

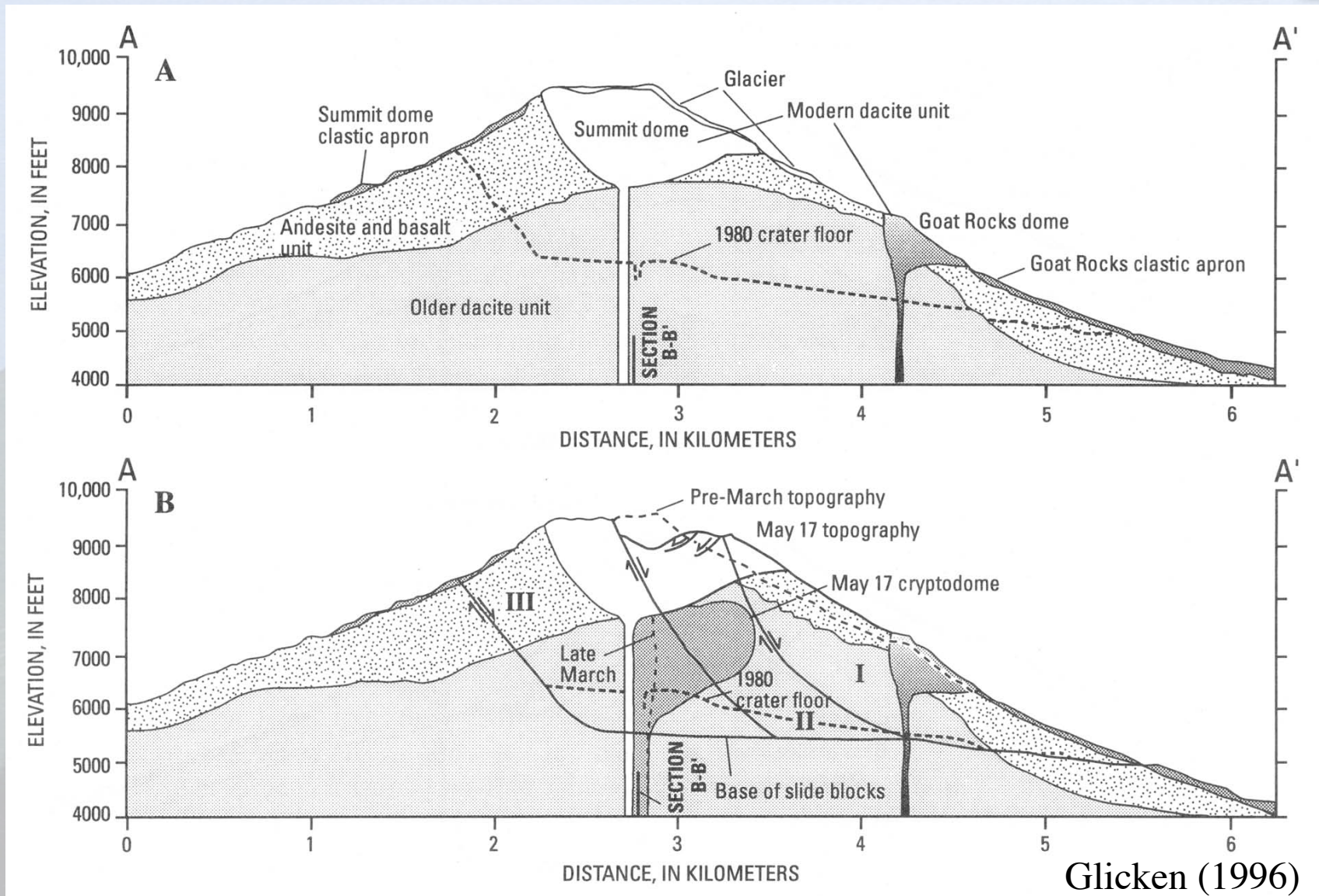
Debris Avalanche

Shinji Takarada

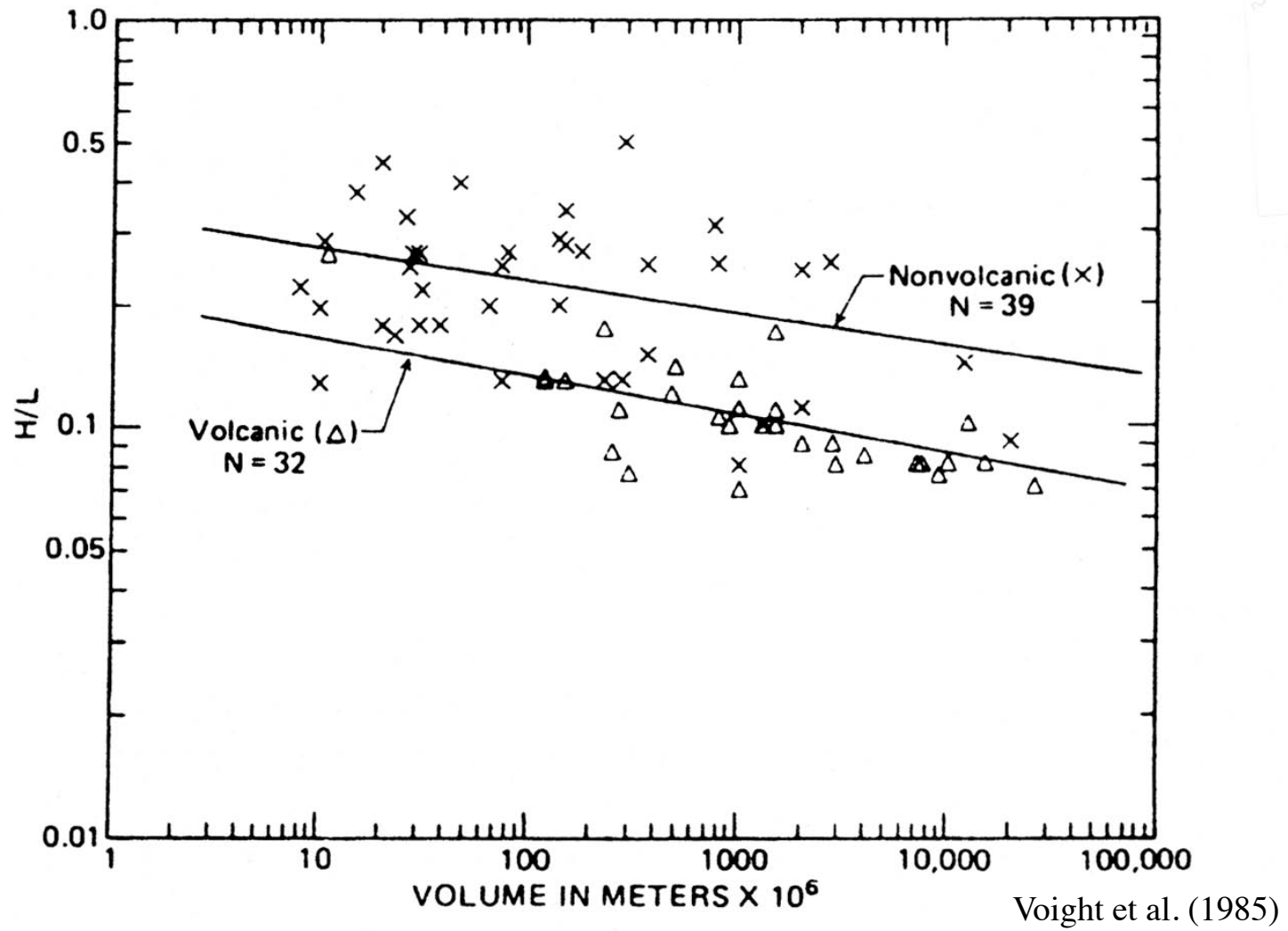
Geological Survey of Japan

AIST

St. Helens 1980 Eruption



Mobility



Emplacement dynamic models



Fluidization with air (Kent 1966)

Air-layer lubrication (Shreve 1968a, b)

Basal gaseous pore pressure (Habib 1975; Goguel 1978)

Basal self lubrication (Johnson 1978)

Combination of mechanical fluidization and sliding on a lubricated substrate (MacSaveney 1978)

Acoustic fluidization (Melosh 1979)

Low-friction sliding on dissociated or melted rock confined along a basal slide plane (Erisman 1979)

