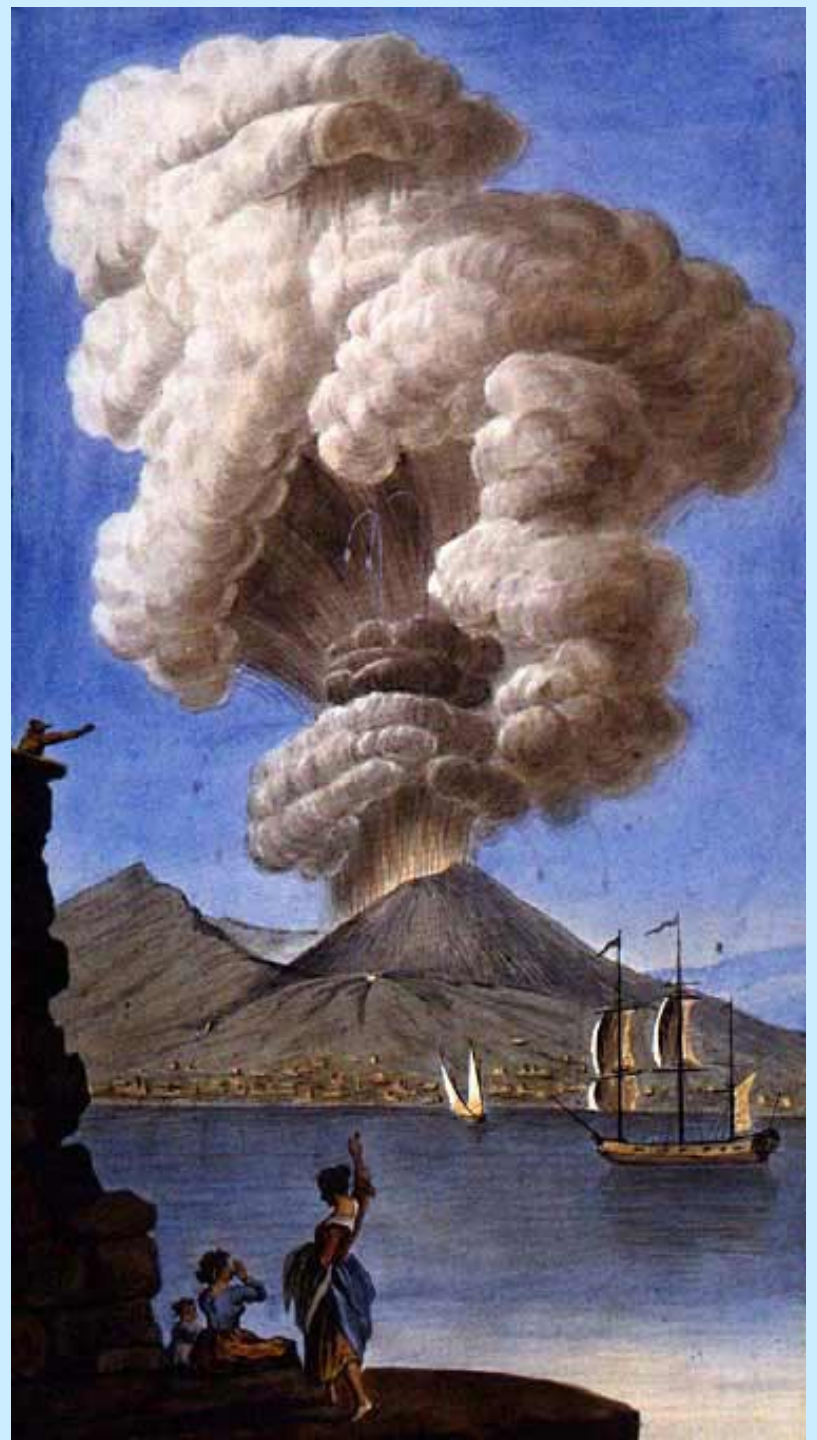


VOLCANIC ERUPTIONS A PRIMER

Claude Jaupart

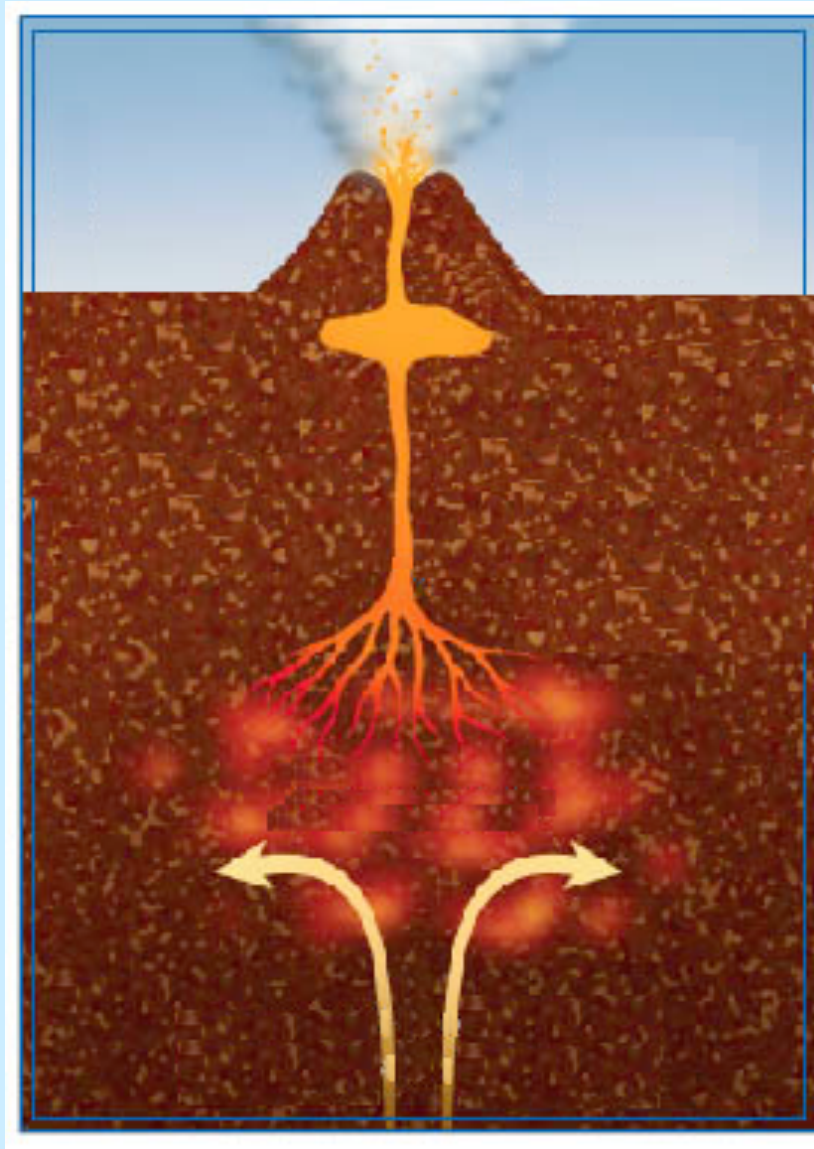
Institut de Physique du Globe
de Paris



A VOLCANIC SYSTEM

1. Deep source (flux + magma composition)
2. Magma (physical properties + volatile content)
3. Shallow plumbing system (reservoir + conduit)
4. Volcanic edifice

