

Mass Wasting: the Work of Gravity  
S=slide

## S1 Key Concepts

What is the process?  
What are the controls and triggers?  
Criteria used to divide types of mass wasting

## S2 Mass Wasting

Down slope movement of rock, regolith, and soil under the influence of gravity – does not require a transport medium

Landslides  
rock

Mudflows  
mud or soil

## S3 Role of Mass Wasting

Landforms develop as the products of weathering are moved away from their place of origin

Mass wasting moves the debris downslope

The combined effects of mass wasting and running water produce stream valleys

S4 Many valleys are wider than they are deep indicating the effects of mass wasting

## S5 Slope changes

Mountain building and volcanic processes produce slopes

Most rapid mass wasting events occur in areas of rugged, geologically young mountains

As a landscape ages massive, rapid mass wasting events are replaced by smaller downslope movements

## S6 Controls and Triggers

Gravity is the controlling force but several factors aid in overcoming inertia and starting the downslope movement

A trigger is an event that starts the movement – some are listed here

Water  
Oversteepened Slopes  
Removal of Vegetation  
Earthquakes

S7 Water from heavy rains or snow melt saturate surface materials  
When pore spaces become filled with water (saturated) the grains easily slide past each other

S8 Increase in slope angle or oversteeped slopes  
Angle of repose is the steepest angle at which material remains stable – 25-40 degrees  
Occurs in sand, soil, regolith, and bedrock

S9 Removal of vegetation  
Plants contribute to the stability of slopes because their root system binds the soil and regolith together and plants shield the soil from the erosional effects of rain  
Vegetation is removed naturally and by human activities

S10 Earthquakes as triggers  
Landslides can be started by the shaking  
Liquefaction – water saturated surface materials loose strength and behave as fluidlike masses that flow

S11 La Conchita Slump: Photo 1  
Slope Failure at the coastal community of La Conchita along Highway 101 between Ventura & Santa Barbara  
Houses at the base of the cliff were destroyed

S12 La Conchita:  
This airphoto shows the large amount of debris that has moved  
In the future more movement will occur because the slope is still unstable

S13 Classification of Processes  
Type of Material – soil and regolith – terms are debris, mud, or earth: bedrock – term is rock  
Type of Motion – fall when the movement involves free fall on steep slopes; slides due to zones of weakness separating the slide material from stable material: flow moves as viscous fluid  
Rate of Movement – ~200 km/hr to less than mm/yr

S14 Rock fall in Pakistan  
The debris on the road is a talus slope

S15 Rock Fall  
Rock Fall in Yosemite Park,  
California in 1996

162,000 tons of rock fell !

S16 Talus Slopes from Rock Fall

Angular rock debris resulting from rock fall is termed Talus

S17 Classification

Slump

Rockslide

Debris Flow

Slow movements –

Creep

Solifluction

S18 Gros Ventre rockslide – rain water soaked through the sandstone to the clay layer, the sandstone had been cut by the river and when the clay became saturated the layer slid down the slope creating a dam in the river  
River overtopped the dam two years later causing a flood

S19 Local Rock Slide North of Ojai

An example of Rock Slide exists north of Ojai on Highway 33 - layers slope to the road & allow 10-foot thick slabs of rock to slide downwards along the slope

S20 Local Mass Wasting:

The North End of Victoria Ave

This Slump can be seen on your way to Ventura College as you drive north on Victoria Avenue

S21 Earthflow on a new slope along a recently constructed highway after a heavy rain

S22 Creep - slow downhill movement of soil or other debris rate about 1-10 mm/yr

S23 Solifluction – saturated soil flows downslope a few mm or cm per day or per year occurs where water cannot move deeper into the subsurface due to hardpan or permafrost

S24 Heating & Permafrost

As owners heated this Alaskan home, the Permafrost

Below was melted and the home sank

The addition to the left was unheated & did not sink