



CZECH REPUBLIC  
DEVELOPMENT COOPERATION

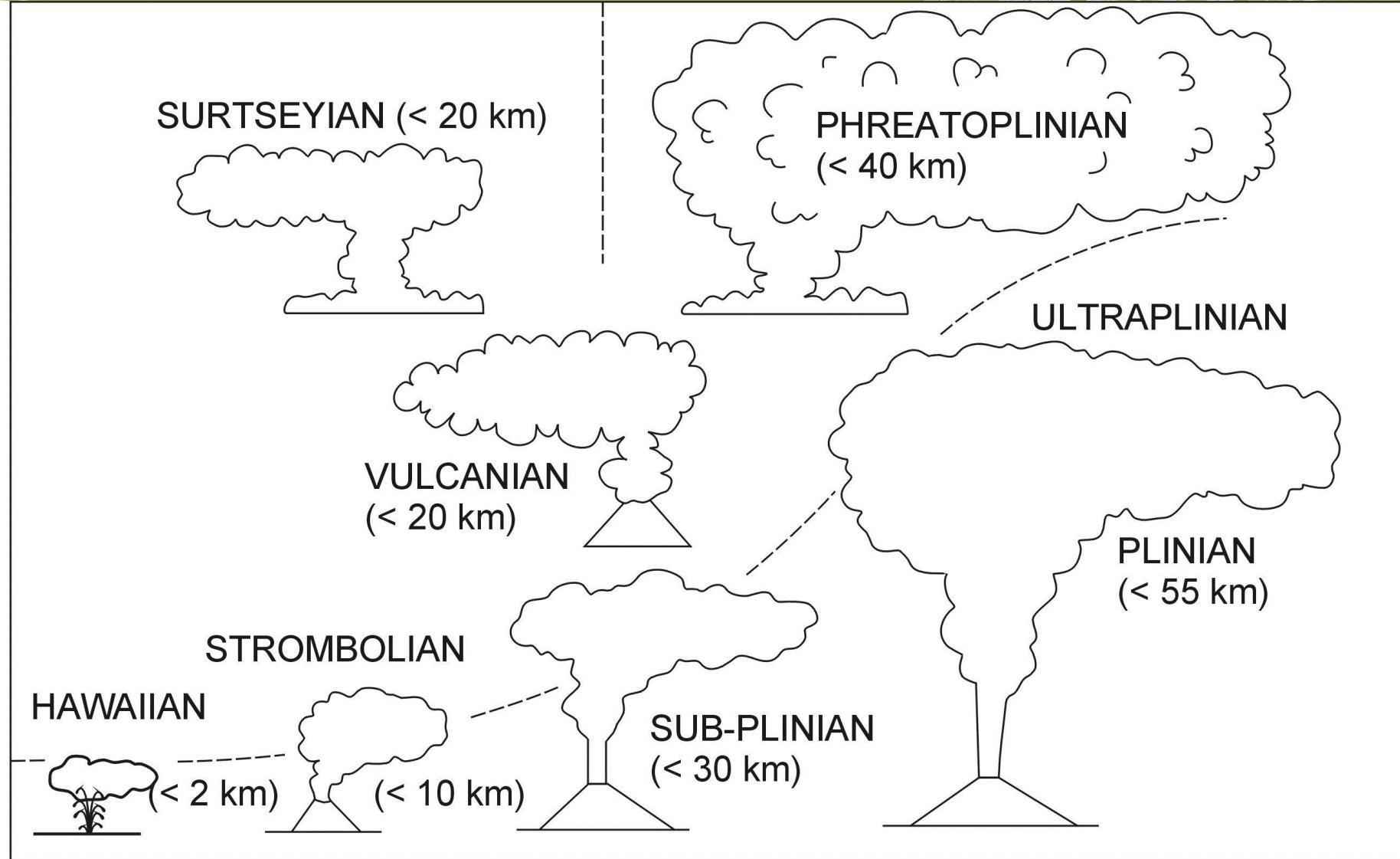
# Pyroclastic rocks

- Classification of eruptions
- Fragmentation
- Deposition





Fragmentation ↑

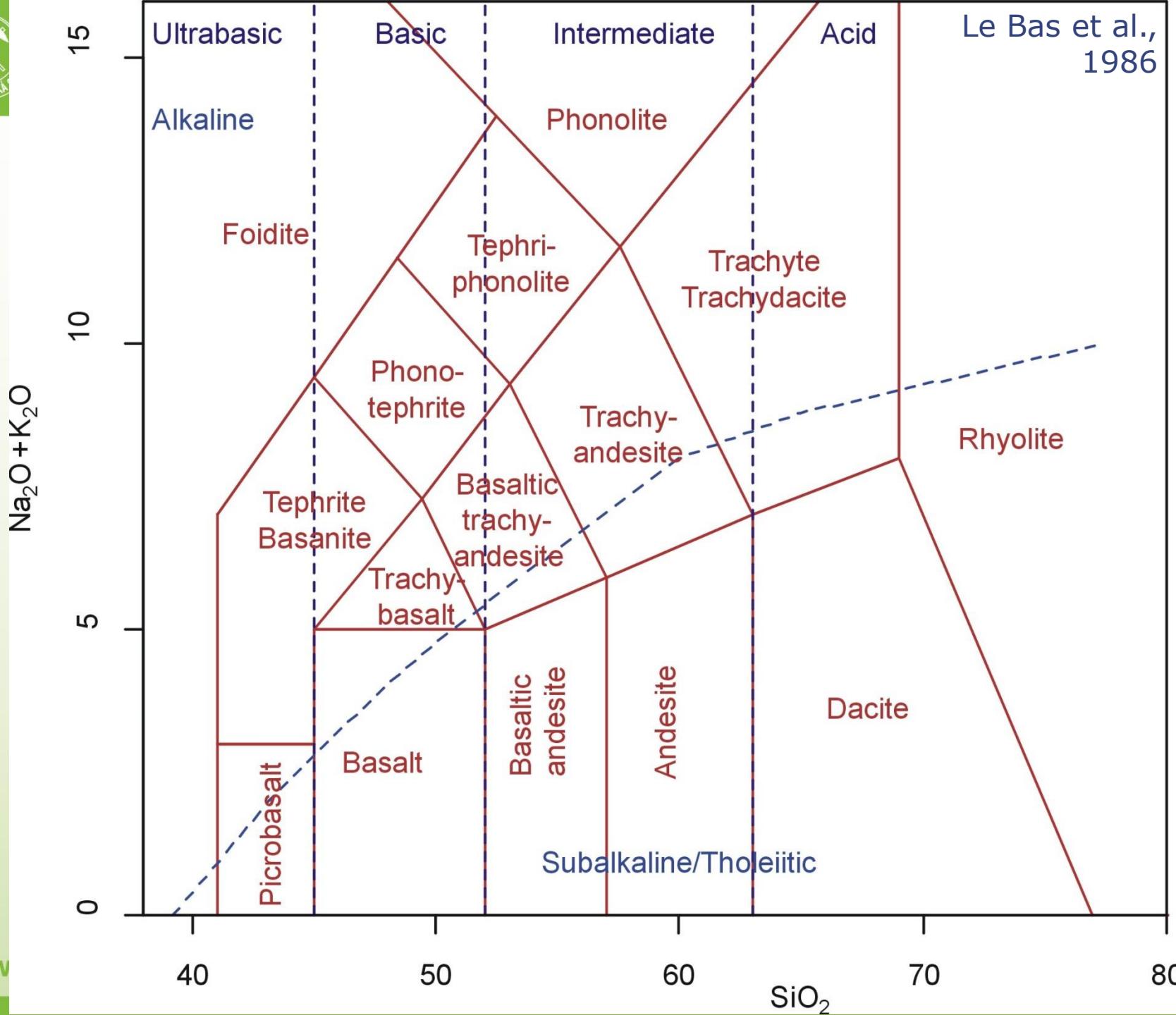


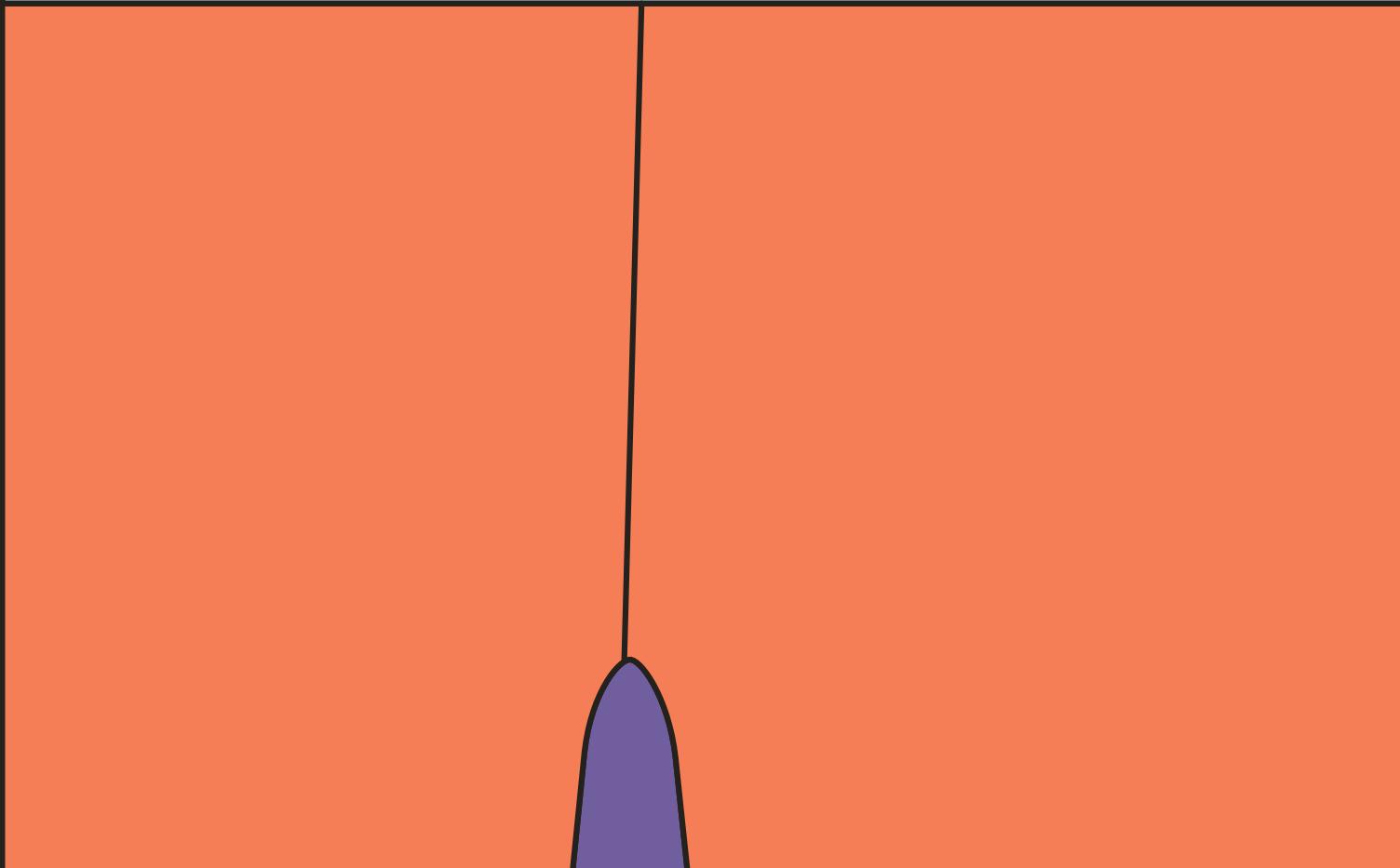
Height of eruption column and dispersal →

