

Stromboli, 1969

## 2. Volcanoes



# Volcano

- ..... structure where magma & gases are erupted;
- ..... one or more vents;
- ..... pipe or fissure vents;
- ..... includes the erupted deposits around the vent(s).

# Volcano

- **Active:** in eruption, or has erupted recently
- **Dormant:** no recent eruption, but expected to erupt again in the future
- **Extinct:** no further eruptions expected

Volcanoes may be **active** for periods ranging from days to decades.

**Dormant** periods may last for decades, centuries or thousands of years

**Repose Period.....**time gap between eruptions

## **Monogenetic**

- conduit used once
- continuous eruption
- usually small size and simple

## **Polygenetic**

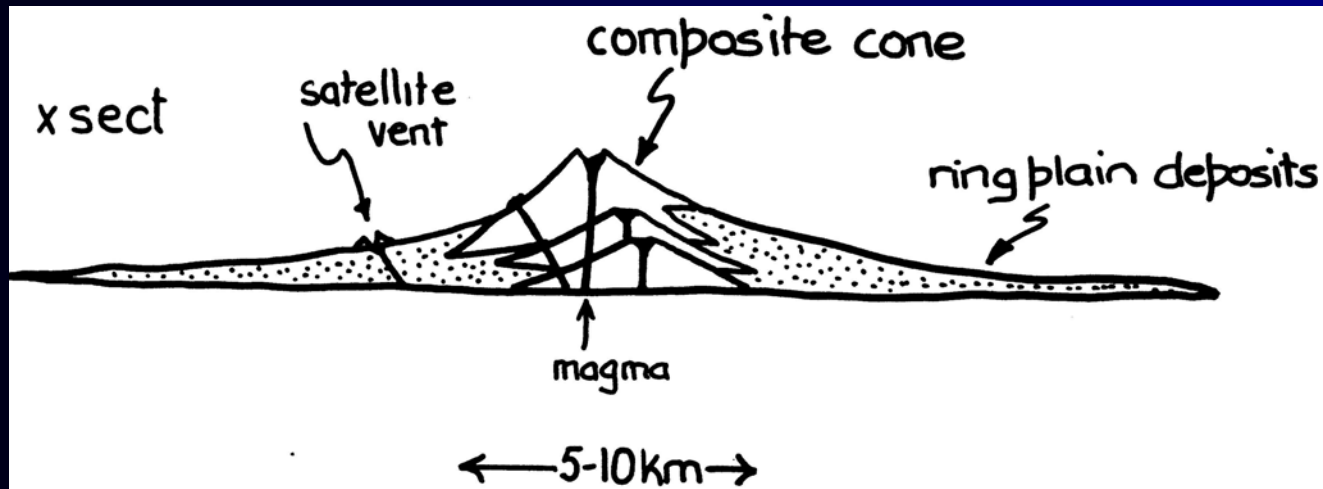
- conduit(s) repeatedly used, sealed, used again
- multiple vents
- usually large and complex

# Volcano Types

- composite volcano (andesite)
- shield volcano (basalt)
- scoria cone (basalt)
- tuff ring and maar (basalt)
- lava dome (andesite, dacite, rhyolite)
- caldera (andesite, dacite, rhyolite)
- volcanoes under water

