

DEBRIS FLOWS AND DEBRIS AVLANCHES (23)

I Main Topics

A Hazard recognition

B Debris flows on Mount Shasta, California

C Debris flows from Nevado del Ruiz, Colombia

D Debris flows & avalanches from Mount St. Helens, Washington

<http://volcanoes.usgs.gov/Hazards/What/Lahars/RuizLahars.html>

E Debris flows and debris avalanches in Hawaii

II Hazard recognition

Debris flows are one of the most widespread types of mass wasting. They are slurries that resemble flows of wet concrete. They are particularly common where episodic pulses of water encounter concentrations of loose rocky debris, such as stream channels in semi-arid regions and on volcanoes. Alluvial fans are built largely by debris flows. Debris avalanches commonly are associated with debris flows.

Iverson (1997) provides an outstanding description of the physics of debris flows:

Iverson, R.M., 1997, The physics of debris flows: Reviews of Geophysics, v. 35, p. 245-296.

III Debris flows on Mount Shasta, California

http://vulcan.wr.usgs.gov/Volcanoes/Shasta/description_shasta.html

IV Debris flows from Nevado del Ruiz, Colombia

<http://volcanoes.usgs.gov/Hazards/What/Lahars/RuizLahars.html>

A Casualty toll of ~23,000 people: largest toll from a mass wasting event in the last 3/4 of a century

B Substantial damage at a run-out distance of 100 km

C Occurred on a volcano

V Debris flows & avalanches from Mount St. Helens, Washington

<http://vulcan.wr.usgs.gov/Volcanoes/MSH/framework.html>

A Largest documented landslide in recorded history

B Debris avalanche generated devastating debris flows

VI Debris flows and debris avalanches in Hawaii

A Makaha Valley Towers 11/14/96

<http://starbulletin.com/96/11/14/news/story1.html>

<http://the.honoluluadvertiser.com/2000/Nov/20/>

B Submarine debris avalanches and debris flows

<http://www.uhh.hawaii.edu/~kenhon/geol205/Landslides2/default.htm>

Moore, J.G., Clague, D.A., Holcomb, R.T., Lipman, P.W., Normark, W.R., and Torresan, M.E., 1989, Prodigious submarine landslides on the Hawaiian Ridge, Journal of Geophysical Research, v. 94, p. 17,465-17,48.

1 Among the largest known mass wasting events in the solar system

2 Nuuanu debris avalanche

a Volume: ~5,000 cubic kilometers

b Length: 235 km

c Run-up height at distal end: 300m+

d Minimum speed at base of Hawaiian Deep:

$$v = \sqrt{2gh} = \sqrt{2(10)(300)}m/sec = 80m/sec = 280km/hr$$