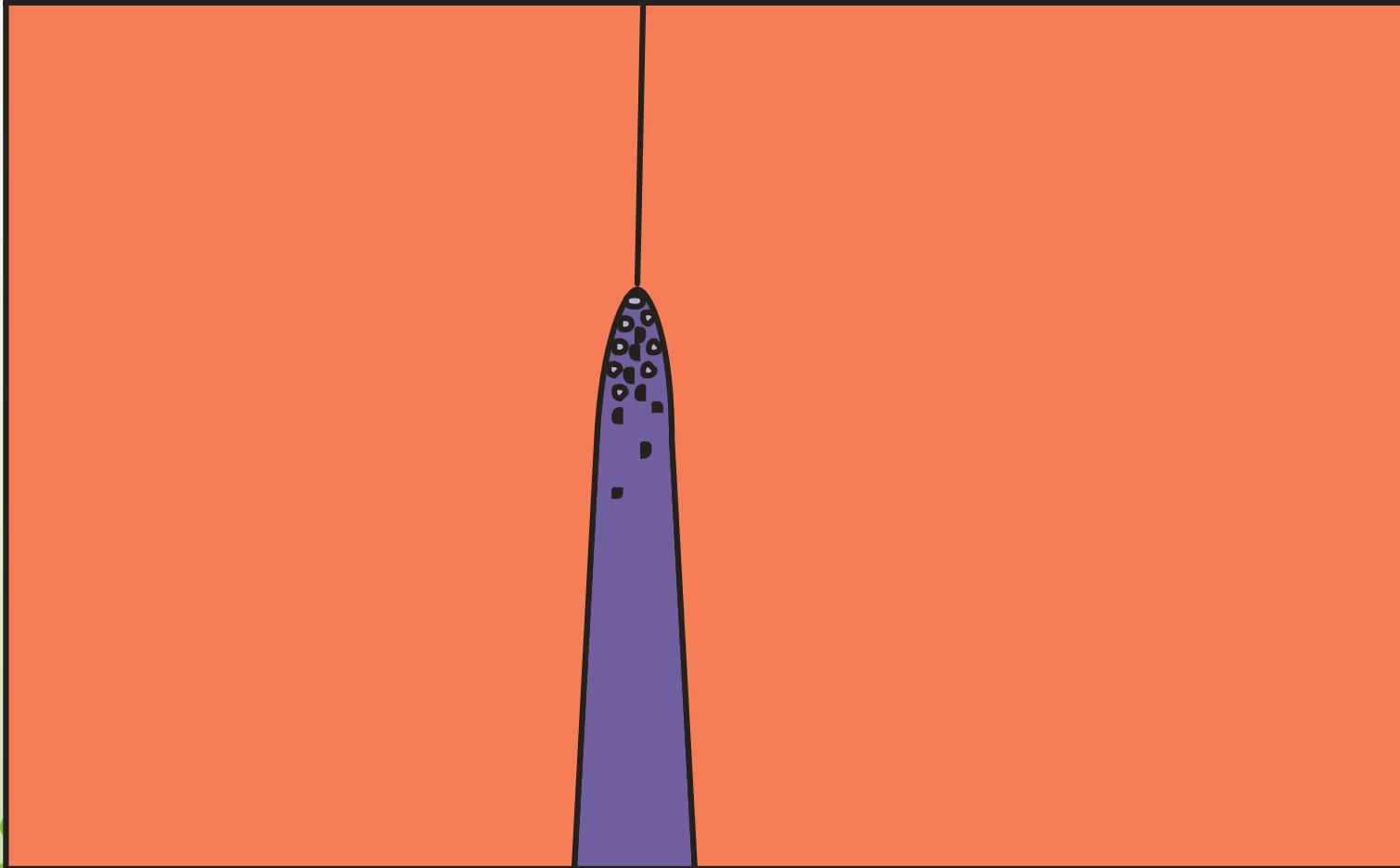


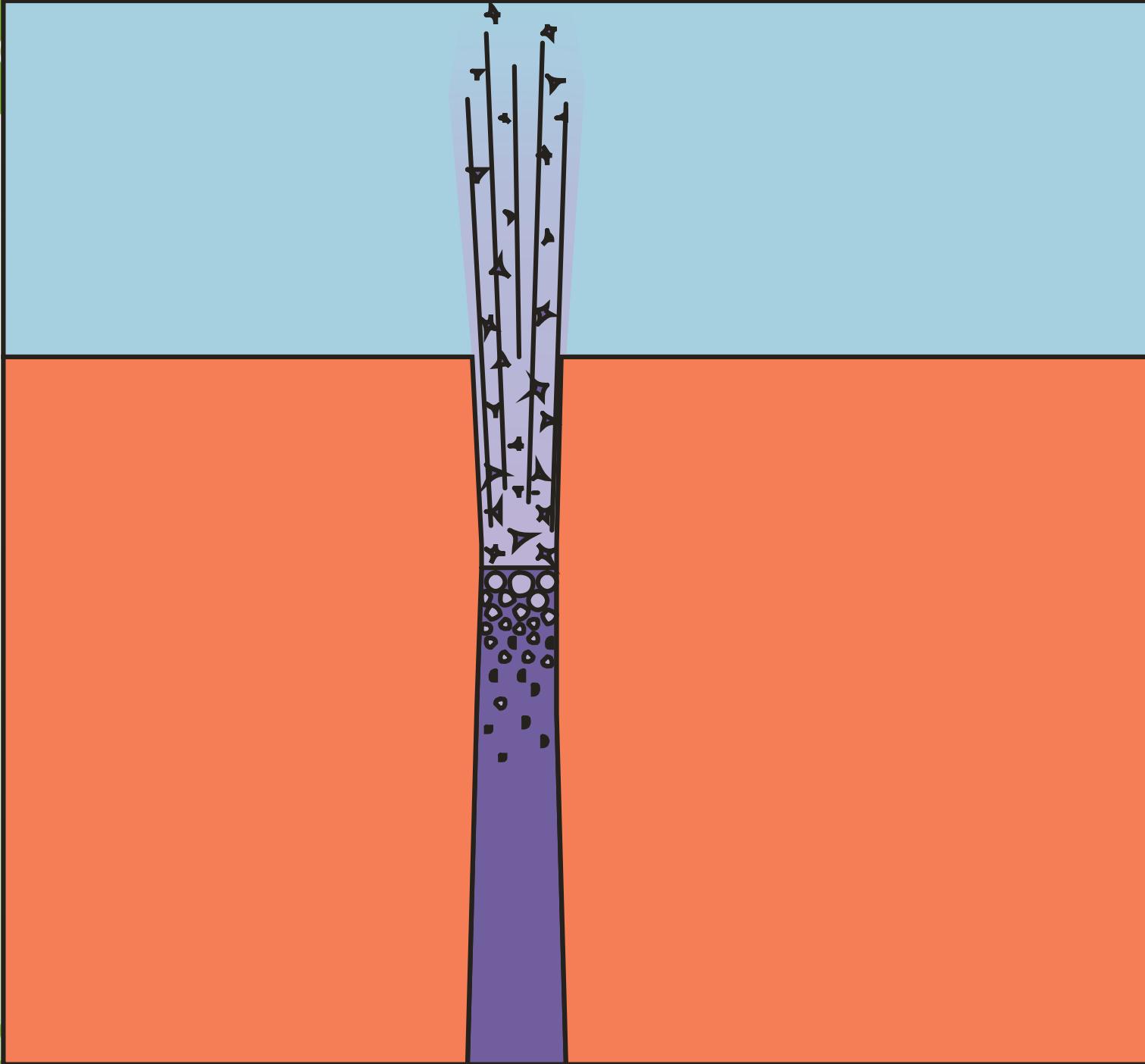
Fragmentation ↑

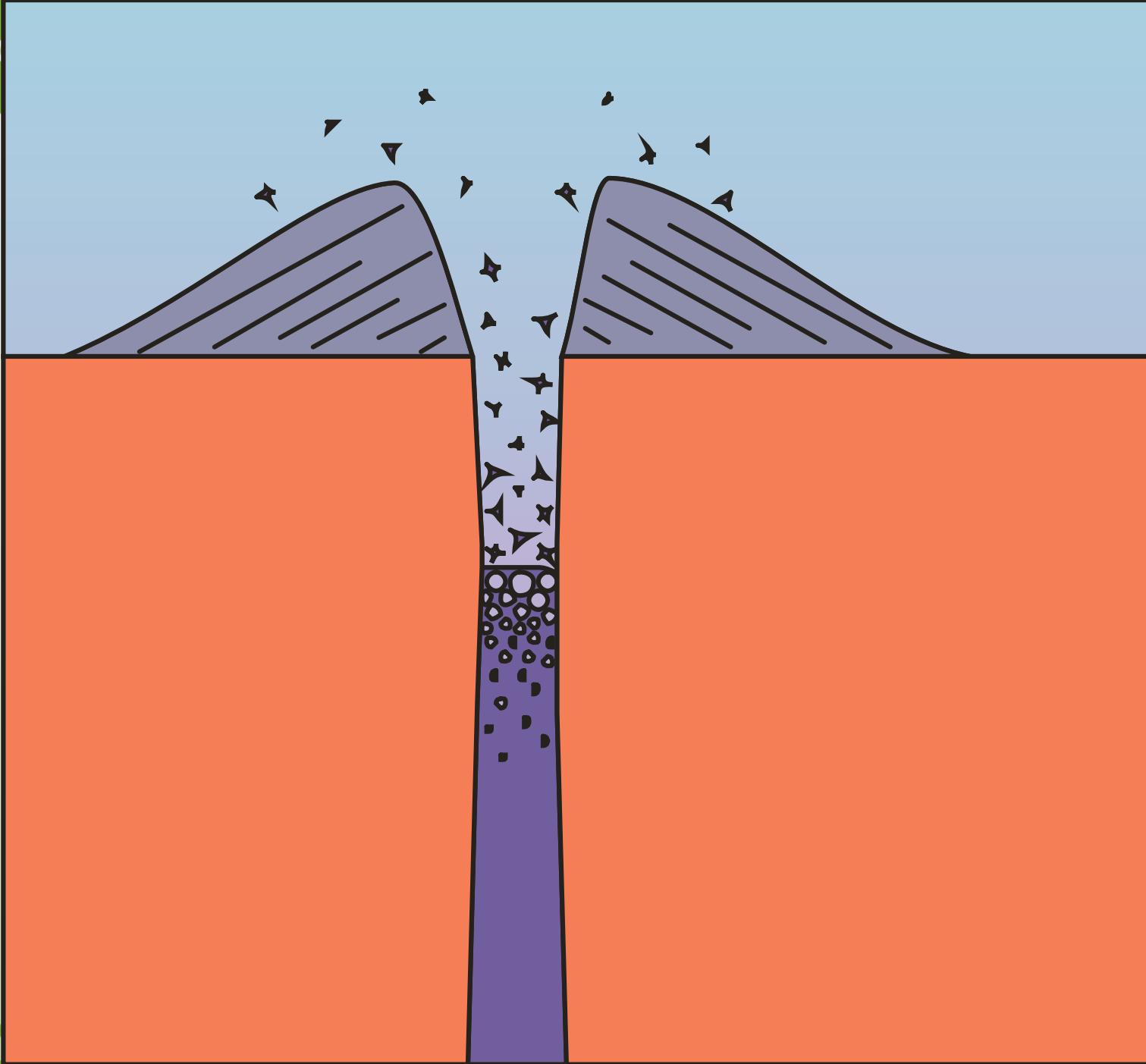


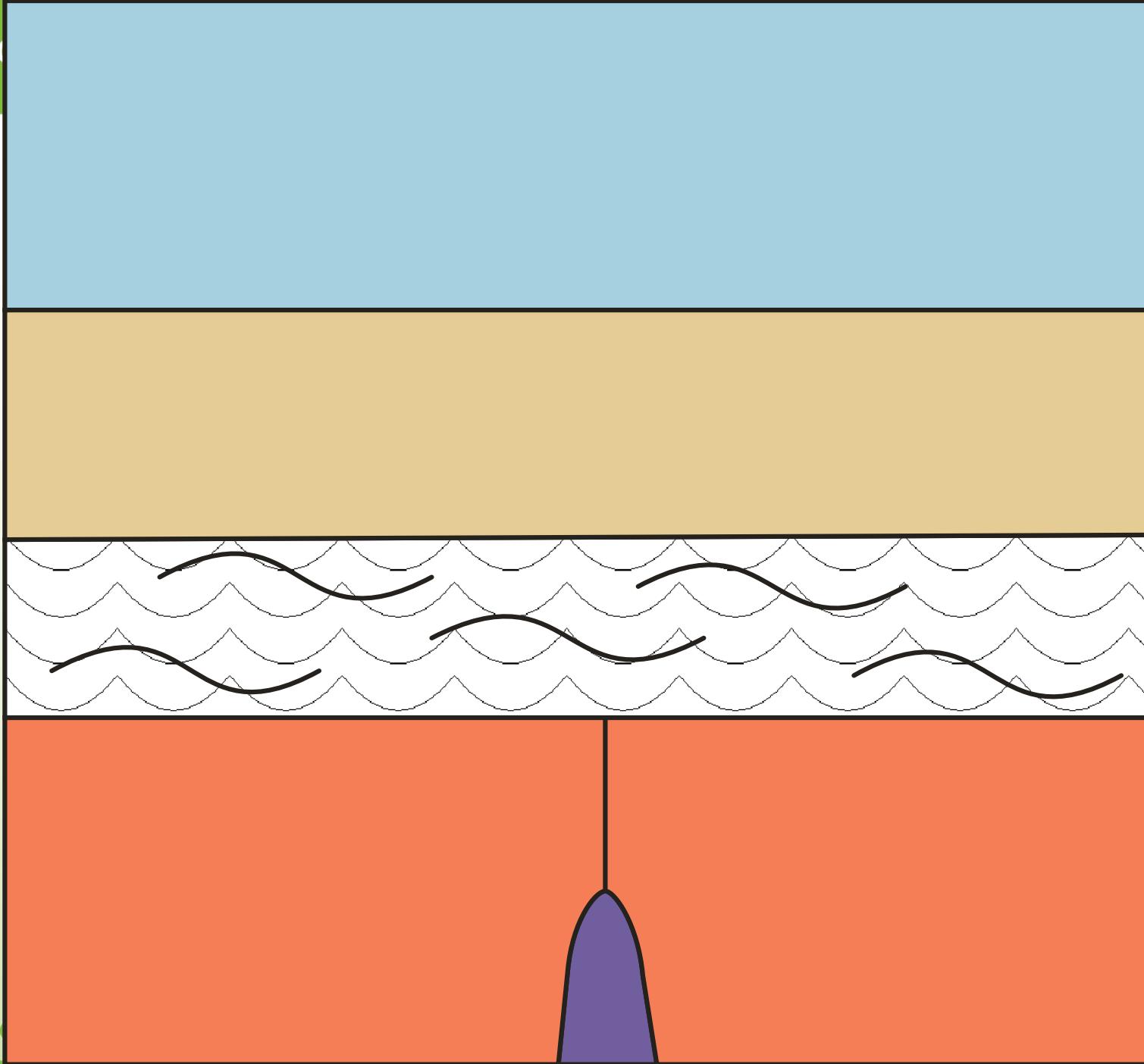


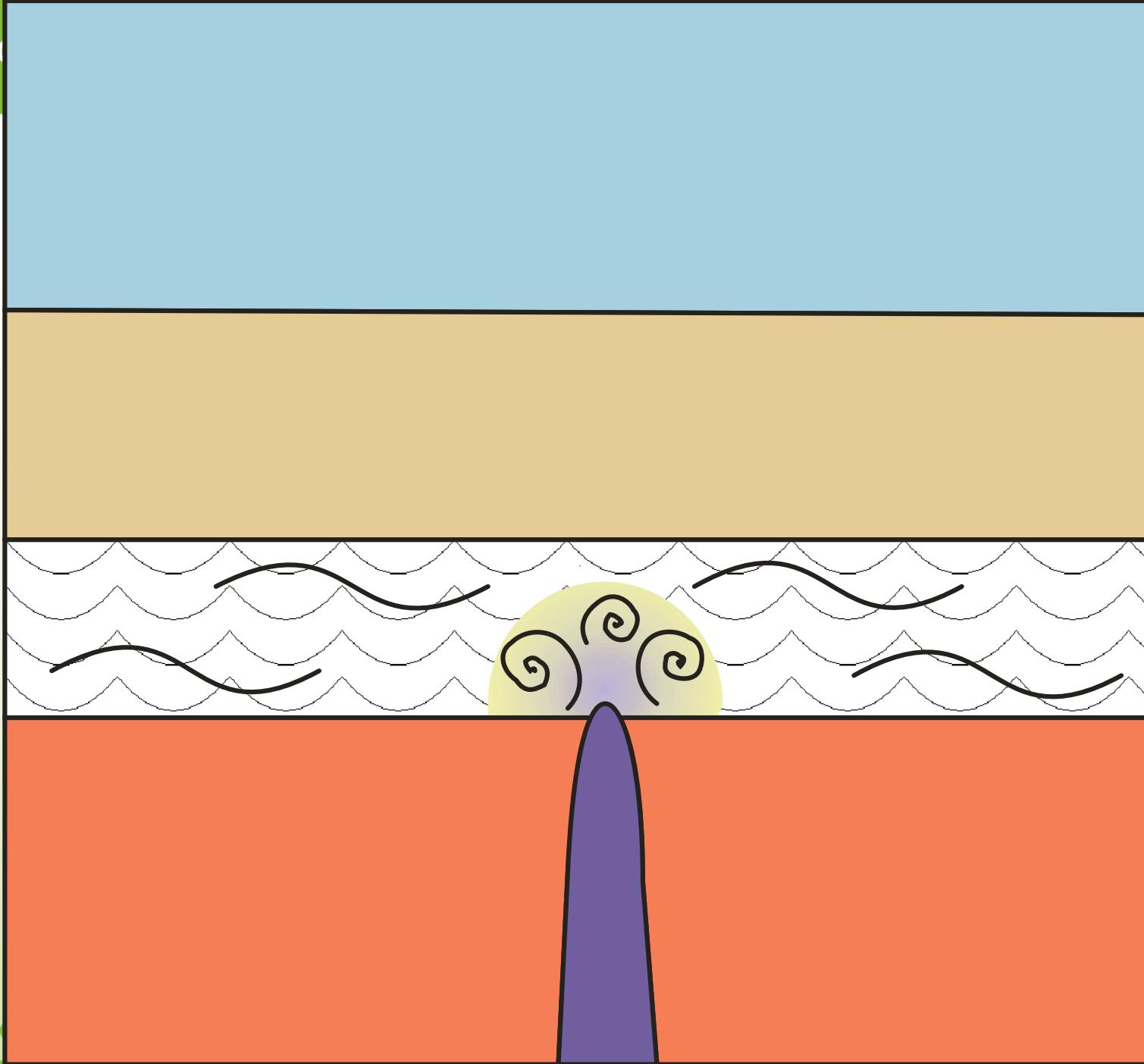


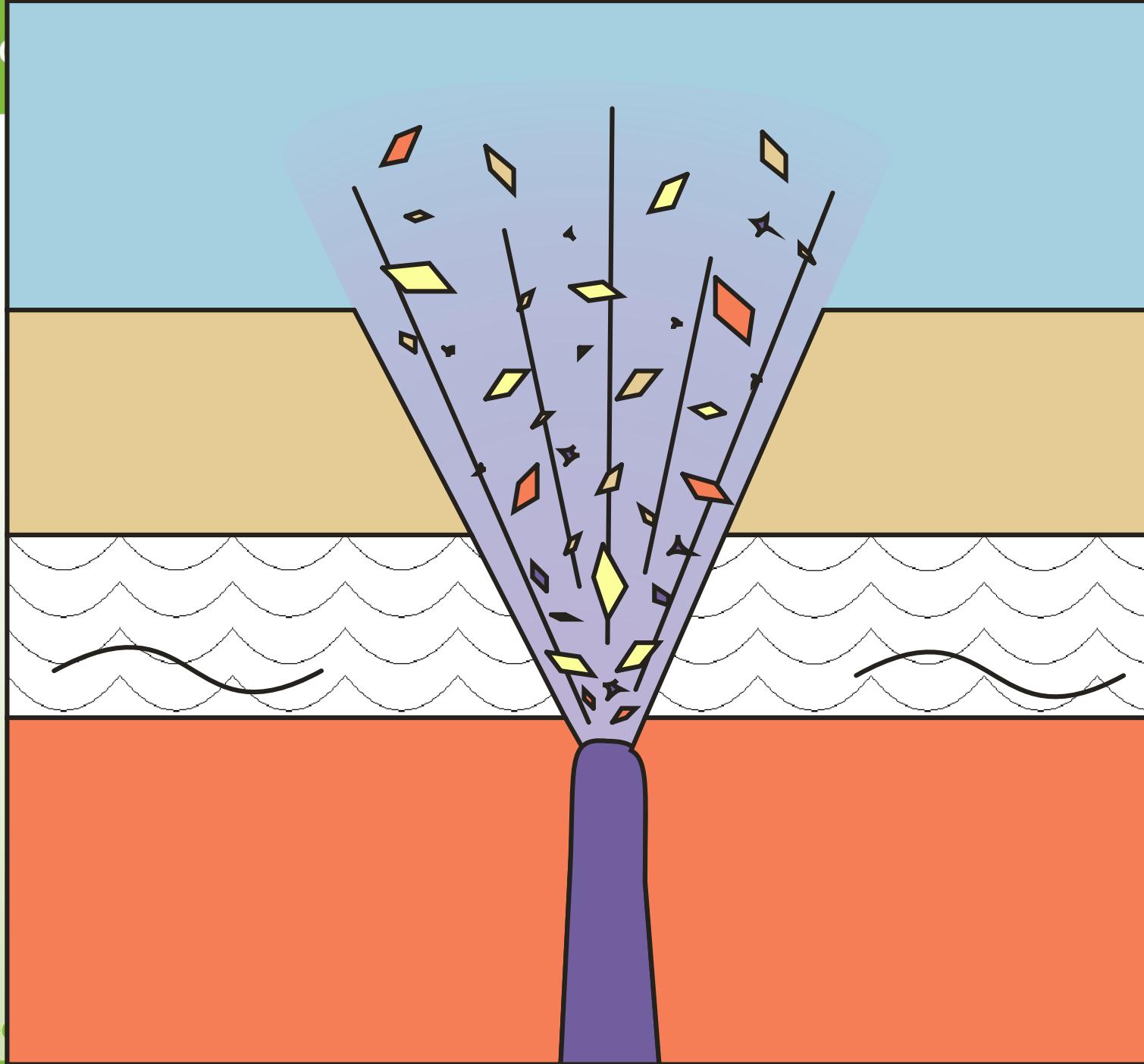