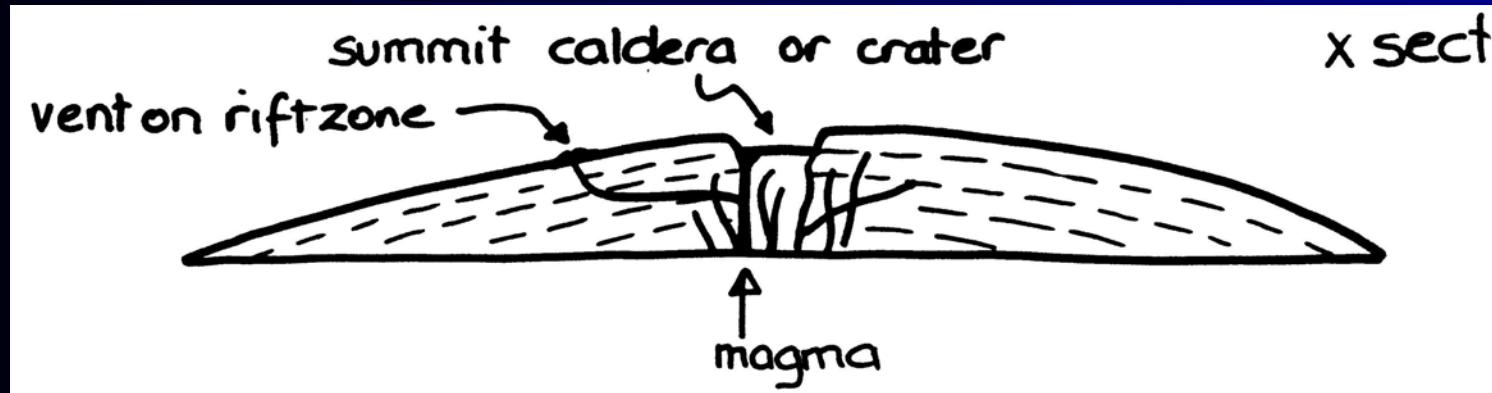
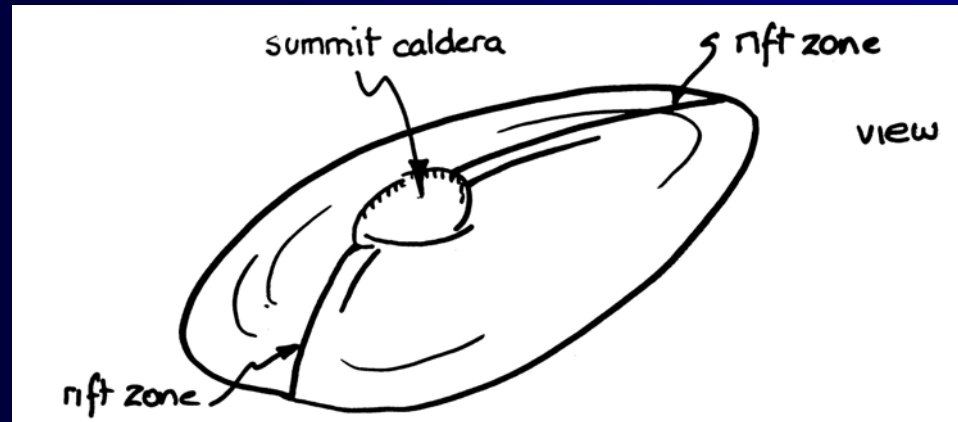
# Composite

= stratovolcano, stratocone



- well-defined cone or overlapping “composite” cones
  - central vent ± satellite vents
  - cone made of lavas and breccia
  - ring plain made of clastic deposits
  - steep slopes; sector collapse and volcanic landslides
- e.g. Parinacota, Chile; Ruapehu, NZ; Merapi, Indonesia