A VOLCANIC PLUMBING SYSTEM

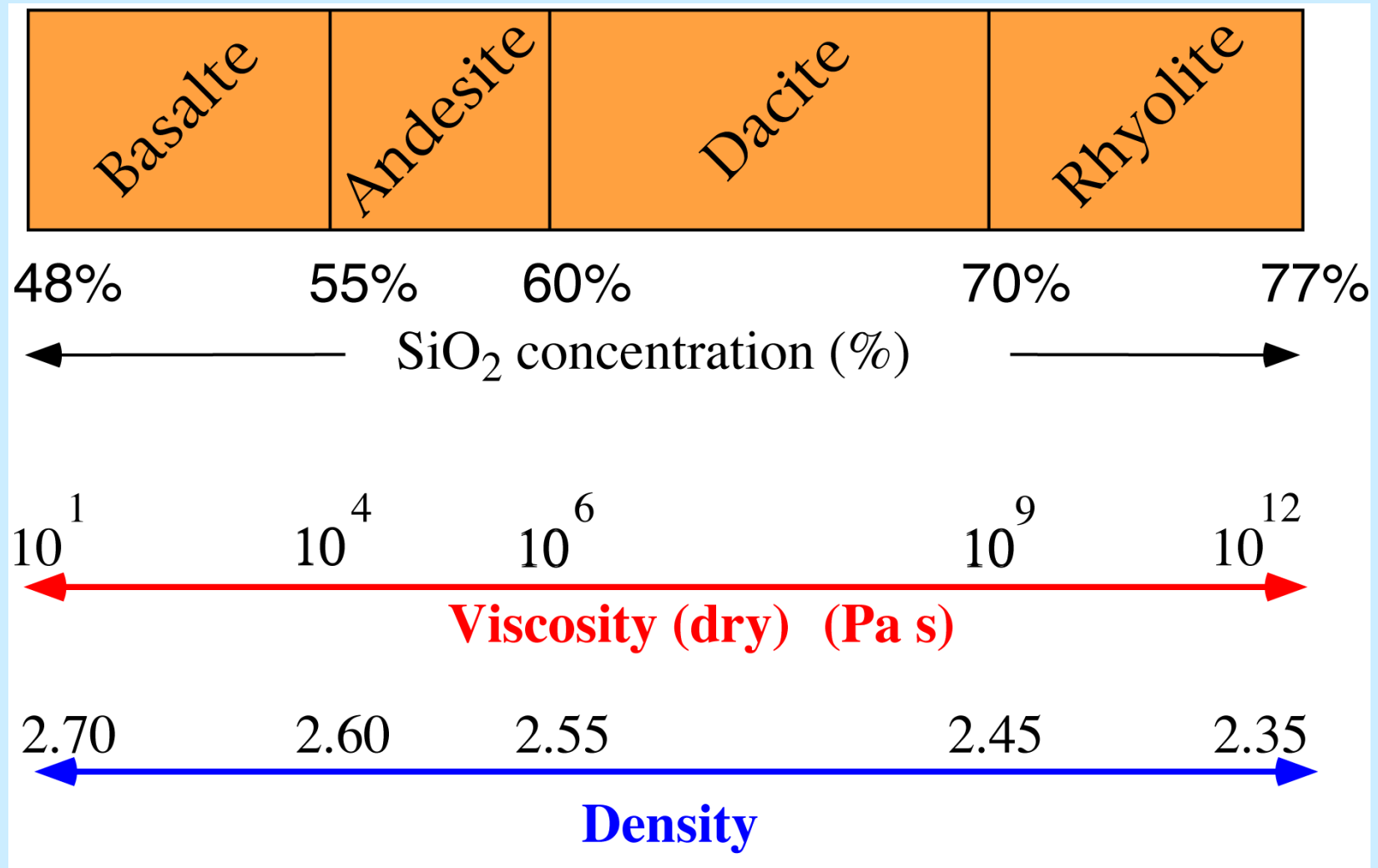


Storage in shallow reservoir
(+ crystallization/differentiation)