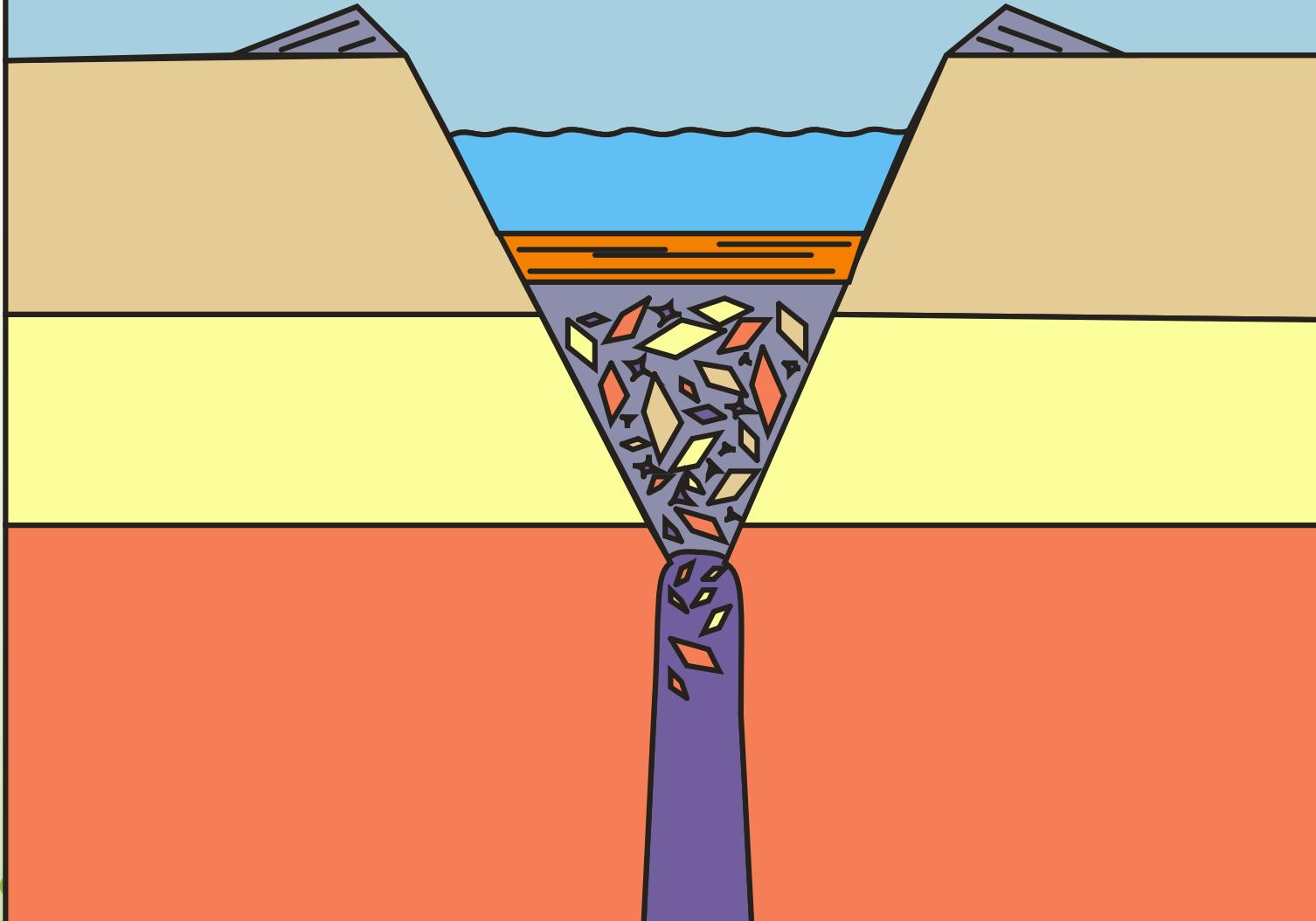














# Hawaiian eruption

- Poor in gas
- Large lava shreds
- Welding

Source: internet

















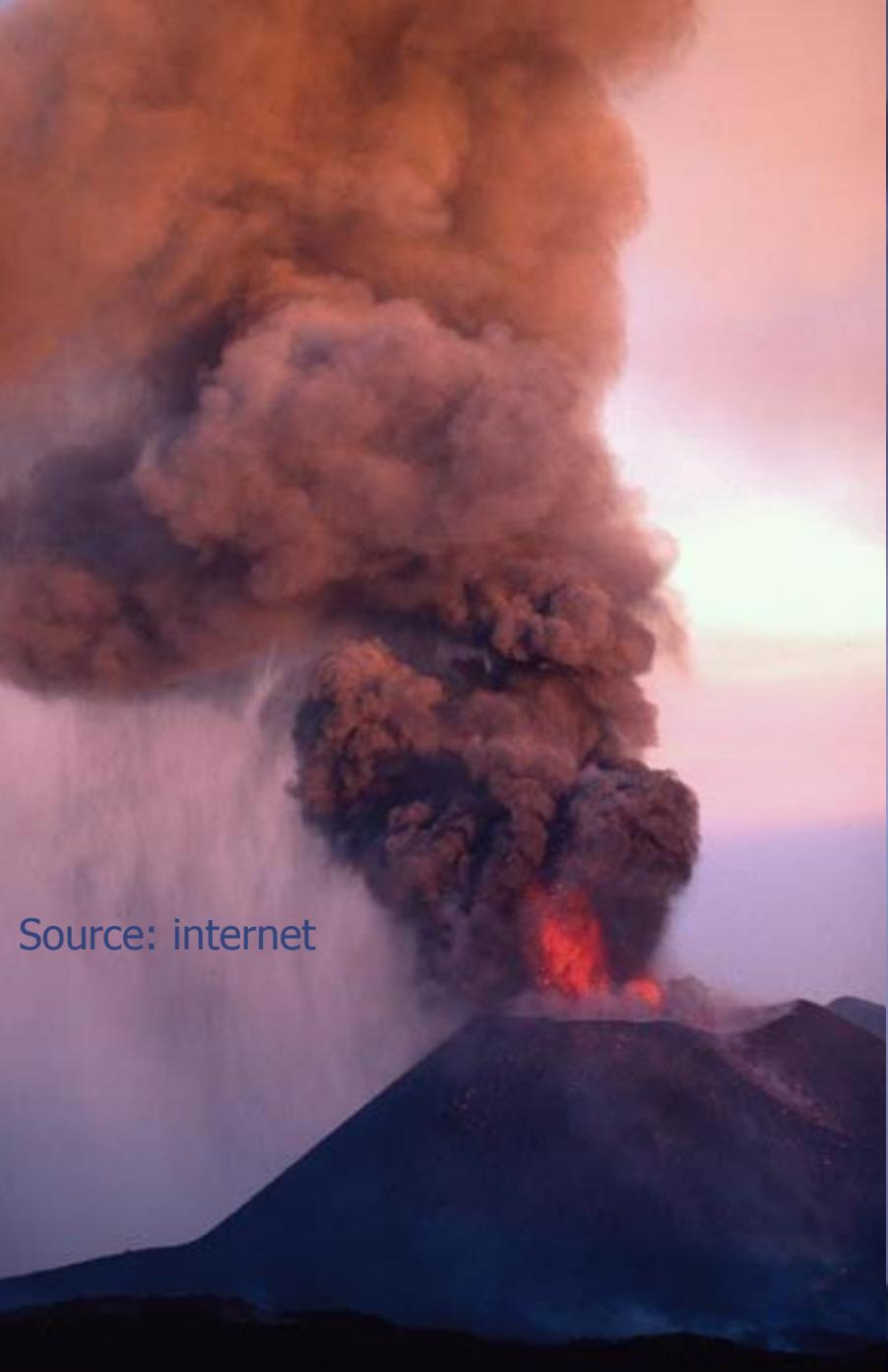
# Strombolian eruption

- Moderate gas
- Fragments of scoria
- No welding