# Shield

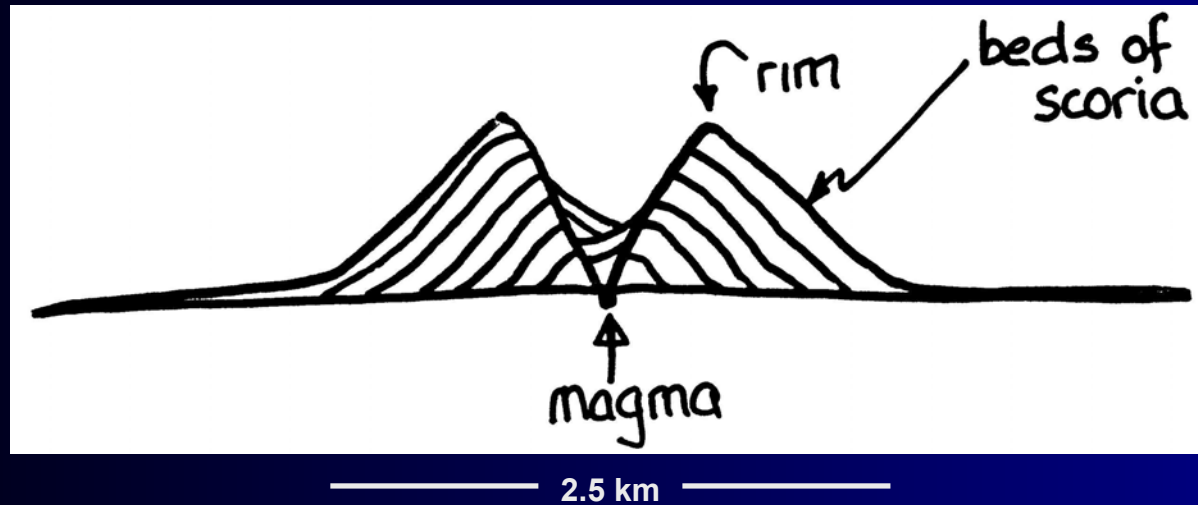


20 - 30 km

- gently sloping “shield” profile
  - radial rift zones, summit crater or caldera
  - summit vent + rift zone vents
  - shield made of extensive, thin lavas
- e.g. Kohala & Mauna Kea, Hawaii, USA

# Scoria Cone

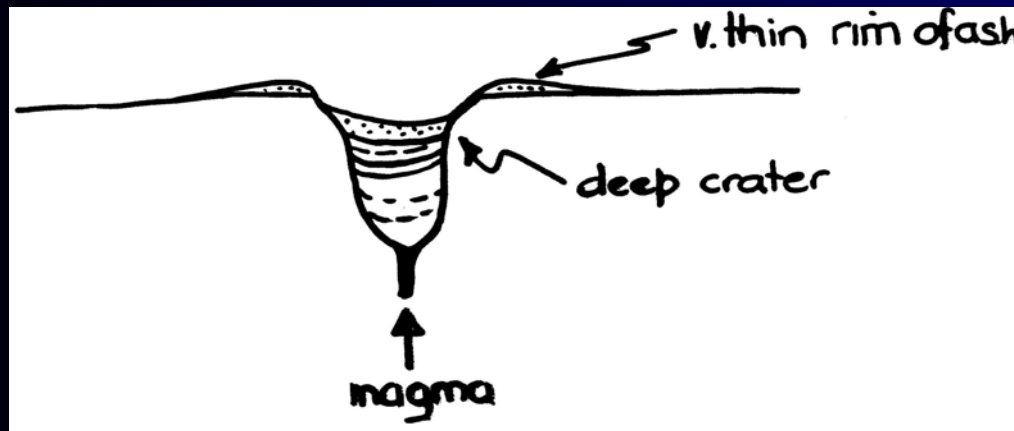
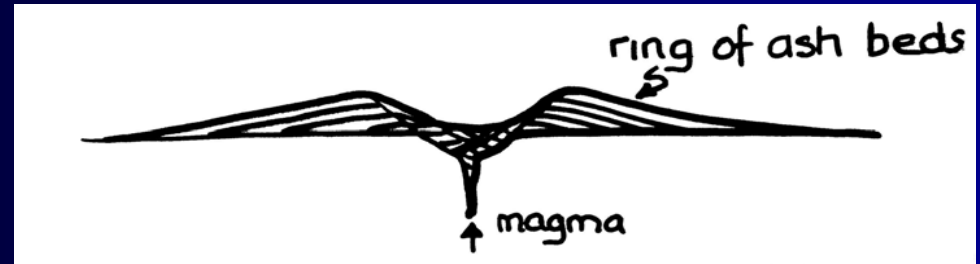
= cinder cone



- usually small; single vent
  - monogenetic
  - cone made of outward-dipping beds of loose scoria
  - mainly pyroclastic fall deposits
- e.g. Mt Capulin, New Mexico, USA  
Mt Elephant, Victoria



