



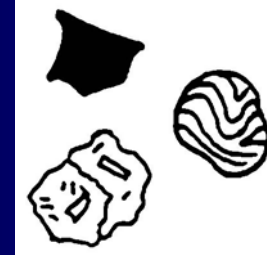
VOLCANICLASTIC DEPOSITS

Mount St. Helens
18 May, 1980

VOLCANICLASTIC deposit or rock

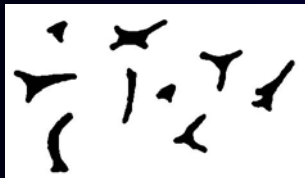
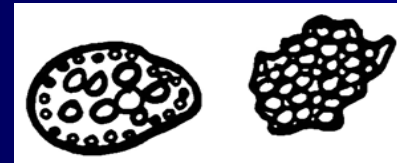
- particulate (clastic) aggregate
- most particles are volcanic

eg. fragments of volcanic rock



crystals and crystal fragments

glassy pumice or scoria



glass shards (wall of vesicles)

VOLCANICLASTIC deposit or rock

- includes **pyroclastic** (explosive fragmentation) and **autoclastic** (non-explosive fragmentation) deposits; these are **primary**
- and deposits derived from **reworking and resedimentation** of non-welded primary volcaniclastic deposits
- and **volcanogenic sedimentary** deposits formed by weathering and erosion of volcanic rocks

PRIMARY volcaniclastic deposit or rock

- clasts formed by **volcanic** processes
- transportation and deposition involve **volcanic** processes

1. explosive eruptions

→ pyroclastic deposits

- fallout, flow, surge deposits
- may be welded (“instant rock”) or non-welded (loose aggregate)

2. effusive eruptions

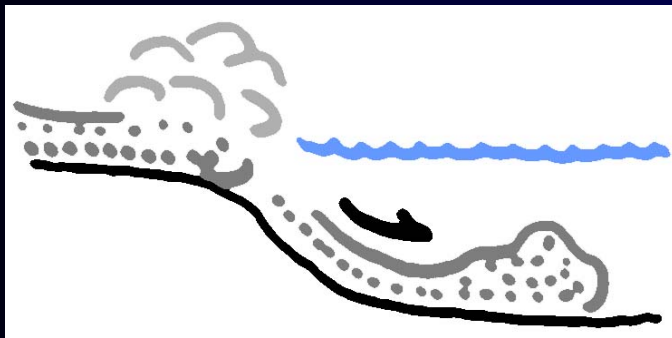
→ autoclastic deposits

- autobreccia (non-explosive brittle fracture of cooler, rigid lava)
- hyaloclastite (quench fragmentation)

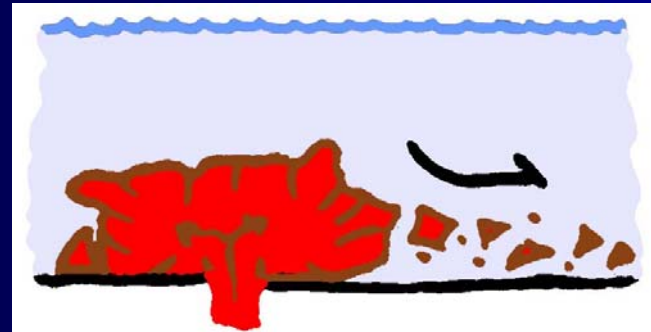
Resedimented or reworked volcanoclastic deposit

- all sorts of non-welded, unconsolidated primary volcanoclastic deposits may be **resedimented or reworked**
- resedimentation or reworking may occur at the same time as eruption → **syn-eruptive**

eg.



**pyroclastic mass-flow
deposit**



resedimented hyaloclastite

- or, significantly later than eruption → **post-eruptive**

eg. as a result of surface weathering and erosion by wind, water or ice acting on **non-welded** pyroclastic or autoclastic deposits

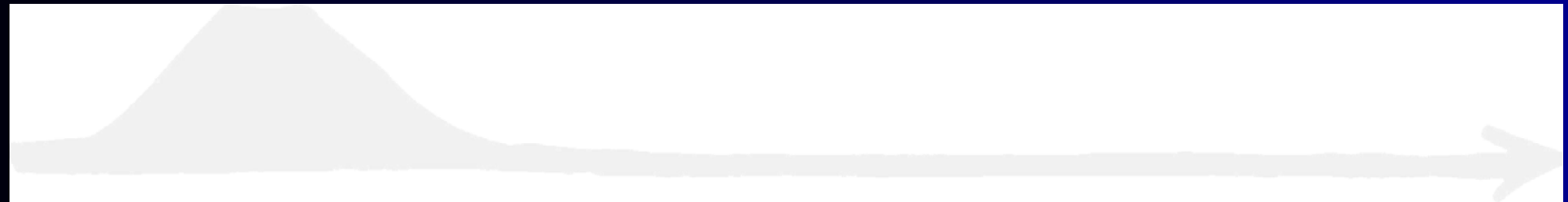
Volcanogenic sedimentary deposit or rock

- physical and chemical weathering and erosion acting on pre-existing volcanic **rocks**
 - operates between eruptions and after volcanism ceases; generally a slow process
 - involves mass wasting, water, wind and ice acting on volcanic rocks
- the particles are “epiclasts” ie. clasts created by weathering and erosion, **not** by volcanic processes; aka “epiclastic volcanic”