Source: internet



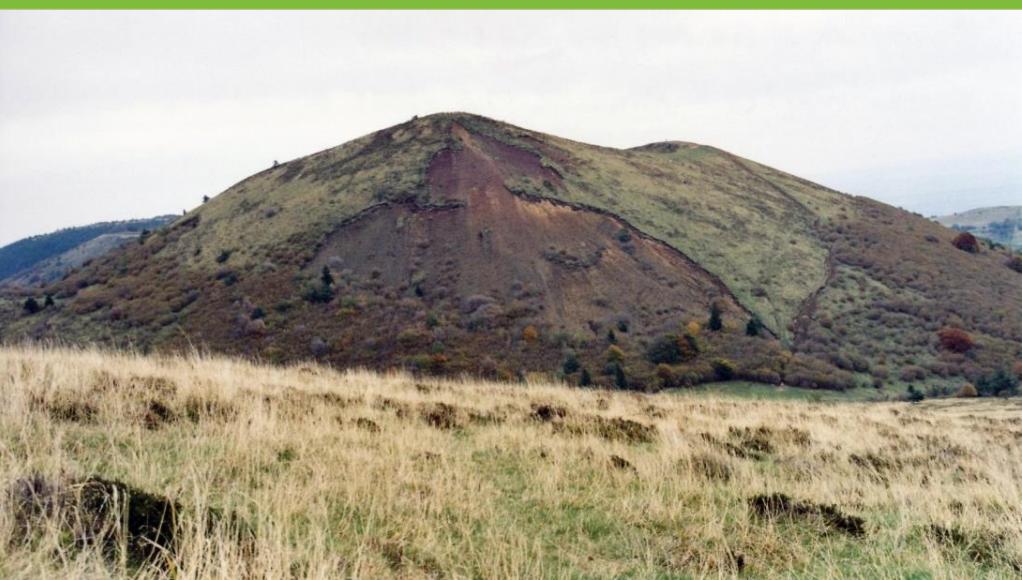


Source: Icelandic Meteo. Agency ([en.vedur.is](http://en.vedur.is))















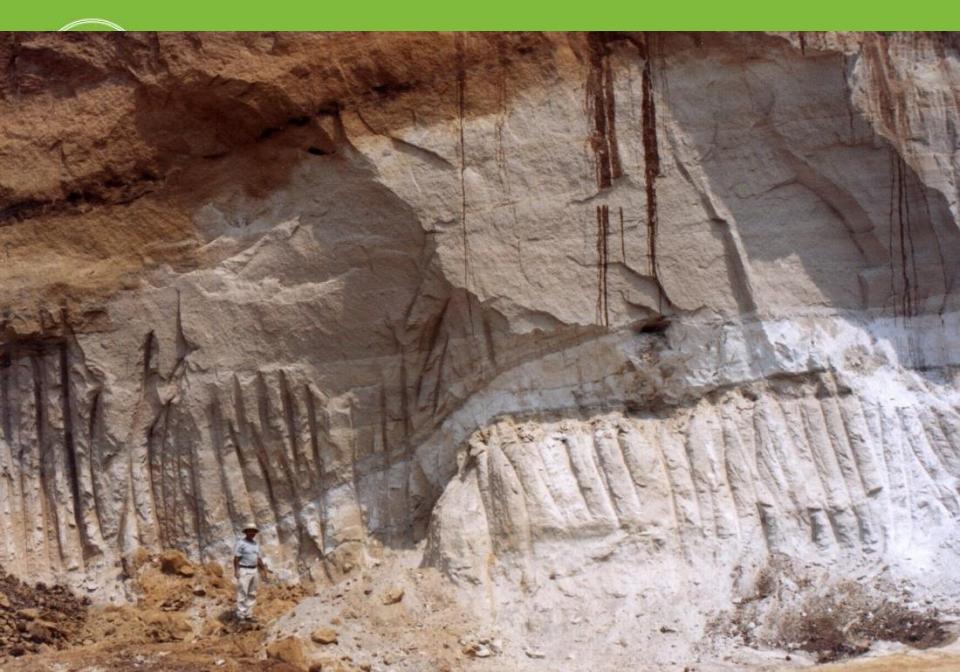
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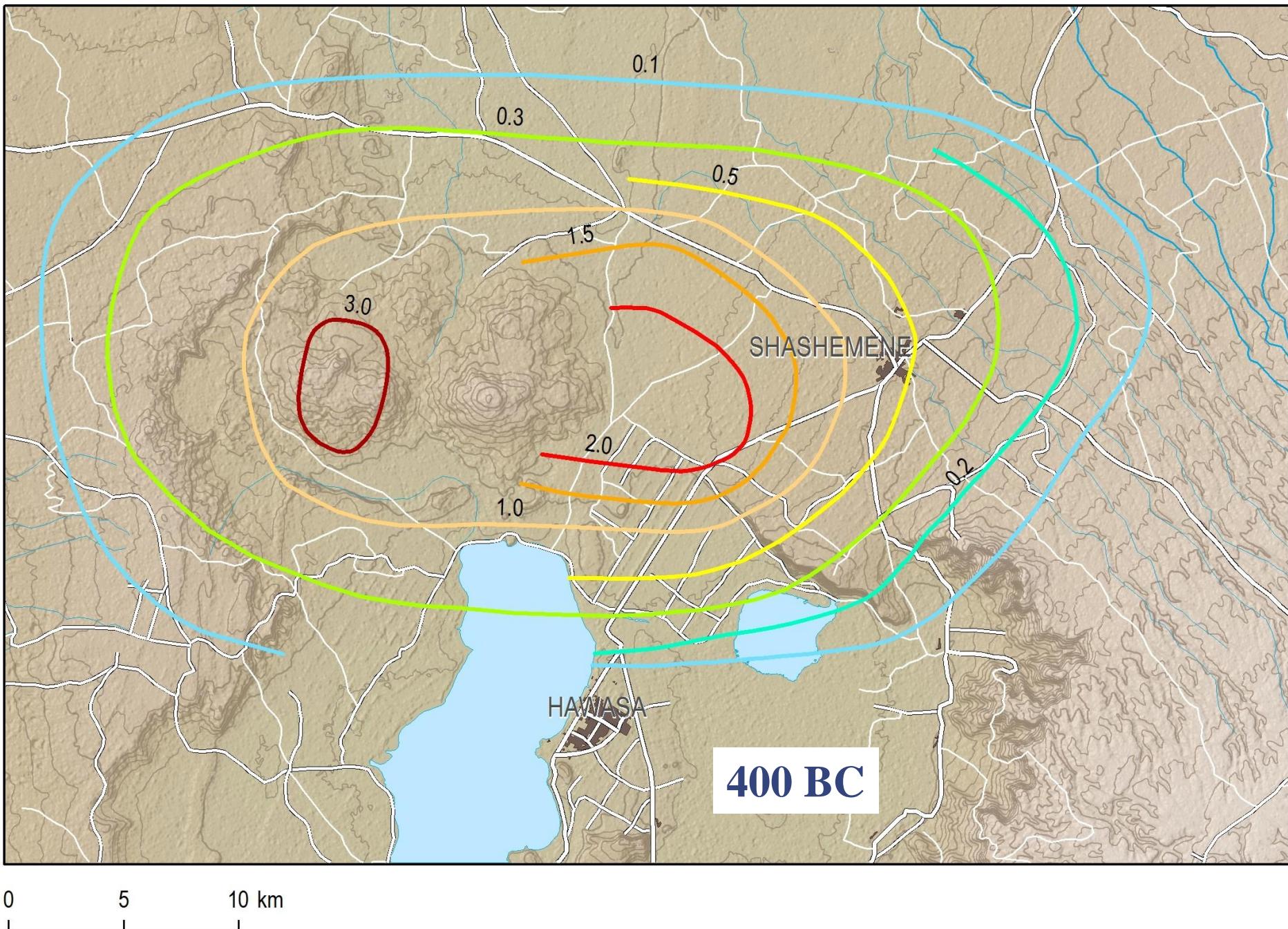


