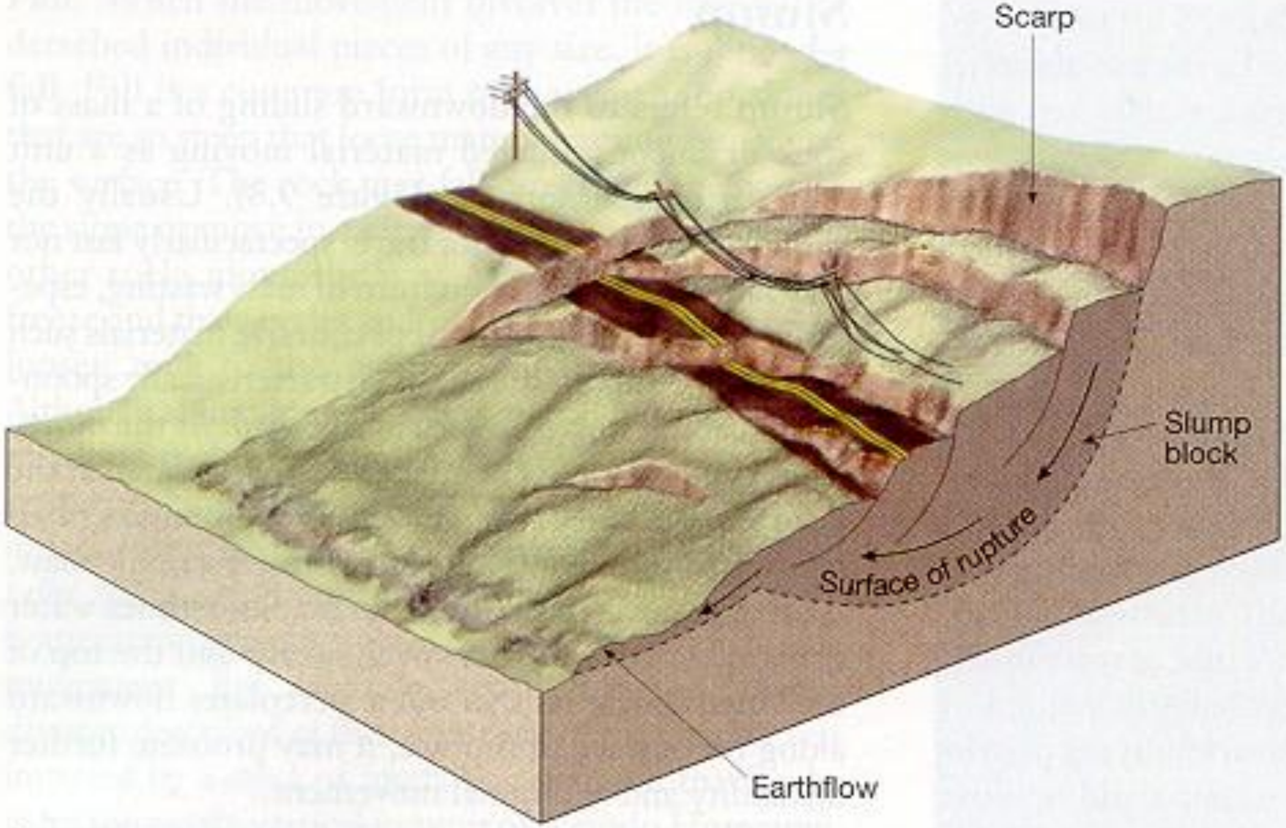


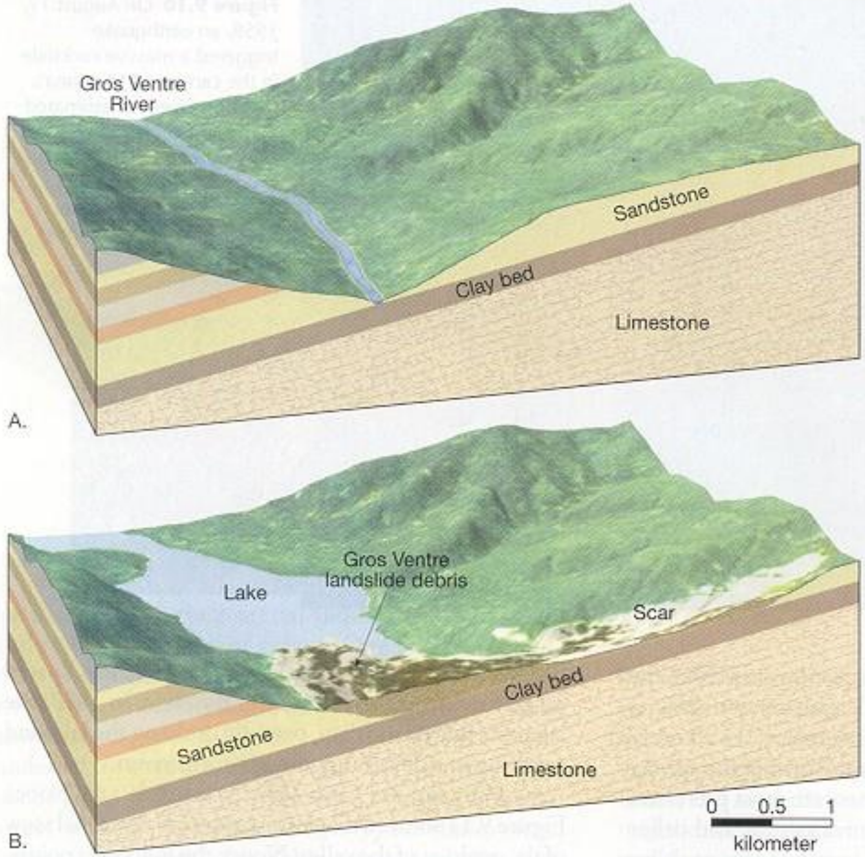
Figure 9.8 Slump occurs when material slips downslope en masse along a curved surface of rupture. Earthflows frequently form at the base of the slump.

Figure 9.9 Slump at Point Fermin, California. Slump is often triggered when slopes become oversteepened by erosional processes such as wave action. (Photo by John S. Shelton)

FIGURE 8.4 A large slump in a high gravel terrace beside the Yakima River in central Washington has broken up a major highway and displaced it more than 100 m laterally into the river channel.

Tataralan creek
E
N
S
W
0
150 m

Figure 9.11 Parts A and B show a before and after cross-sectional view of the Gros Ventre rockslide. The slide occurred when the tilted and undercut sandstone bed could no longer maintain its position atop the saturated bed of clay. As the photo in part C illustrates, even though the Gros Ventre rockslide occurred in 1925, the scar left on the side of Sheep Mountain is still a prominent feature. (Parts A and B after W.C. Alden, "Landslide and Flood at Gros Ventre, Wyoming," Transactions (AIME) 76 (1928); 348. Part C photo by Stephen Trimble)



C.

