Eruption Types

Reference: *Encyclopedia of Volcanoes*: pp. 249-269

Explosive Eruptions

- Size
- Explosivity
- Classification
- Types

Eruption Size

- Magnitude (volume, m³)
- Power (area covered, m²)
- Intensity (rate, m³/s)

Volcanic Explosivity Index (VEI)

- Used for ancient as well as recent events
- Increasing scale from 0 to 8
- Based on a combination of factors
  - Total volume of products
  - Eruptive cloud height
  - Descriptive terms
  - Other features (nature of products, etc.)

Volcanic Explosivity Index

- Scale of 0 to 8 conforms to a volume range of $10^4$ to $10^{12}$ m³
- Range in column height <100 m to > 25 km
- Common types: hawaiian, strombolian, vulcanian, plinian, ultra-plinian

General Types

- Magmatic
  - Deep (magmatic) sources of heat, solids, and propellant
- Hydromagmatic
  - Related to the interaction of surface or near surface water with magma or magmatic heat
  - Phreatic = water in an aquifer
  - Fuel/coolant interactions FCI
### Hawaiian
- Type case is on Hawaii
- Generally basaltic composition
- Fire fountains
- Column generally less than 500 m
- Scoria deposits (scoria cones)
- Welded scoria (ramparts)
- Fluid lava flows

### Strombolian
- Type case is Stromboli, Sicily
- Basaltic magma
- More viscous than Hawaiian
- Intermittent explosions, no sustained column
- Ejecta to heights of a few hundred m
- Minutes of pause between bursts

### Vulcanian
- Type case is Vulcano, Sicily
- Highly viscous magma involved
- Powerful separate explosions
- Highly fragmented magma
- Clouds rise to 10-20 km
- Wide dispersal of tephra
- May be associated with growing domes
**Sub-plinian**
- High eruptive plumes, up to 30 km
- Sustained columns
- Generally dacite to rhyolite composition
- Continuous sheets of tephra
- Less fragmented than Vulcanian products
- Pumice is common

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**Plinian**
- Type case is the AD 79 eruption of Vesuvius
- Rare events (2-3 per century)
- Highly evolved magmas, abundant pumice
- Stratospheric eruption columns
- Sustained columns
- Huge volumes and large mass flux
Pinatubo, 1991

Mayon
- Plinian column
- Collapsing plume
- Pyroclastic flows
- Lahars

Subglacial

Surtseyan
- Type case is Surtsey, Iceland
- Rapid small explosions
- Column less than 500 m
- Associated surge clouds
- Highly fragmented materials
- Commonly within a standing water body

Phreatoplinian
- No historic eruptions of this type known
- High eruptive column
- Extremely fine ash, accretionary lapilli
- Wide dispersal of deposit