Buoyancy-driven ascent

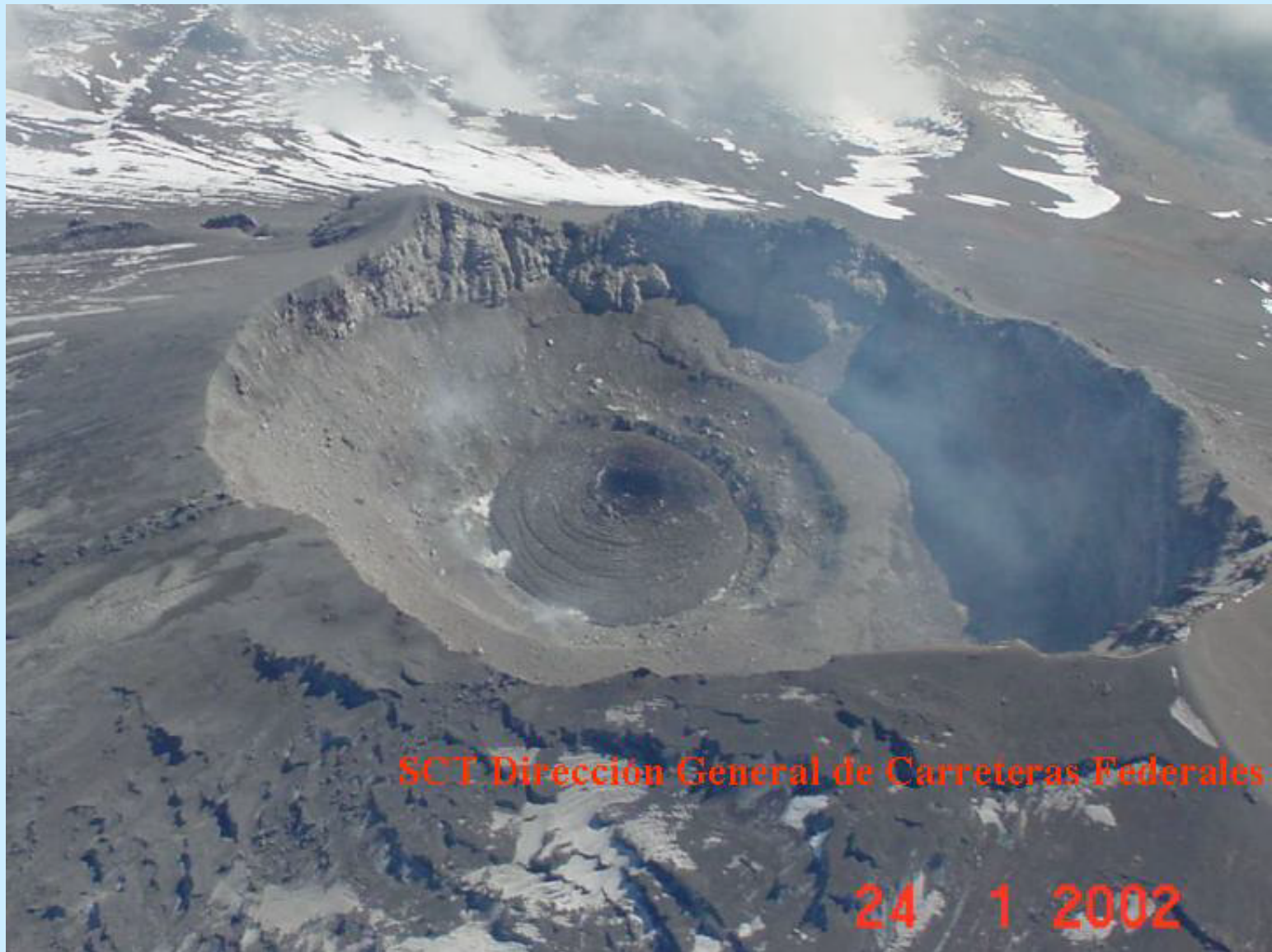
Deep source

MAGMAS : A WIDE RANGE OF PHYSICAL PROPERTIES