Spreading avalanche by mechanical fluidization (Davies 1982)

Bingham flow (Voight et al. 1983; Mimura et al. 1988)

Grain flow (Glicken 1986, 1996; Hui and Haff 1986)

Dilatant flow (Takahashi 1982, 1986; Egashira et al. 1989)

Basal low-density layer (Campbell 1989)

Mass loss (Van Gassen and Cruden 1989; Hunger and Evans 1997)

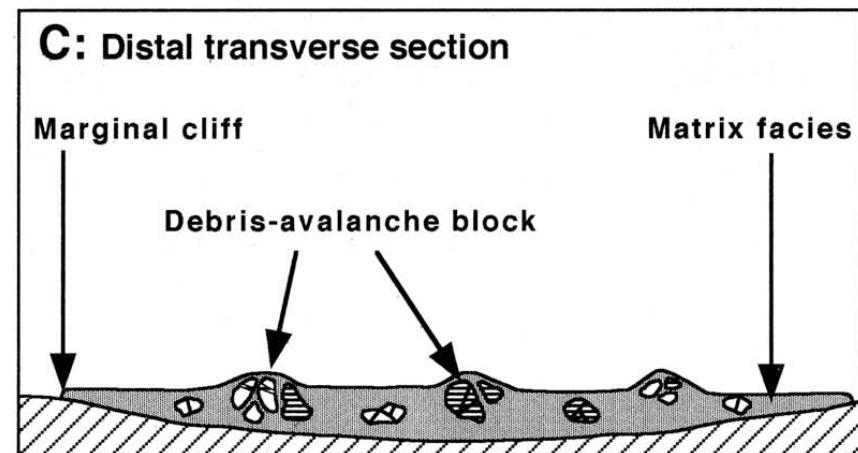
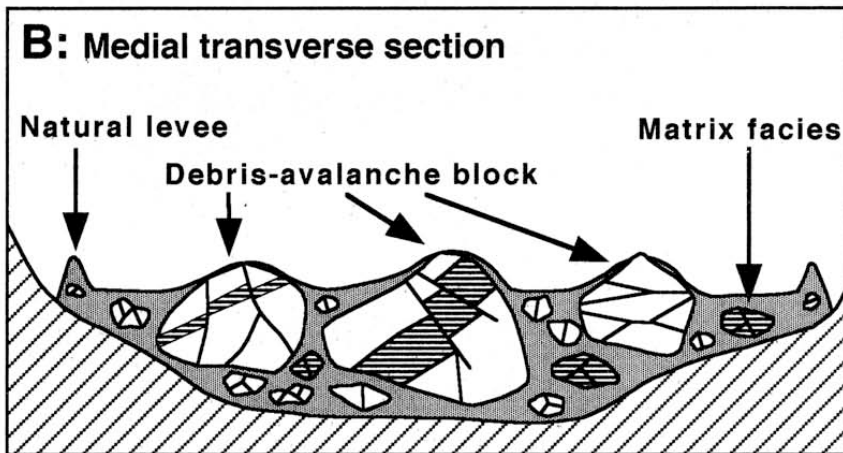
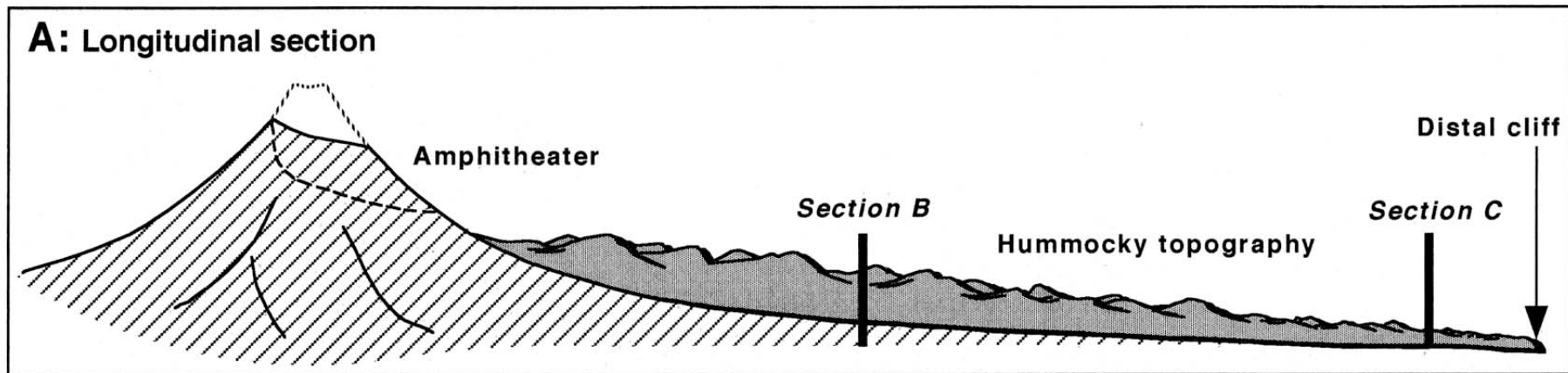
Seismic energy fluidization (Hazlett et al. 1991)