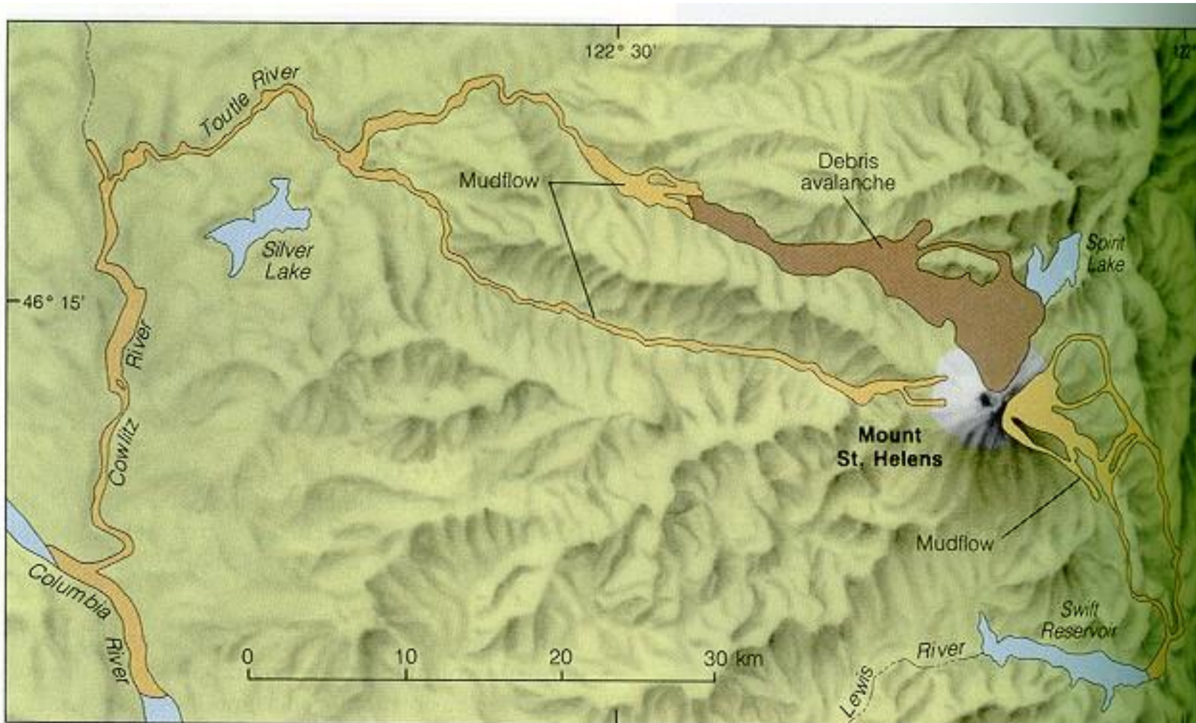


FIGURE 8.14 During the 1980 eruption of Mount St. Helens in Washington, volcanic mudflows were channeled down valleys west and east of the mountain. Some mudflows reached the Columbia River, having traveled more than 90 km. Flow velocities were as high as 40 m/s and averaged 7 m/s.

Figure 9.14 This small, tongue-shaped earthflow occurred on a newly formed slope along a recently constructed highway. It formed in clay-rich material following a period of heavy rain. Notice the small slump at the head of the earthflow. (Photo by E.J. Tarbuck)

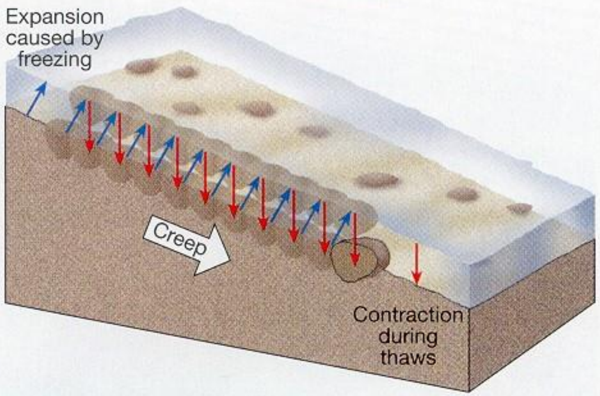


Figure 9.15 The repeated expansion and contraction of the surface material causes a net downslope migration of rock particles—a process called *creep*.