Kilauea : Hawaii

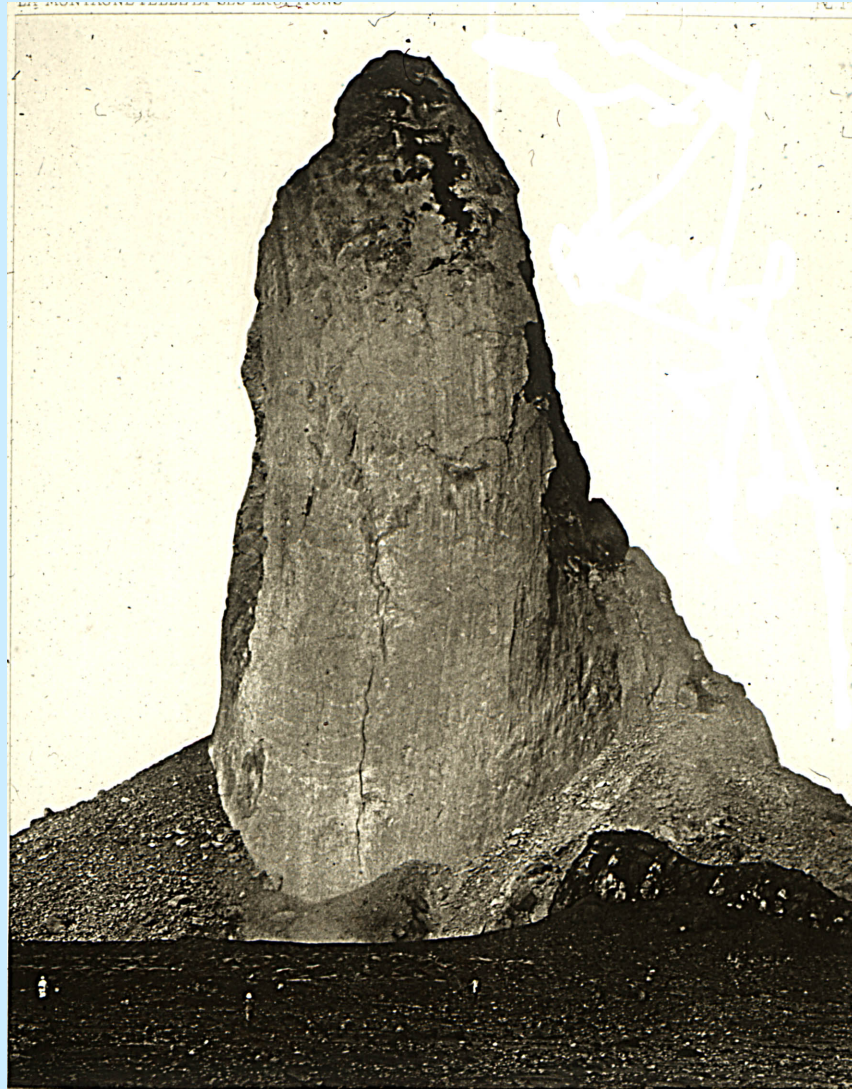


SCT Dirección General de Carreteras Federales