Basal pressure wave (Kobayashi 1991)

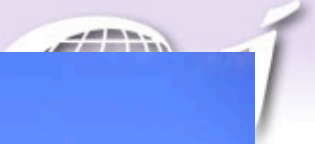
Viscous flow (Sousa and Voight 1991)

Hydroplaning (Voight and Sousa 1994)

Characteristics

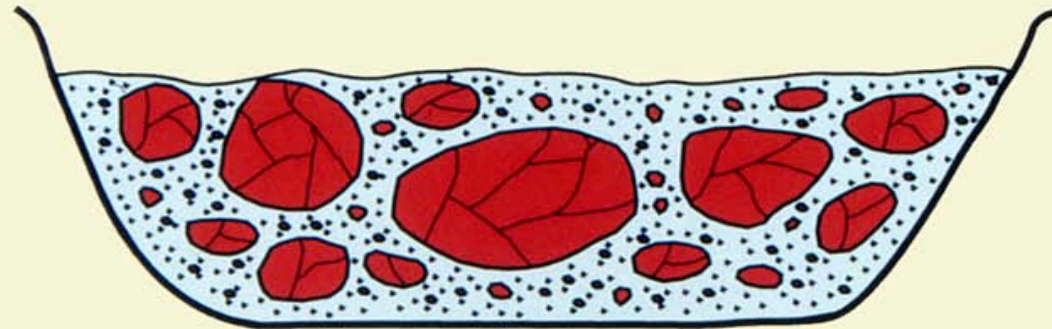


Ui et al. (2000)

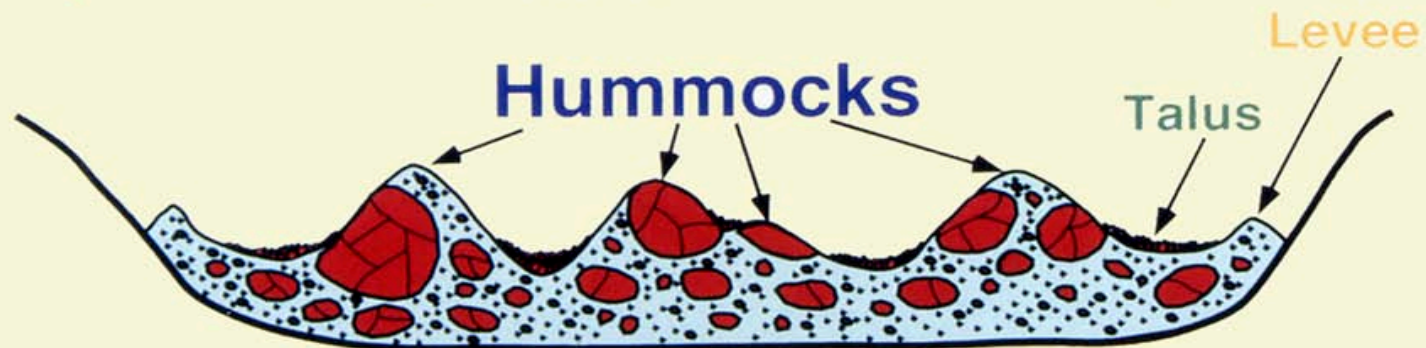


Hummocks in the debris avalanche deposit (1980 St. Helens)
Geological Survey of Japan, AIST