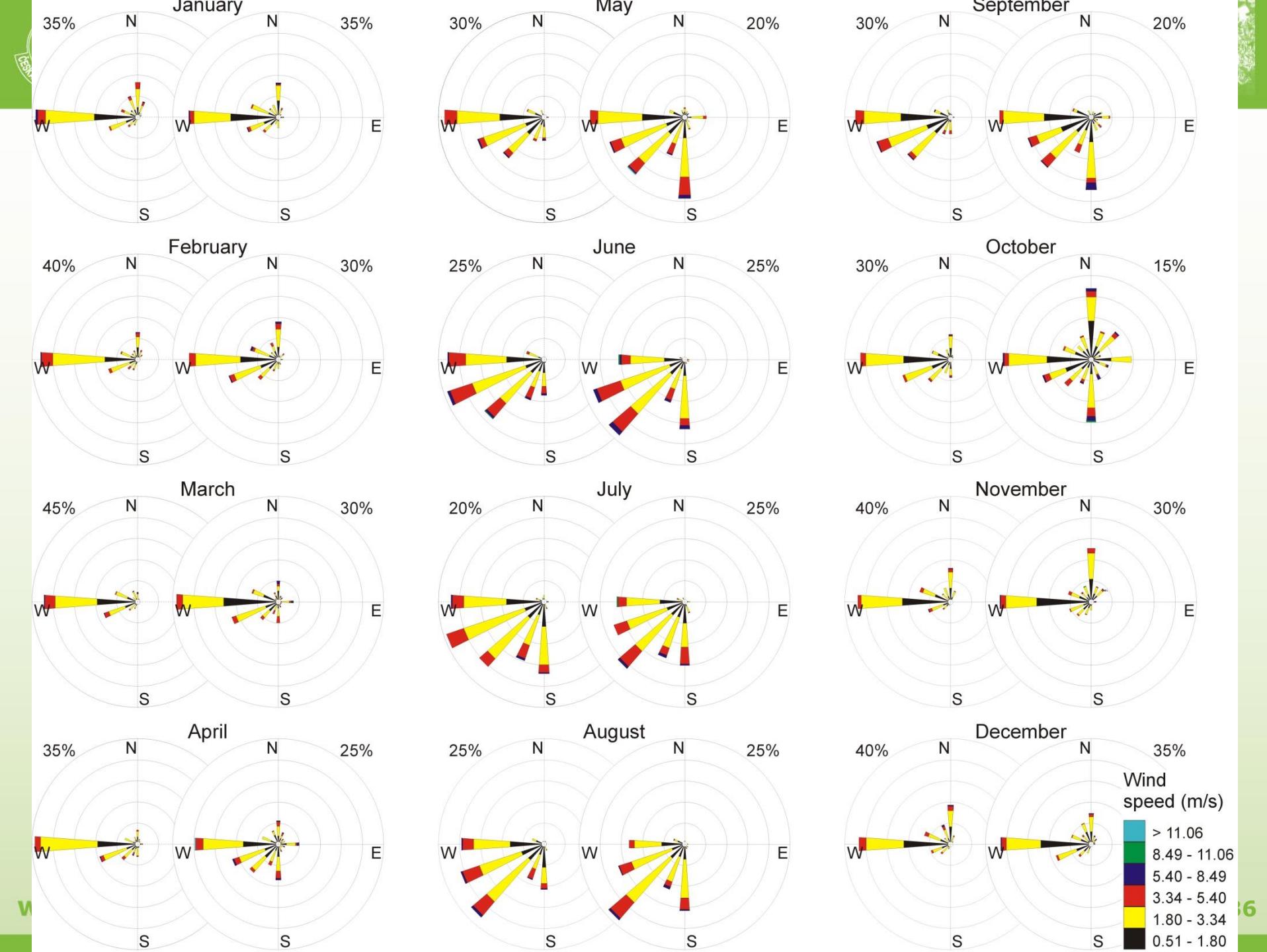
# Plinian eruption

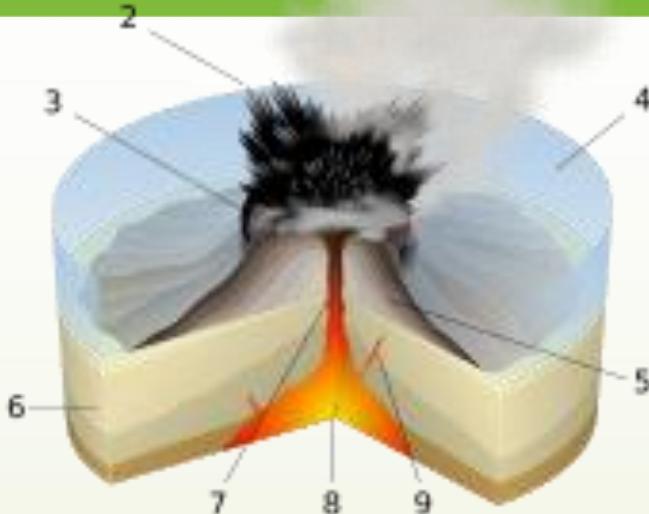
- Rich in gas
- Effective fragmentation
- Large areas











# Surtseyan eruption

- External gas
- Effective fragmentation
- Large areas





# Tuff cones

- When magma interacts with surface water
- Small eruptions with high explosivity

















**Strombolian phase**

**Initial phreatomagmatic phase**







# Maar eruption

- Ground water
- Unsorted deposits
- Funnel-shaped craters

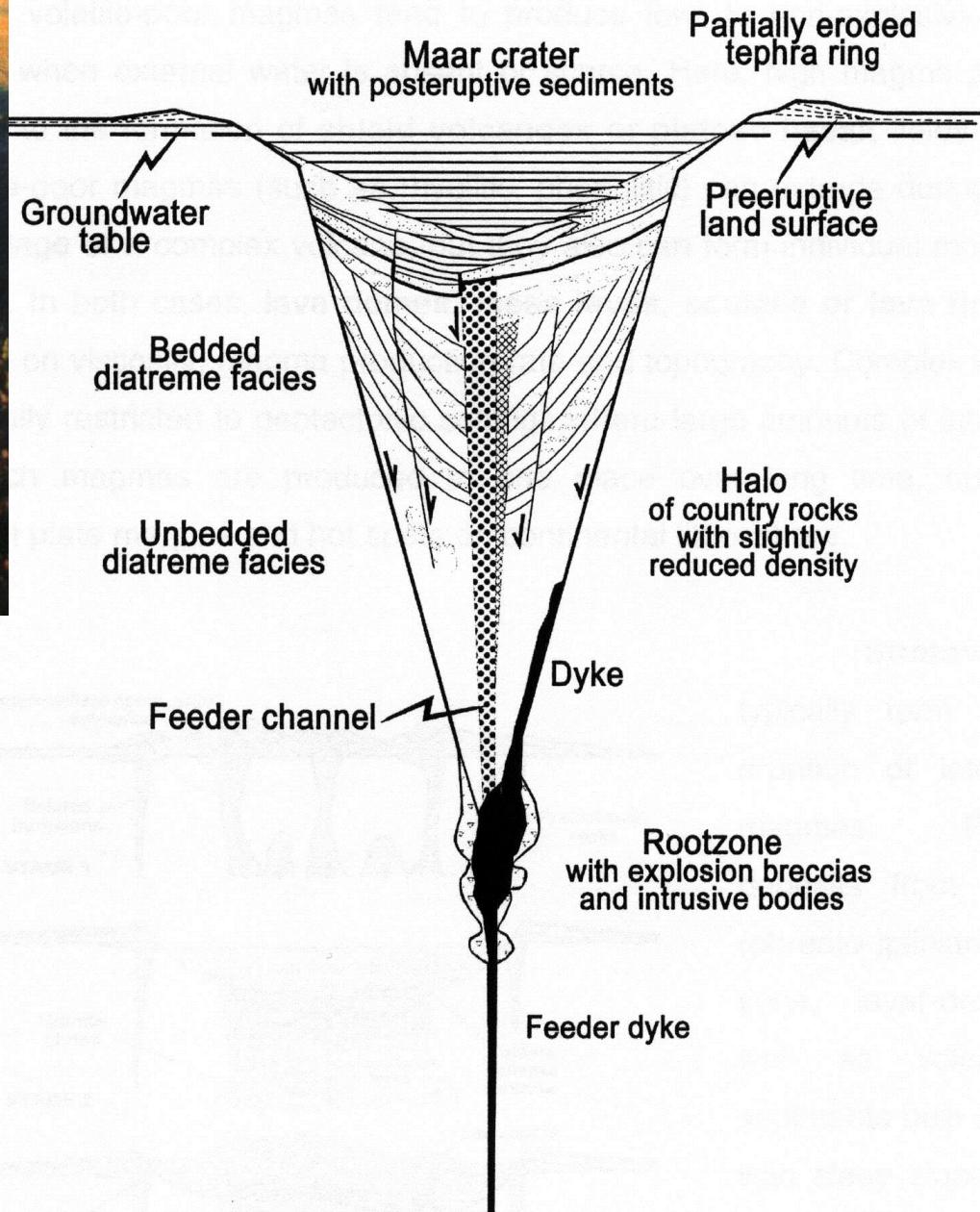
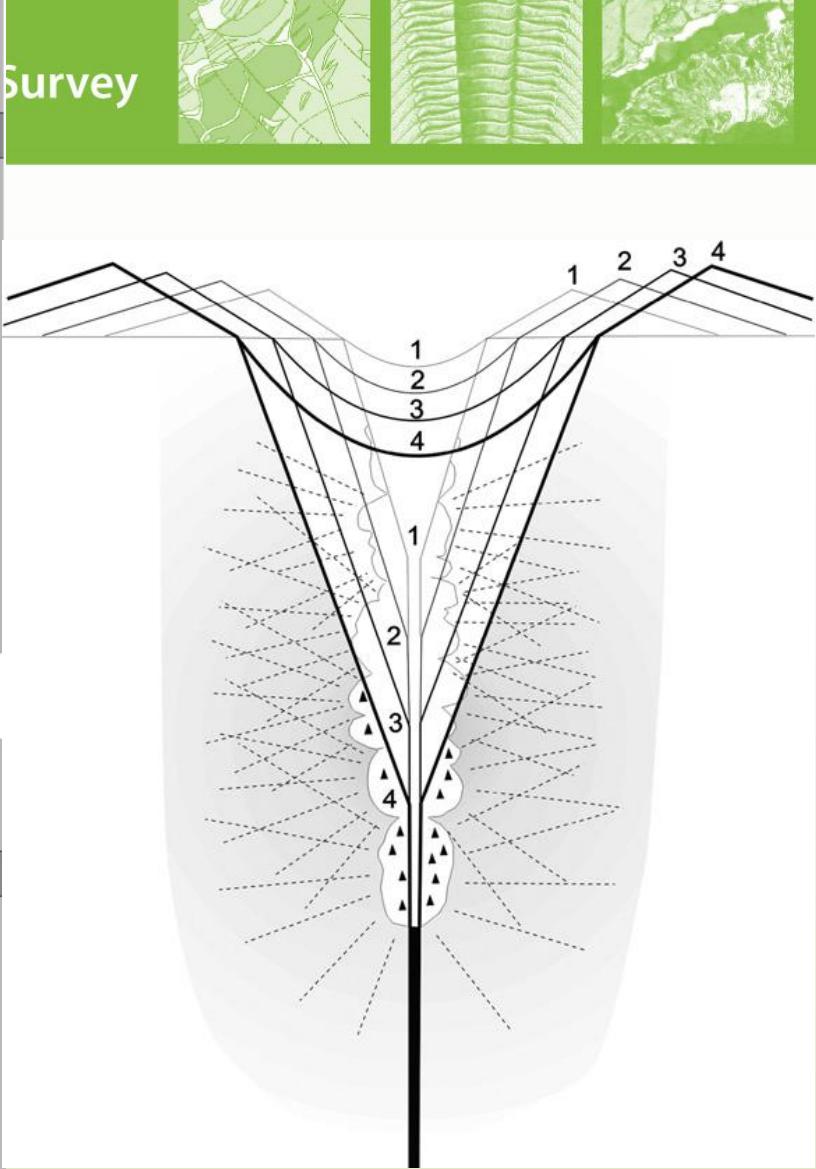
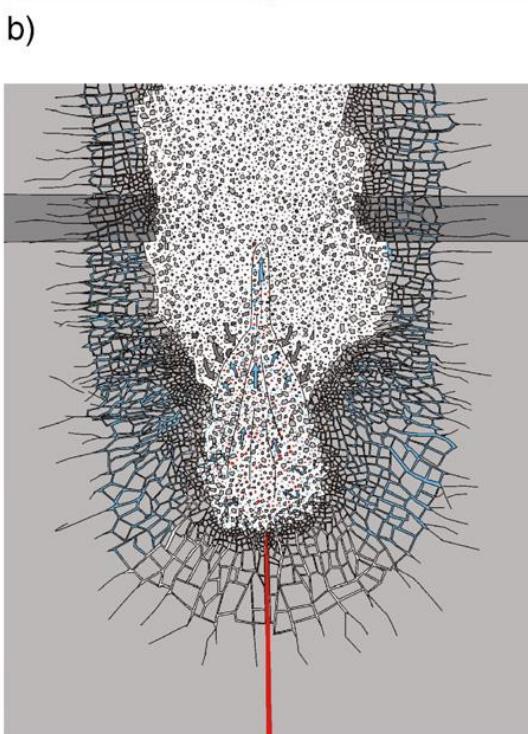
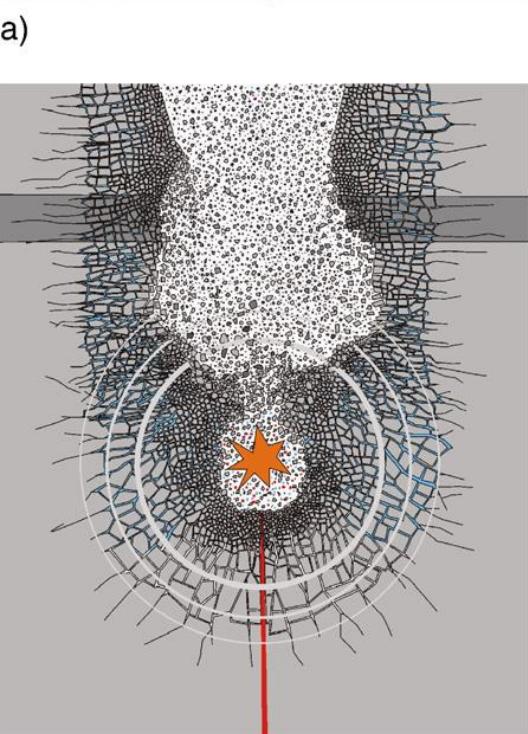
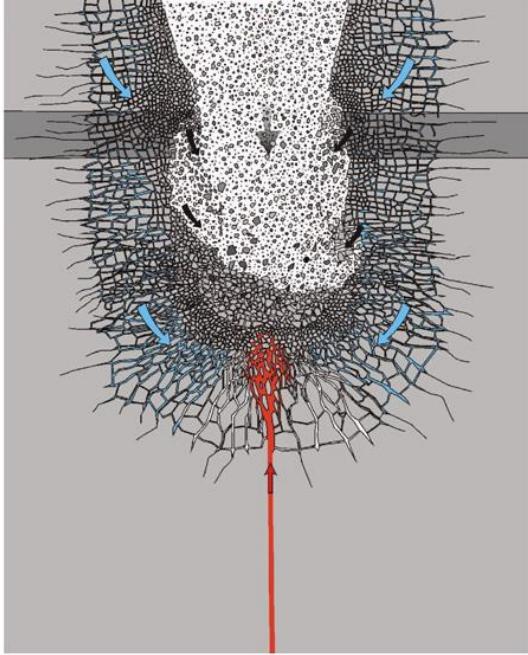
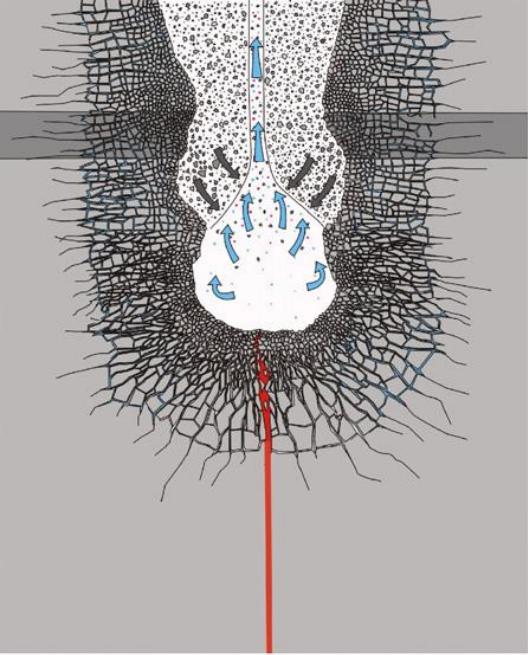