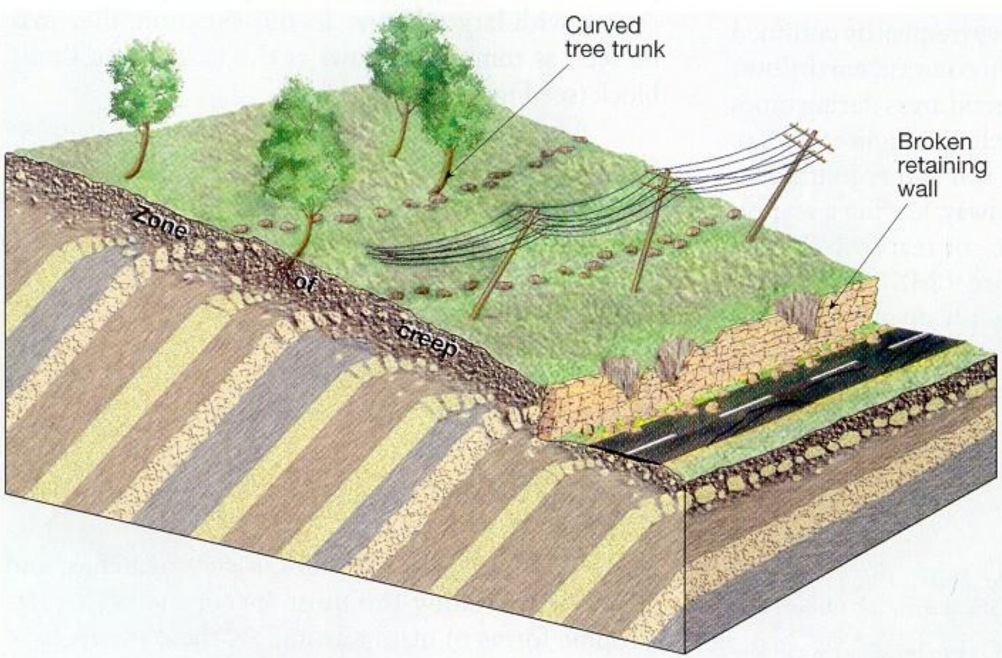


Figure 9.16 Alth
imperceptibly slov
effects are often vi

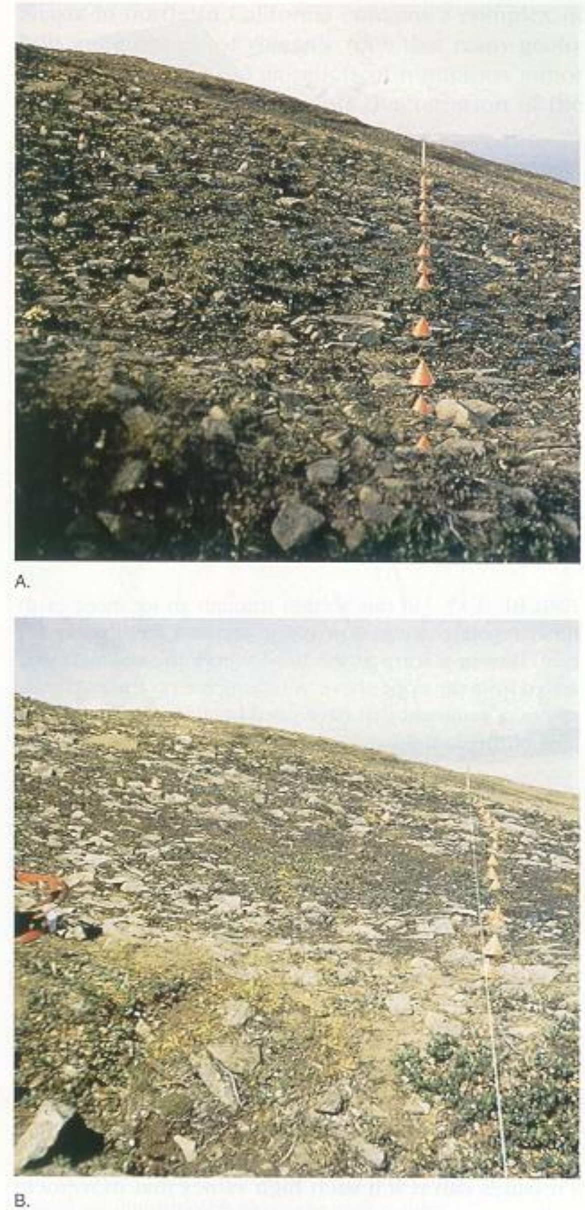


FIGURE 8.16 Colored targets placed in a straight line across a hillslope in Greenland. A. had been moved differentially downslope by creep when photographed a year later. B. The maximum recorded movement along the slope averaged 12 cm/yr.