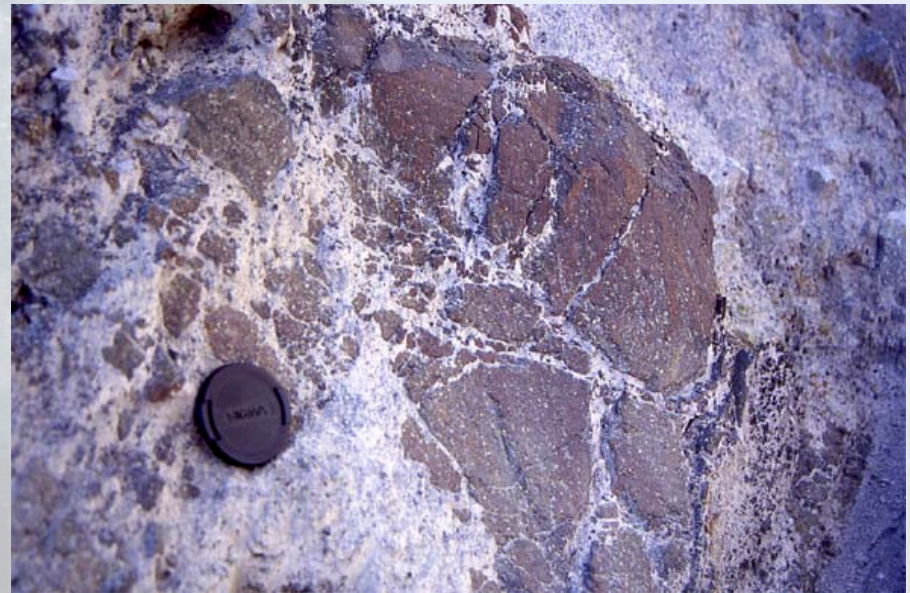
Transport [valley-filling]



Deposition [disaggregation due to lateral spreading]