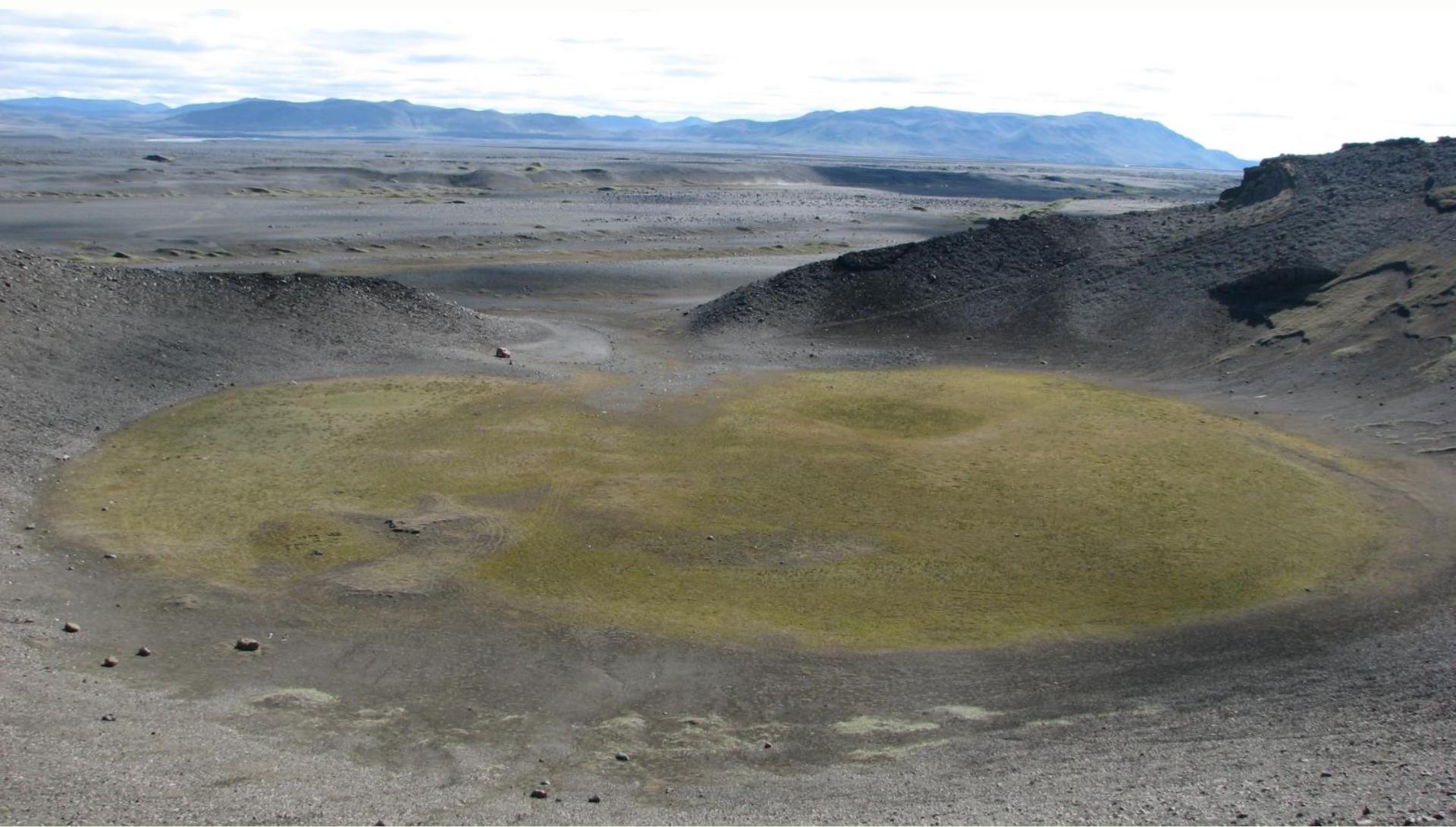
Fig. 3.3 Schematic cross section through an extinct maar volcano emphasizing the diatreme architecture; From Volker Lorenz, 2004