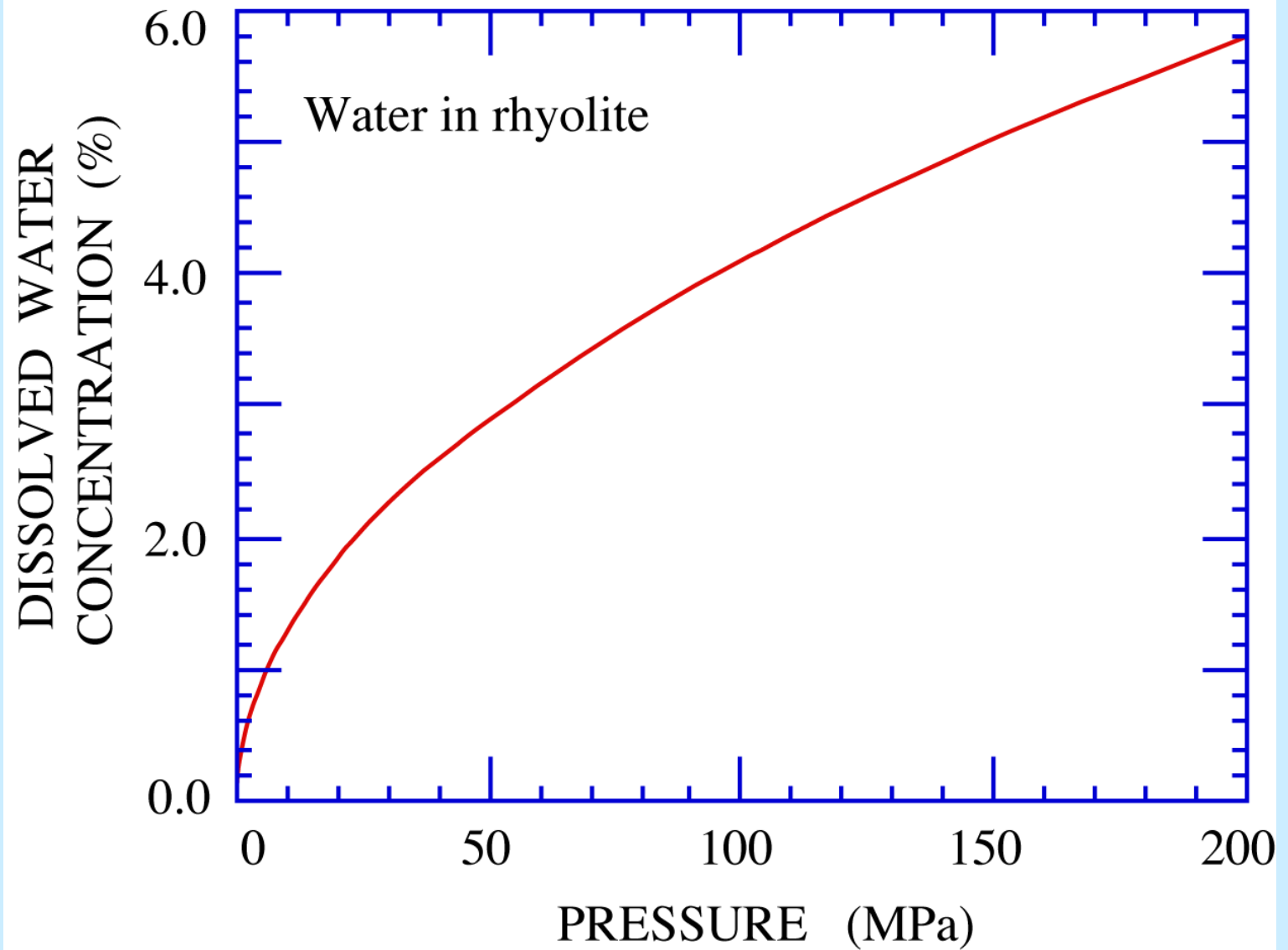
24 1 2002

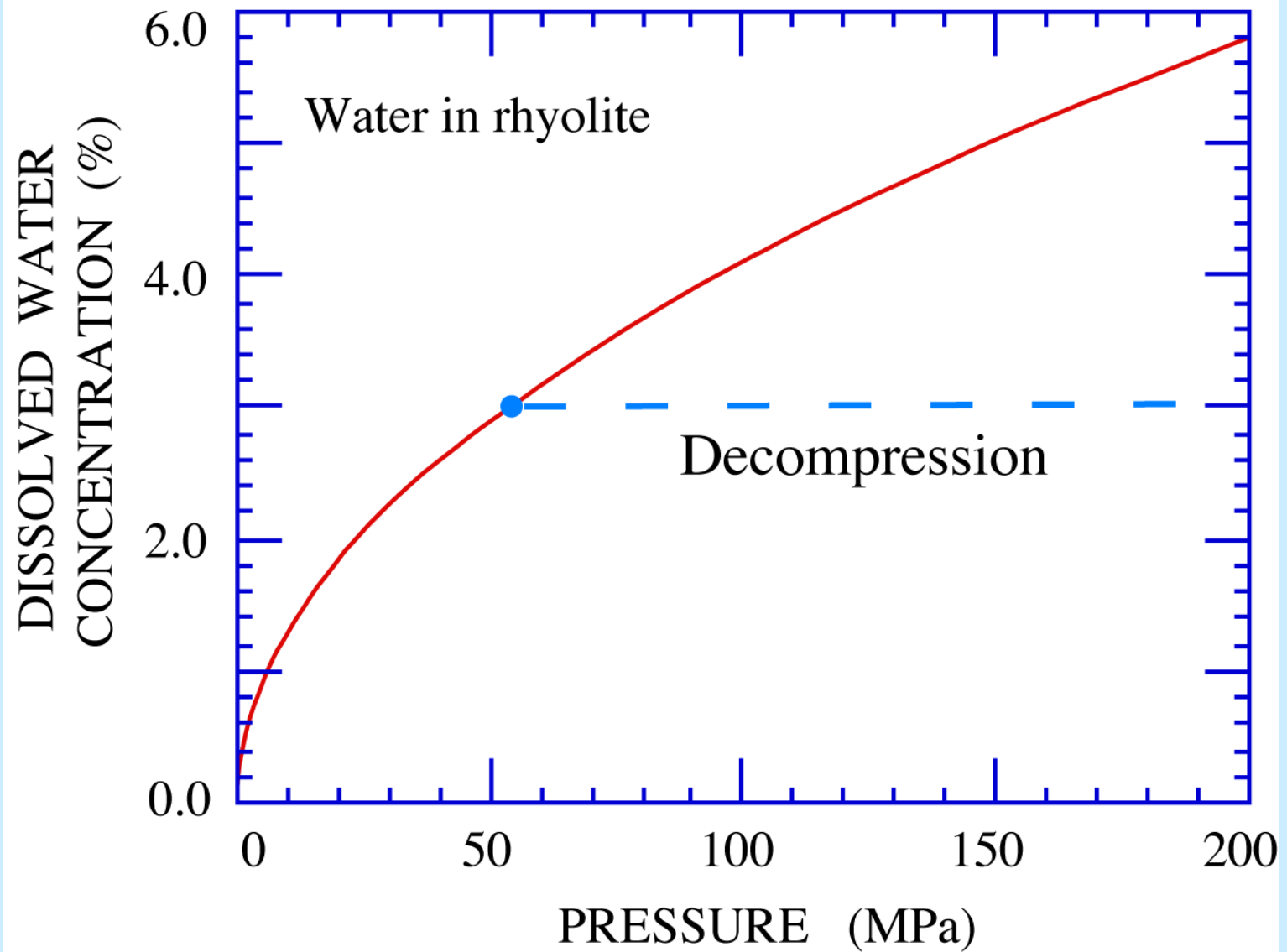