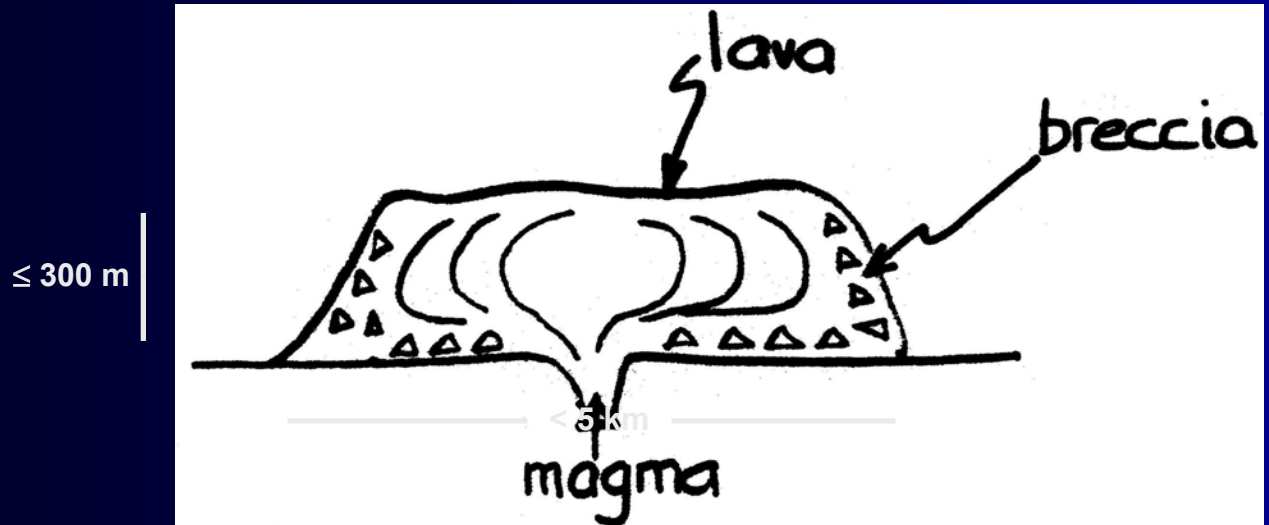
# Tuff Ring & Maar



< 5 km

- small; usually single vent
  - monogenetic
  - vent surrounded by low ring of ash beds
  - mainly pyroclastic surge deposits
- e.g. Ubehebe, Death Valley, California, USA

