Creep Encyclopedia Article

Creep

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Creep

The slow, often imperceptible downslope movement of **soil** or other debris is called creep. Because creep moves materials so slowly, it is difficult to discern directly. Observation of the effects of creep, such as bent trees, tilted fences, and cracked walls, usually leads to identification of the problem.

Creep is caused by the interaction of multiple factors, but heaving is likely the most important process. Heaving involves the expansion and contraction of **rock** fragments, and occurs during cycles of wetting and drying, as well as **freezing** and thawing. As expansion occurs, particles move outward, perpendicular to the hillside. During contraction, the particles move back toward the hillside, vertically, and end up slightly downslope of where they began. The repeated motion of individual particles results in net downslope movement of the material. Areas that undergo wet/dry or freeze/thaw cycles are most susceptible to creep.

Solifluction is a special type of creep that occurs in cold regions underlain by **permafrost**. During the winter, the ground freezes right up to the surface. When the surface layer thaws, during the spring and early summer, the meltwater cannot percolate downward into the frozen layers beneath. This causes the surface layer of soil to become waterlogged, facilitating downslope movement as the layer becomes saturated. In this case the surface layer flows, riding above the frozen ground beneath. Although most common in permafrost areas, solifluction can occur anywhere that the surface soil layer becomes saturated.

Although movement associated with creep is slow, it causes significant economic damage because it is a widespread phenomenon that is probably occurring to some extent on virtually all soil-covered slopes. Some of the problem relates to the difficulty of detection. Unless trees, walls, or other built structures are deformed, it is difficult to impossible to determine whether or not creep is occurring. Unfortunately, where creep has been identified, it is also difficult to control. The best response to the problem is to avoid building in areas undergoing creep. Where construction is necessary, buildings should be anchored to **bedrock** beneath the creeping soil and debris layer.

See Also

Mass Wasting; Regolith; Weathering and Weathering Series