

Mass Movement Encyclopedia Article

Mass Movement

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Mass Movement

Mass movement refers to the downslope movement of **soil**, **regolith**, or **rock** under the influence of **gravity** and without the aid of a transporting medium such as **water**, **ice**, or air. The term is synonymous with **mass wasting** and stands in contrast to mass transport, in which the same kinds of material are transported by water, ice, or air.

Mass movement can occur by a variety of processes including landsliding in all of its forms, **creep**, and solifluction. Rates of mass movement can range from a few millimeters per year in the case of creep or solifluction to tens of meters per second in the case of **catastrophic mass movements** such as debris avalanches. Debris and mud (or earth) flows are generally considered to be forms of mass movement because they are comprised primarily of solid material with only a small proportion of water.

Both mass movement and mass transport are naturally occurring processes that contribute to the cycle of tectonic uplift, **erosion**, transportation, and deposition of sediments. They are responsible for the **topography** of mountain ranges and river canyons that has developed over **geologic time**. Since the Industrial Revolution, however, humans have become increasingly significant agents of mass movement and transport. Catastrophic mass movements at Elm, Frank, and Vaiont were triggered by human activity on or near potentially unstable slopes; the failure of hydraulic structures such as Teton and St. Francis dams have produced major **floods** with great erosional power; and open pit mining involves the movement of cubic kilometers of material over decades of operation. Agriculture is also a large, but subtle contributor to mass movement, because exposed and tilled soil is much more easily eroded than that in its natural state. Recent estimates suggest that humans are currently responsible for the movement of about 37 billion tons of soil and rock per year, and that the cumulative amount of soil and rock moved by humans is the equivalent of a mountain range that is 2.5 miles (4 km) high by 62 miles (100 km) long by 24.8 miles (40 km) wide.

See Also

Debris Flow; Landslide; Mud Flow; Rockfall; Slump