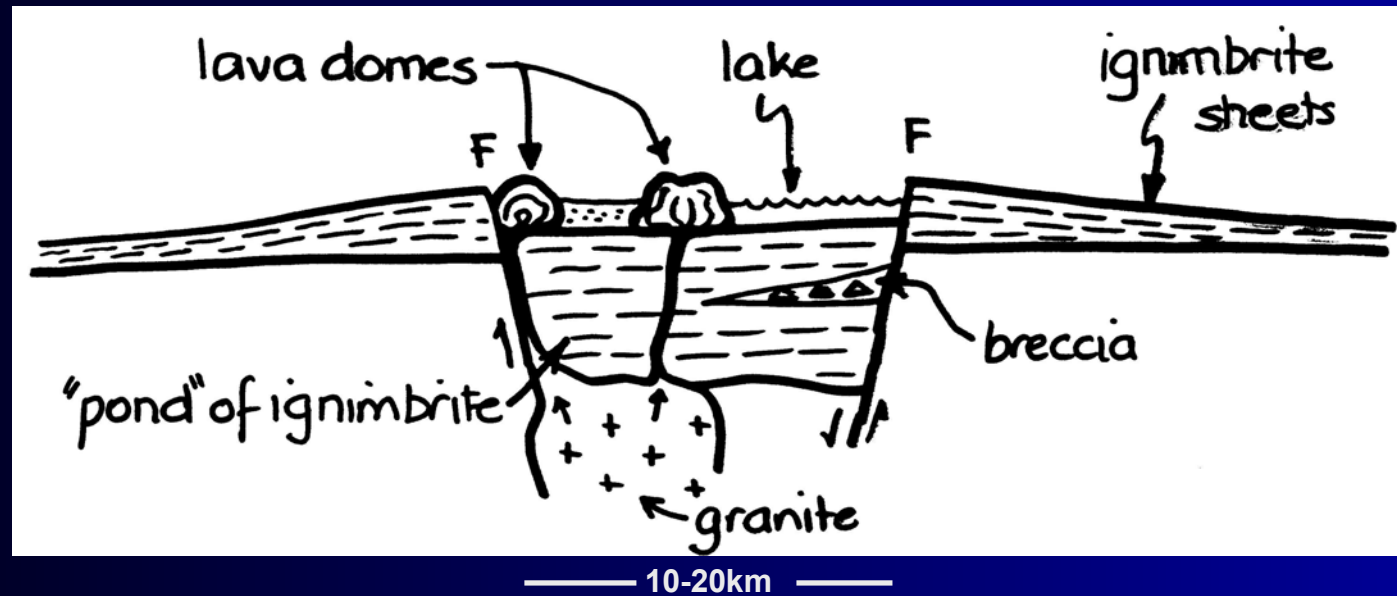
# Lava Dome



- usually small
- single vent, monogenetic
- made of lava & autobreccia
- steep margins surrounded by talus, flat top

e.g. Novarupta, Alaska, USA; Chao, Chile; Tarawera, NZ

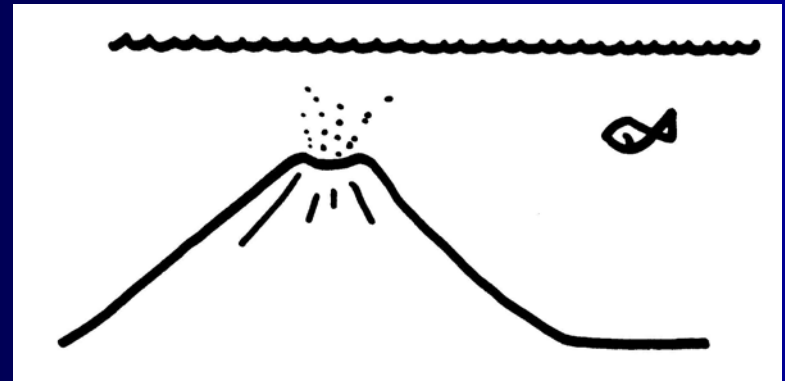
# Caldera



- big, multiple-vent volcanic centres
  - very large volumes erupted explosively
    - ⊗ widespread ignimbrite & fall deposits
  - low topographic relief; capture drainage
    - ⊗ lakes
  - collapse of centre along ring faults
  - develop over  $10^3$  to  $10^5$  years
- e.g. Rotorua caldera, NZ; Valles caldera, New Mexico, USA

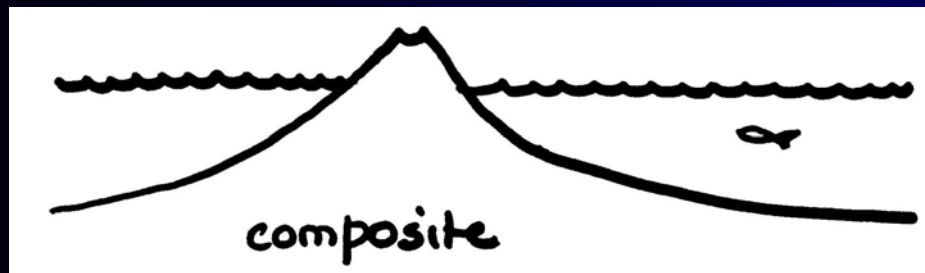
# Seamounts

- build up from sea floor
- mainly lava and breccia
- commonly located on faults;  
may be elongate in plan



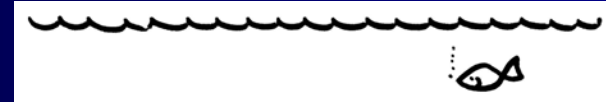
Plan view

- may emerge  
..... **island volcano**



e.g. Maui, Hawaii, USA  
White Island, NZ

# Eruptions in Water



e.g. volcanoes on the sea floor, volcanoes in lakes

## Lavas

- quenched to glass
- broken; “hyaloclastite”



– pillow lava

## Explosive eruptions

- OK in shallow water
- deep water: gas cannot expand (P too high)