in-situ gravitational collapse

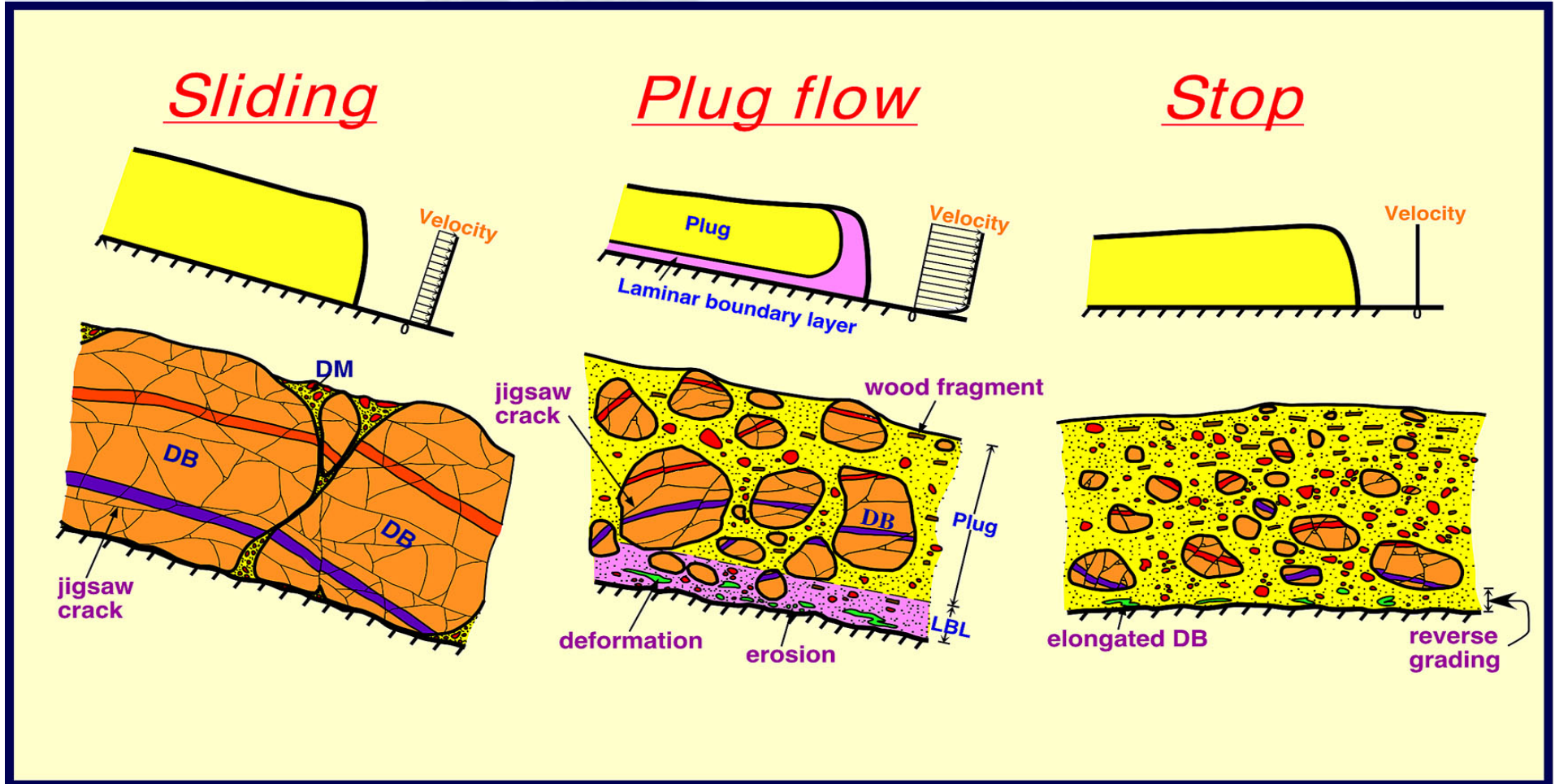


Jigsaw cracks and Jigsaw-fitting textures in debris-avalanche blocks (1980 St. Helens)
Geological Survey of Japan, AIST



Distal and basal textures in debris-avalanche matrix (1980 St. Helens)

Emplacement mechanism (valley-filling type)



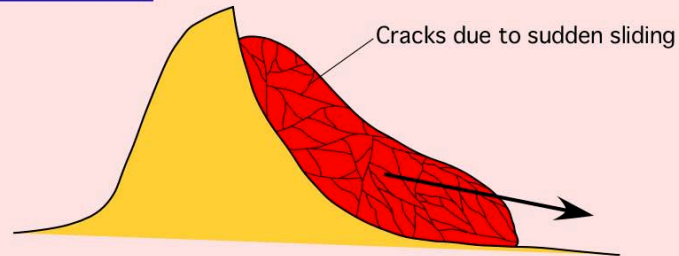
Takarada et al. (1999)

Emplacement mechanism (unconfined type)

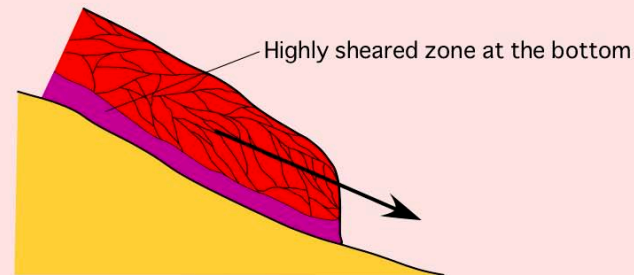


1. Sliding

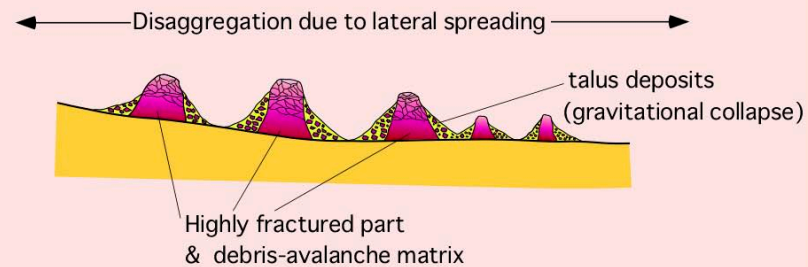
Sliding Stage



Transportation Stage



Depositional Stage



2. Laminar plug flow transport

3. Lateral spreading deposition

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