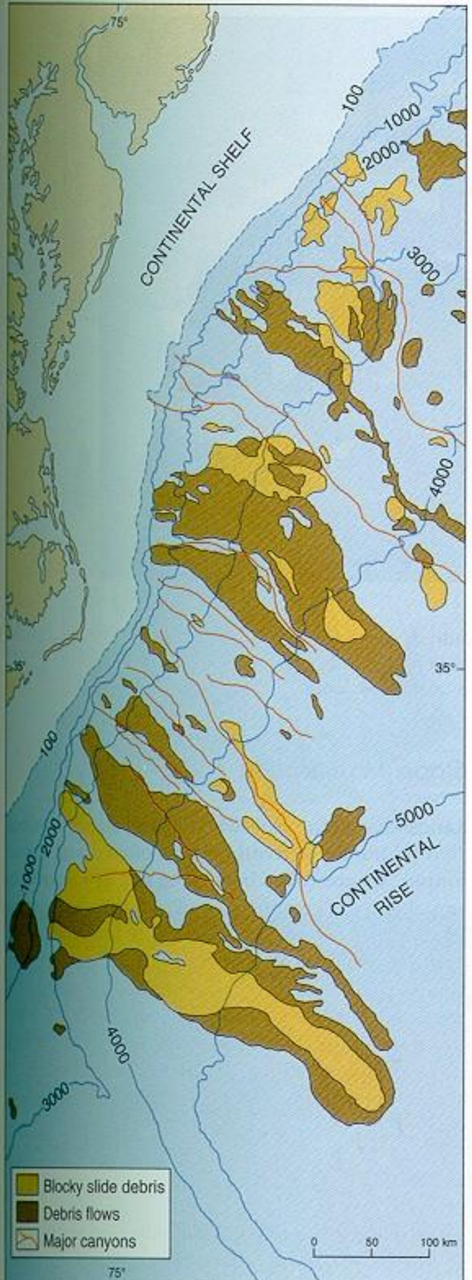


FIGURE 8.24 Map of a region off the eastern coast of the United States showing the distribution of large blocky landslide and debris-flow deposits on the continental slope and rise.

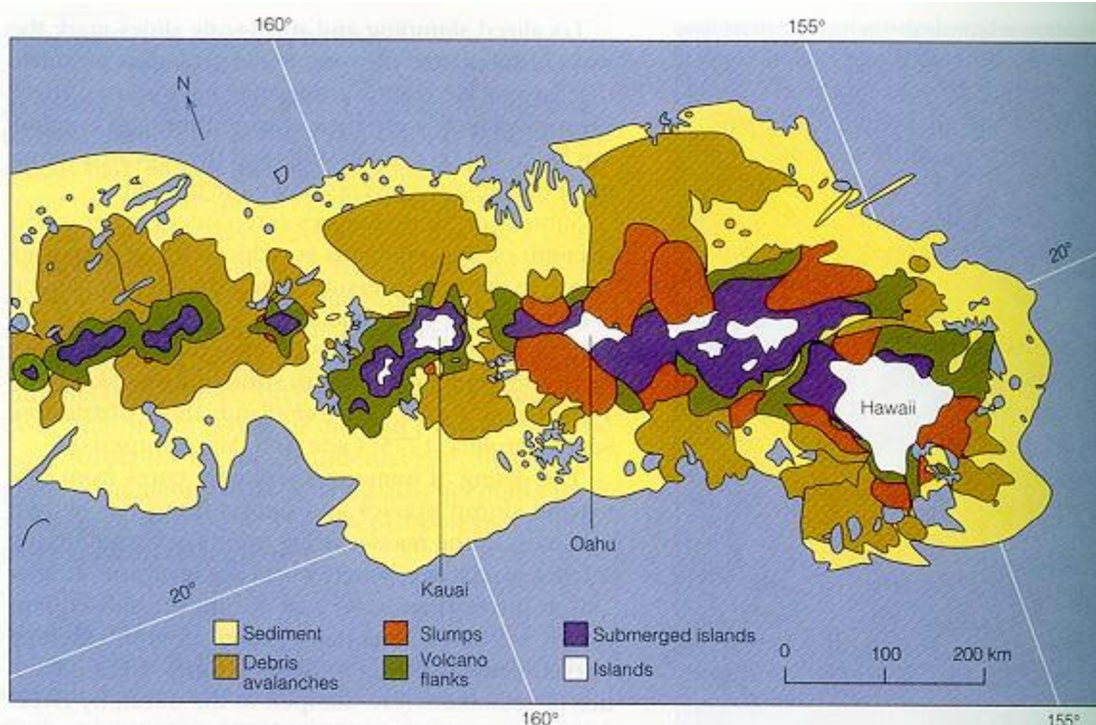


FIGURE 8.25 A broad belt of chaotic terrain extending hundreds of kilometers across the seafloor adjacent to the Hawaii Islands is interpreted as deposits of massive landslides that originated on the steep, unstable submarine flanks of the volcanoes.

Figure 9.17 Solifluction lobes northeast of Fairbanks, Alaska. Solifluction occurs when the active layer thaws in summer. (Photo by James E. Patterson)