Sedimentary environments and processes in active volcanic terranes

- proximity to volcanic centre
 - subaerial *versus* subaqueous
 - type of volcanic centre
 - eruption frequency and size
-
- + climate
 - + basement lithologies and structure
 - + tectonic setting

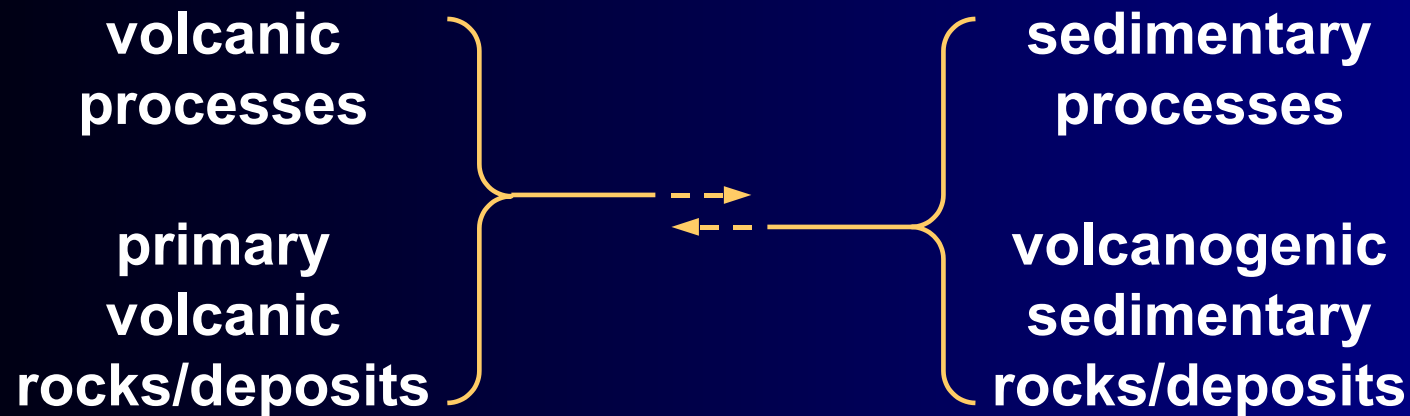
Proximity to volcanic centre



proximal

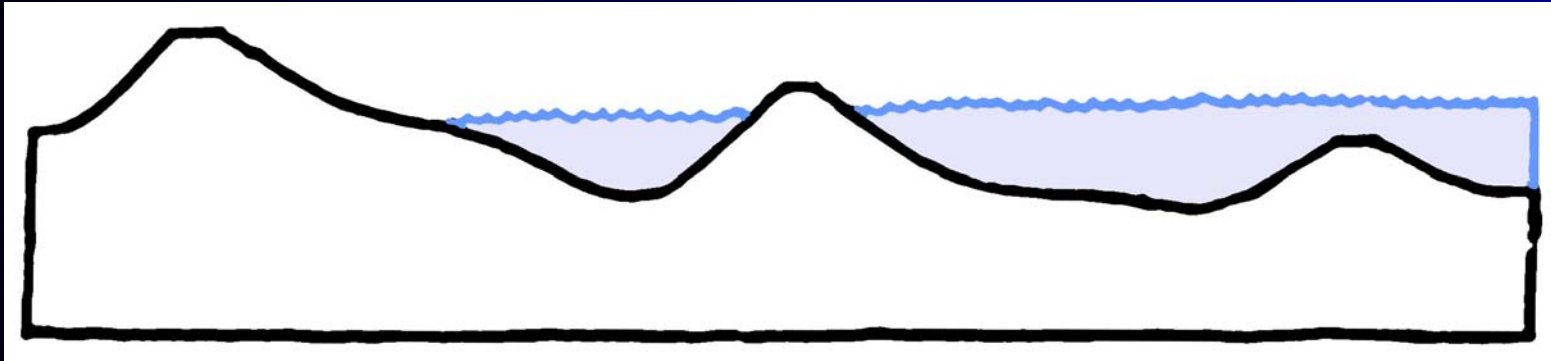
medial

distal



← weathering and erosion →

Subaerial *versus* subaqueous setting



subaerial

partly submerged

subaqueous

**explosive eruptions
vigorous weathering and erosion**

**glacial
fluvial/ alluvial
lacustrine**

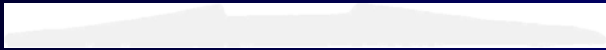



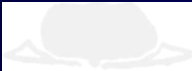
**fluvial
deltaic
transitional
shallow marine**

**shallow marine
shelf
slope
deep marine**

Type of volcanic centre

- dominant magma composition
 - mafic
 - intermediate
 - silicic
- style of eruption
 - explosive
 - explosive and effusive
 - effusive
- multiple vent *versus* single vent, polygenetic *versus* monogenetic

Type of volcanic centre

- **caldera** 
 - silicic, mainly explosive, multiple vents, big
- **composite volcano** 
 - intermediate, explosive and effusive, multiple vents
- **shield volcano** 
 - mafic, effusive, single or multiple vents; small and big
- **scoria cone** 
 - typically mafic, explosive, single vent, small
- **lava dome** 
 - silicic or intermediate, effusive, single vent, small

During repose



- edifice **destruction**
- clasts are produced by surface weathering and erosion acting on pre-existing volcanic rocks and deposits
- post-eruptive **reworked and resedimented** volcaniclastic deposits, and **volcanogenic sedimentary** deposits dominate