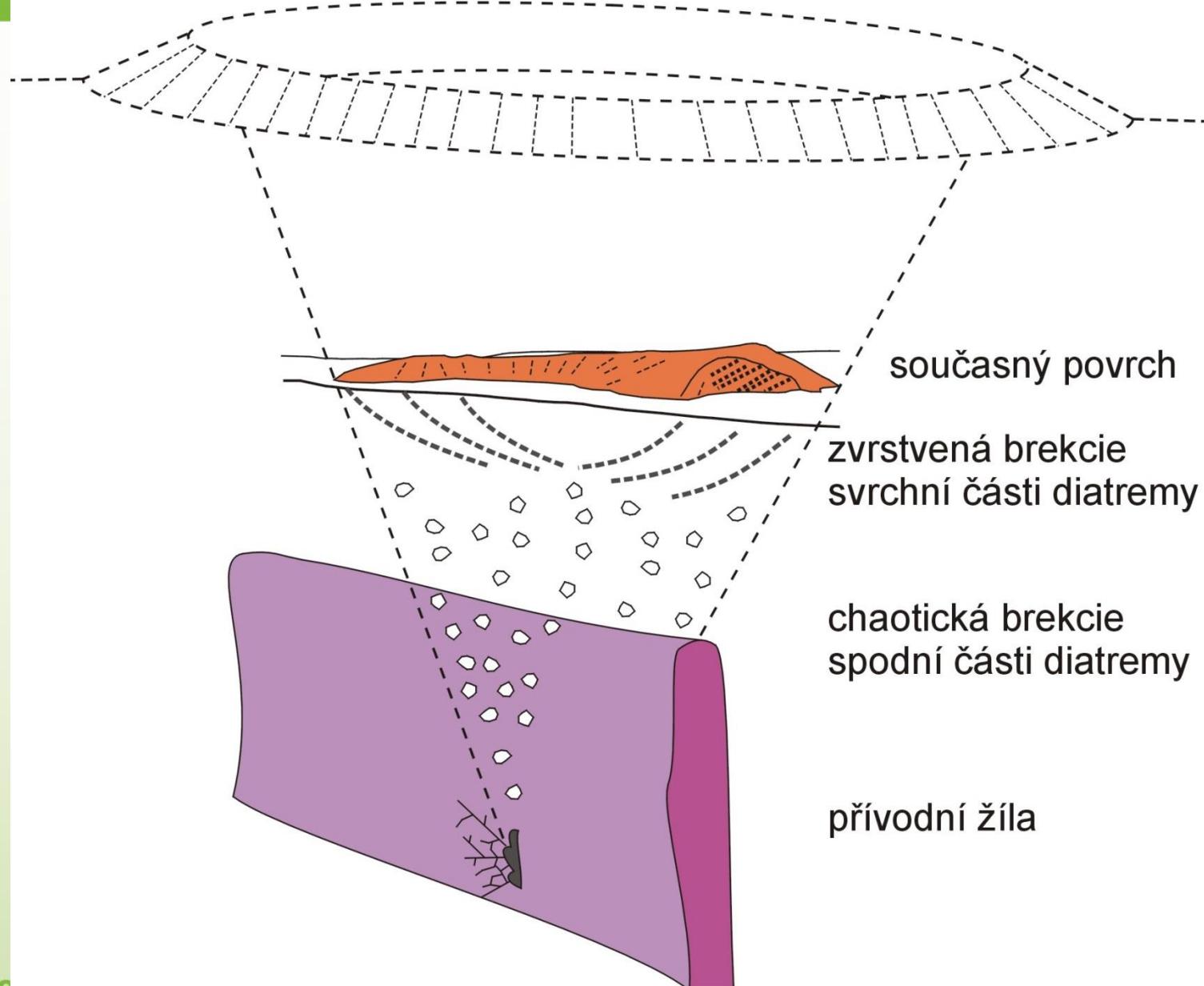


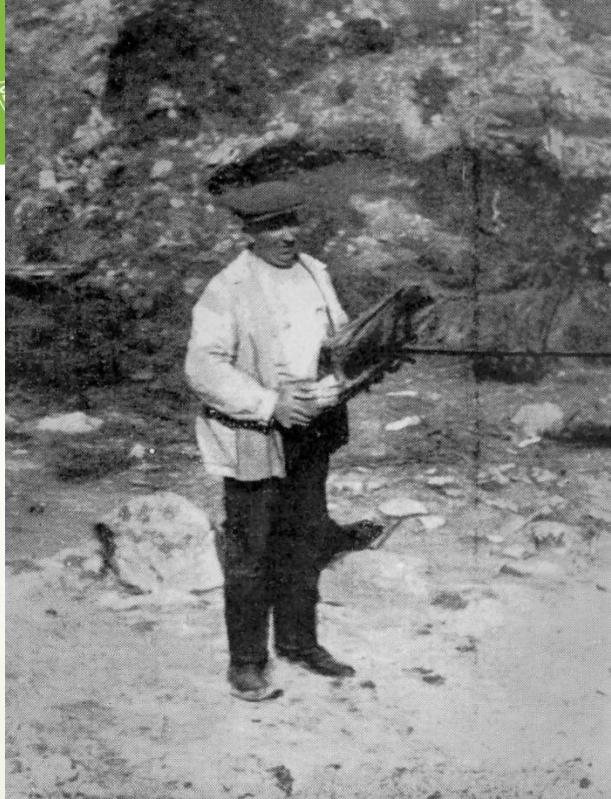


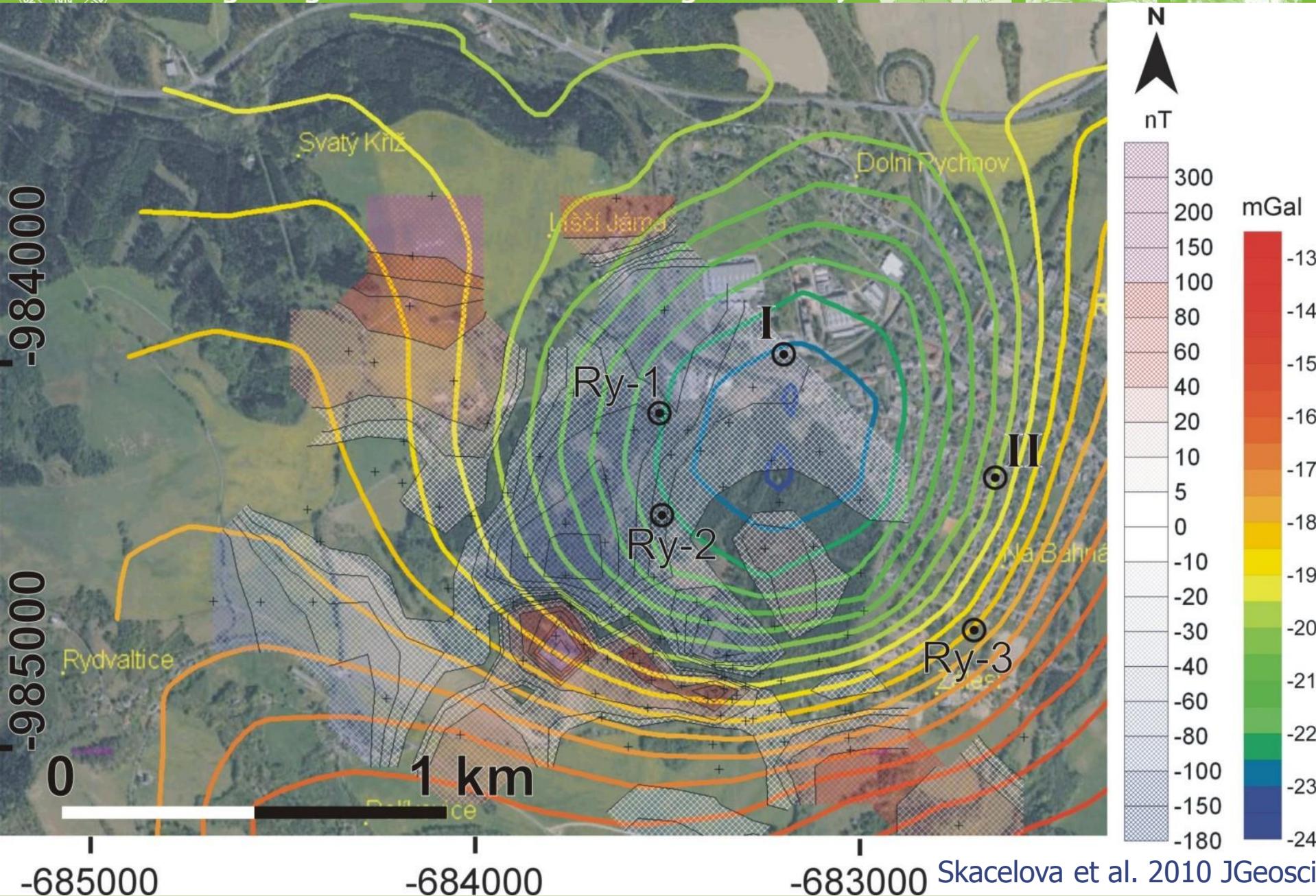




# původní maar u Hnojnic s tufovým prstencem









# Deposition of pyroclastic rocks

- Fall
- Flow
- Surge



# Fall clast-supported sorted

Bigger clasts (bombs)  
ballistically



Ash in the cloud. Convective  
transport, wind transport



Source: Icelandic Meteo. Agency ([en.vedur.is](http://en.vedur.is))

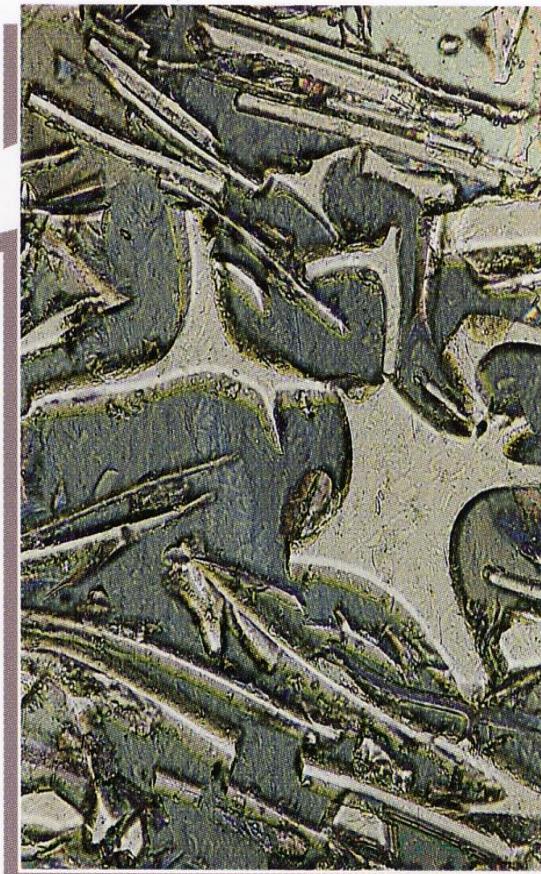
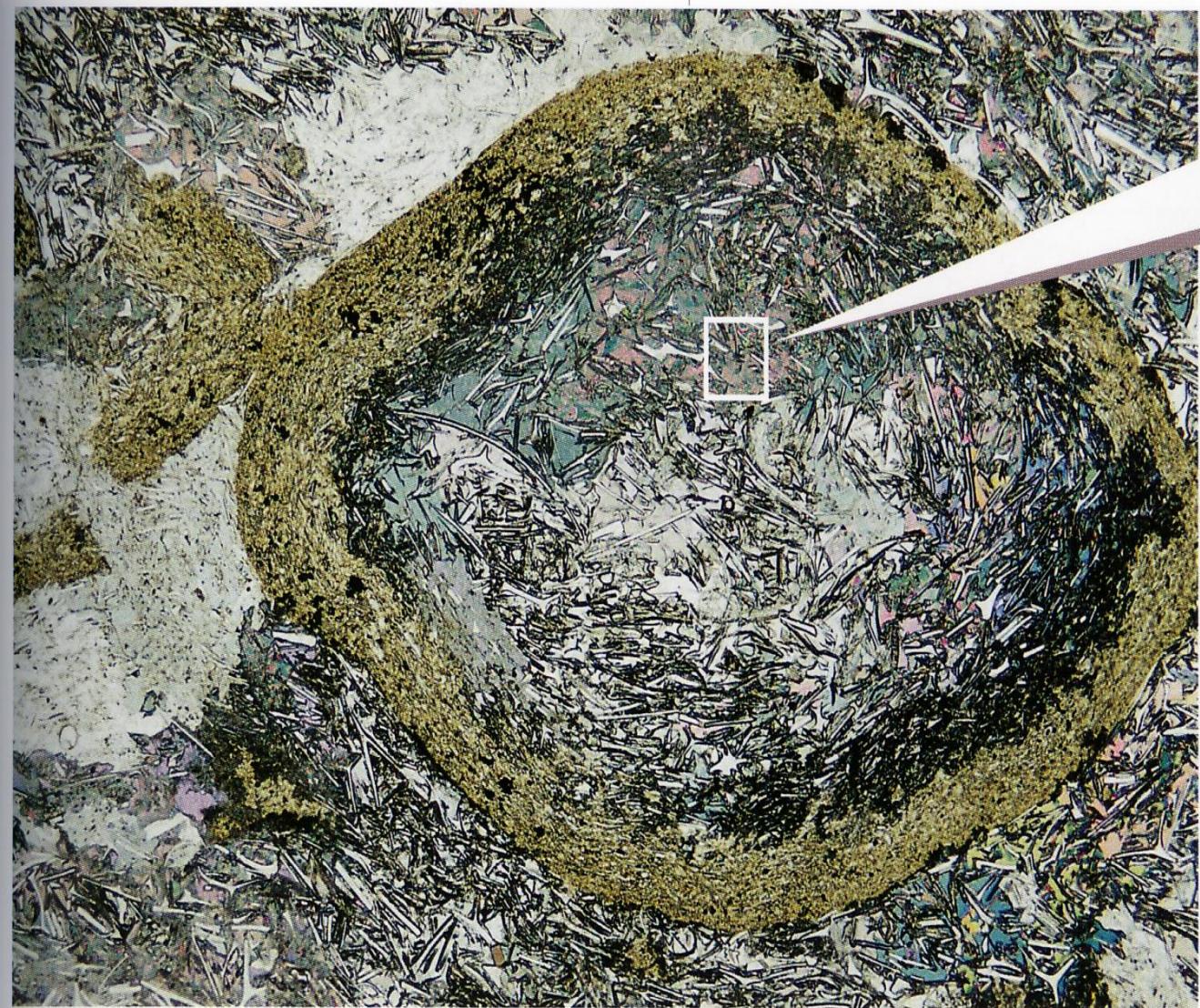




# Accretionary lapilli

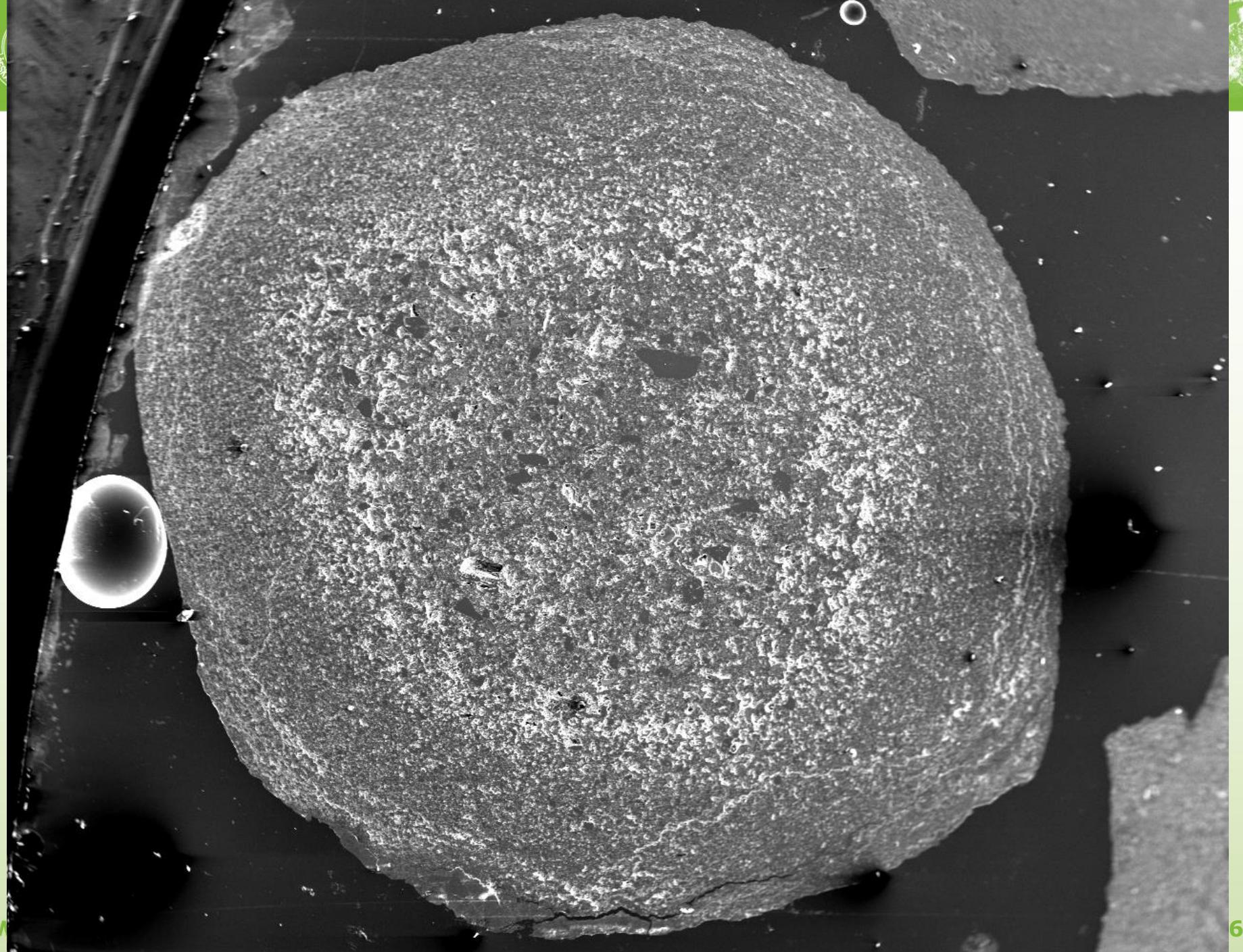
Accretion of  
ash particles by  
electric charge  
and  
condensating  
moisture.  
Concentric  
structure