Popocatepetl

SPINES: EXTREME CASE



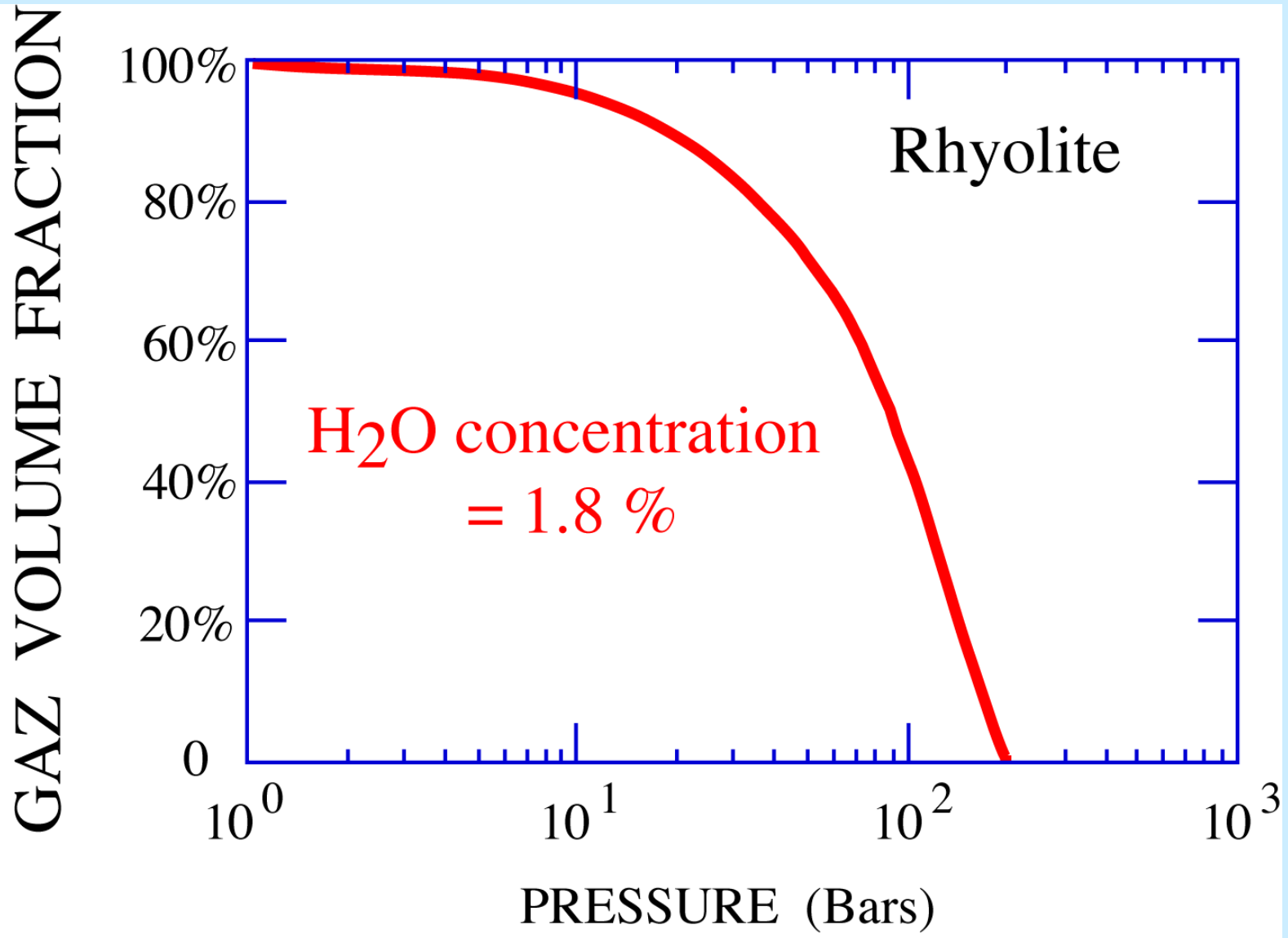
Montagne Pelée, Martinique (1902)





