

FIELD OCCURRENCE OF VOLCANIC ROCKS

BASALTS ==>> Low Viscosity (Very Fluid), Low Volatile contents

Eruptive Forms: **Shield volcanos** {e.g., Hawaii, Tahiti}
 Flood basalts {massive, rift-fed flows}

Shield volcanos:

- Low-profile,
- typically have SUMMIT CALDERAS or PIT CRATERS which fill with lava lakes during eruptions.
- Additional flows may be fed by eruptions from RIFTS on the flanks of the volcano.

Flood Basalts:

- MASSIVE FLOWS 50 to 200 feet thick
- Usually fed by FISSURE eruptions

Subaerial Basalts:

pahoehoe = thin ropey flows.

a-a = thick massive flows with rubblely tops and bottoms.

- Pahoehoe flows commonly form LAVA CHANNELS and LAVA TUBES where high flow rates are encountered.
- a-a flows form “wall of lava” that advances like bulldozer.

Strombolian = fire fountains: scoria, spatter, agglutinate

Strombolian activity forms CINDER CONES and SPATTER CONES.

Subaqueous Basalts:

sheet flows : similar to subaerial pahoehoe flows

pillow lava : buds and tongues with chilled surfaces.

hyaloclastites : shattered pillow rims, glassy tuffs, breccias.

ANDESITES: More viscous, higher volatiles, Explosive eruptions common.

Eruptive Forms: **Strato-volcanoes, Composite Volcanos**
(Mt. Fuji, Vesuvius, Mt. St. Helens, Mt. Shasta)

Andesite Lavas:

Block lava = Thick massive core w/large, jumbled blocks on surface.

>> Blocks = rectangular, non-vesicular, larger than a-a rubble (0.5-1 m)

Block and Ash Flows =

Matrix-supported volcanic breccias w/fluidized ash matrix.

>> Mafic-Andesites similar to Basalts

>> Felsic-Andesites similar to Dacites

DACITES / RHYOLITES

Commonly associated with Andesite Stratovolcanos:

Flows are rare generally short in length

Obsidian, Pumice flows like squeezing putty

Explosive volcanism is more common, e.g., Mt. St. Helens

PYROCLASTIC VOLCANISM = Andesites, Dacites, Rhyolites

Clast Sizes, Types:

| | |
|------------------|---------|
| Blocks and bombs | > 64 mm |
| lapilli | 64-2 mm |
| ash | < 2 mm |

- Lapilli = pumice fragments, rock fragments
- Ash = glass bubble-wall shards, crystals

PYROCLASTIC ERUPTION TYPES

Volcanian = Individual, episodic eruptions, deposit stratified ash with ballistic bombs. Form by explosive failure of andesitic plug in conduit.

Plinian = Volatile-rich, continuous or pulsed eruptions.
Form by outgassing of expanding magma.
Pyroclastic Ejecta = Ash falls, form ash fall tuffs

Deposits: Air-fall tuff = expelled pumice and ash in air deposits

- Thin but extensive (may cover 1000 sq km.)
- “Drape” over topography

Pyroclastic flows = Ash flows, form welded tuffs, ignimbrites

Ignimbrite-forming Eruptions

- Eruption column collapse, pulsed eruptions: Ash-rich
- Associated with Caldera formation

Deposits

- Ash Flow Tuff or Tuff-Breccia = Poorly-sorted, no bedding, commonly reverse graded, heterolithic (includes variety of rock types).
- Ash Cloud Surge = Bedded, crossbedded, sits on top of ash flow

Ash flow tuffs

Pyroclastic flow deposits, form by laminar flow of gas-rich ash and included blocks.

Welded Tuffs (= Ignimbrites)

- After emplacement of hot pyroclastic flow, welding takes days to weeks. Thus, several flows may be emplaced separately and cool together as single cooling unit.
- Incipient welding = Shards deform around crystal and lithic fragments.
- Dense welding = Complete loss of pore space, resembles obsidian (but can see relict shard structures in thin section).

PELEAN type eruptions

- >> typically dacitic, andesitic --> Cascades, Antilles
- >> form "Nuee Ardentes" = Glowing Avalanch

1. LAVA DOME COLLAPSE

Spine or Dome of viscous Dacite becomes gravitionally unstable and collapses, or is shattered by gas explosions. Shattered dacite flows downhill.

or

2. BOILING OVER ERUPTION

Lava auto-disintegrates as it erupts --> No eruption column

- Both form "Nuee Ardents" = No pumice or pumice shards.
- May travel 100mph but does not go far (<10 mi or 16 km).
- Not as voluminous as ashflows.
- "Homolithic" = All blocks same lithology