▲ Enlargement of central part of accretionary lapillus, showing rhyolitic glass shards (light-colored), about 50 µm in diameter, embedded in calcite cement

Schmincke: Volcanism, 2005



SEI 15.00 KV 6.00 mm x 4.80 mm

1 mm





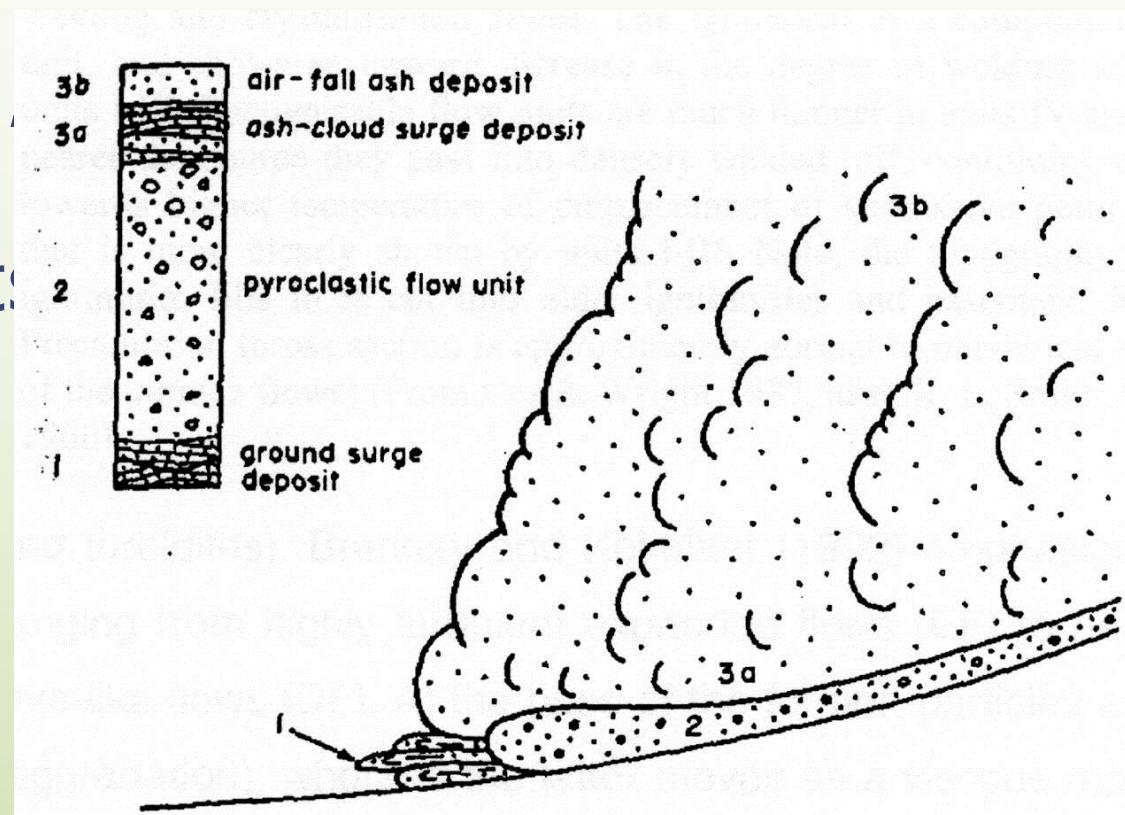






# Pyroclastic flows and ignimbrites

- Avalanche of glowing mixture of ash, gas, pumice, lithic fragments
- Laminar flow
- Deposit of pumice-PF is called ignimbrite



(Cas and Wright 1987)



USGS



- Un-sorted
- Matrix-supported
- Lithics normal grading
- Pumice reverse grading







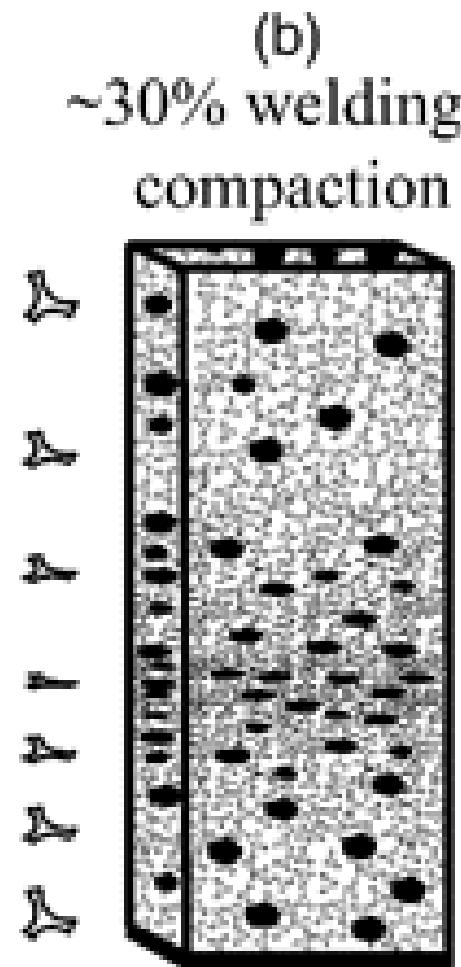
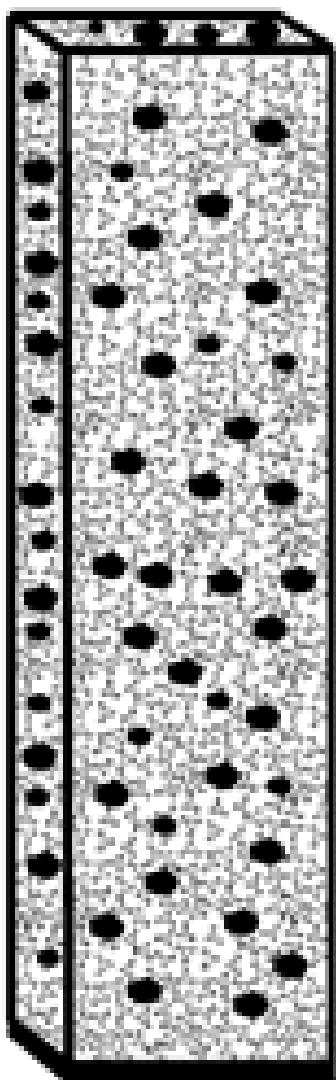






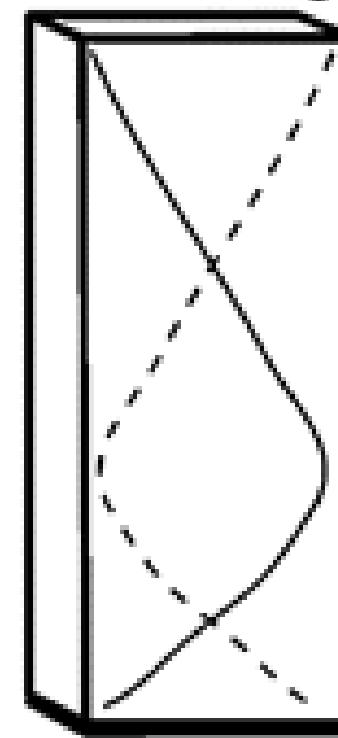


# Original Unwelded Deposit

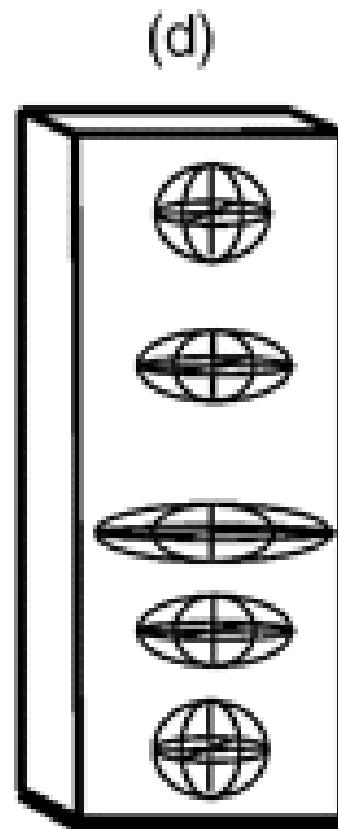


## Welding

(c)  
Porosity (%)  
low                  high



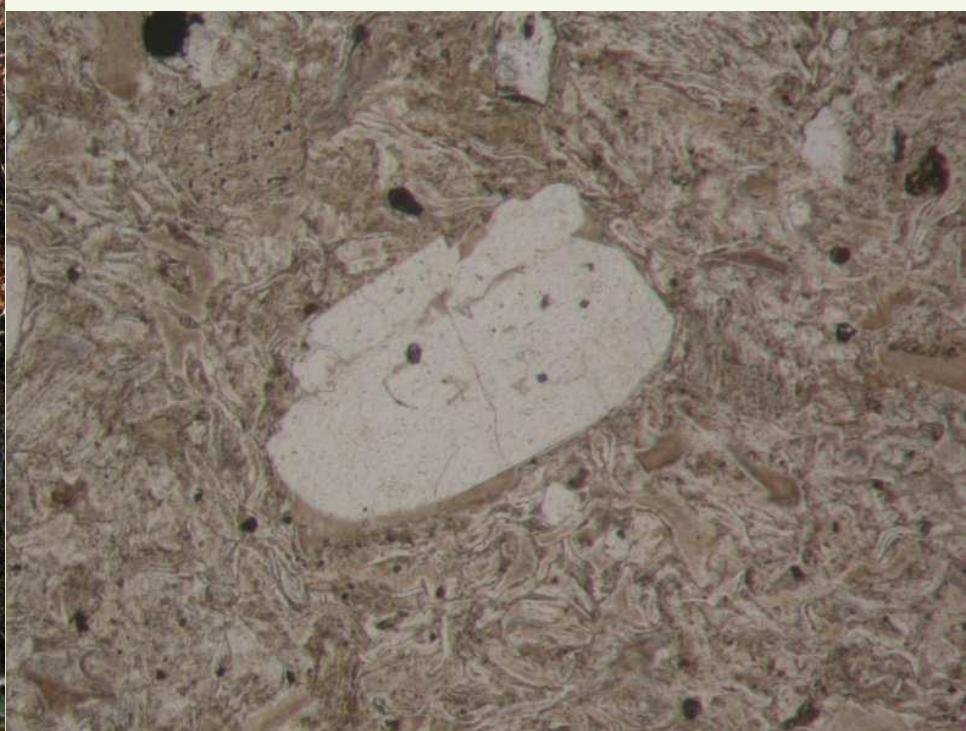
Density ( $\text{g}/\text{cm}^3$ )













# Pyroclastic surges

- High-energy transport
- Gas >> solids
- Similar to nuclear bomb explosion
- Turbulent flow migration of dunes
- Ill-sorted
- Clast-supported
- Diagonal bedding (dunes, antidunes)