VOLATILES: MOSTLY H₂O

small weight fractions but large volume fractions



Two types of volcanic eruptions

Explosive

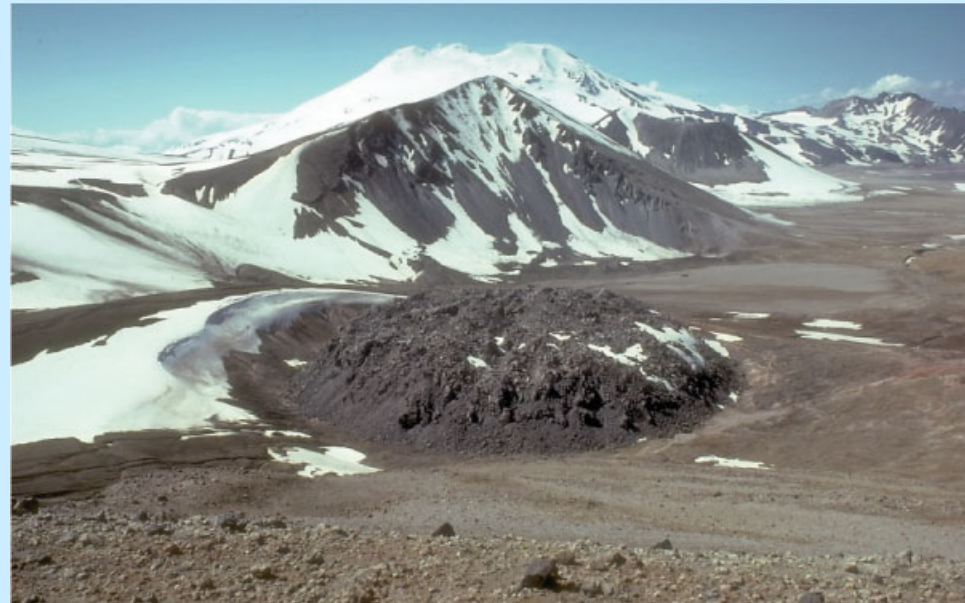
Gas in the atmospheric column



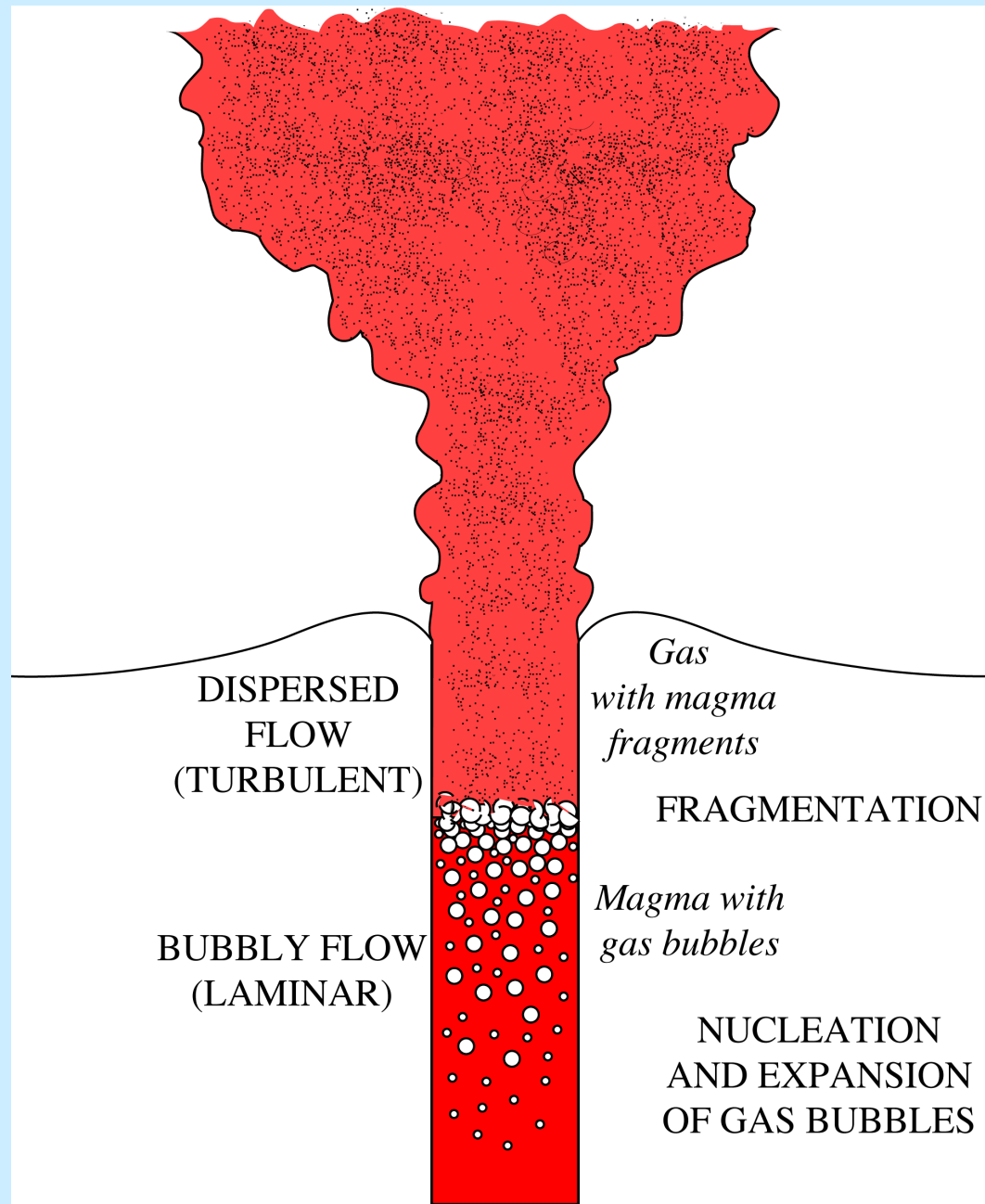
Effusive

Gas in lava domes

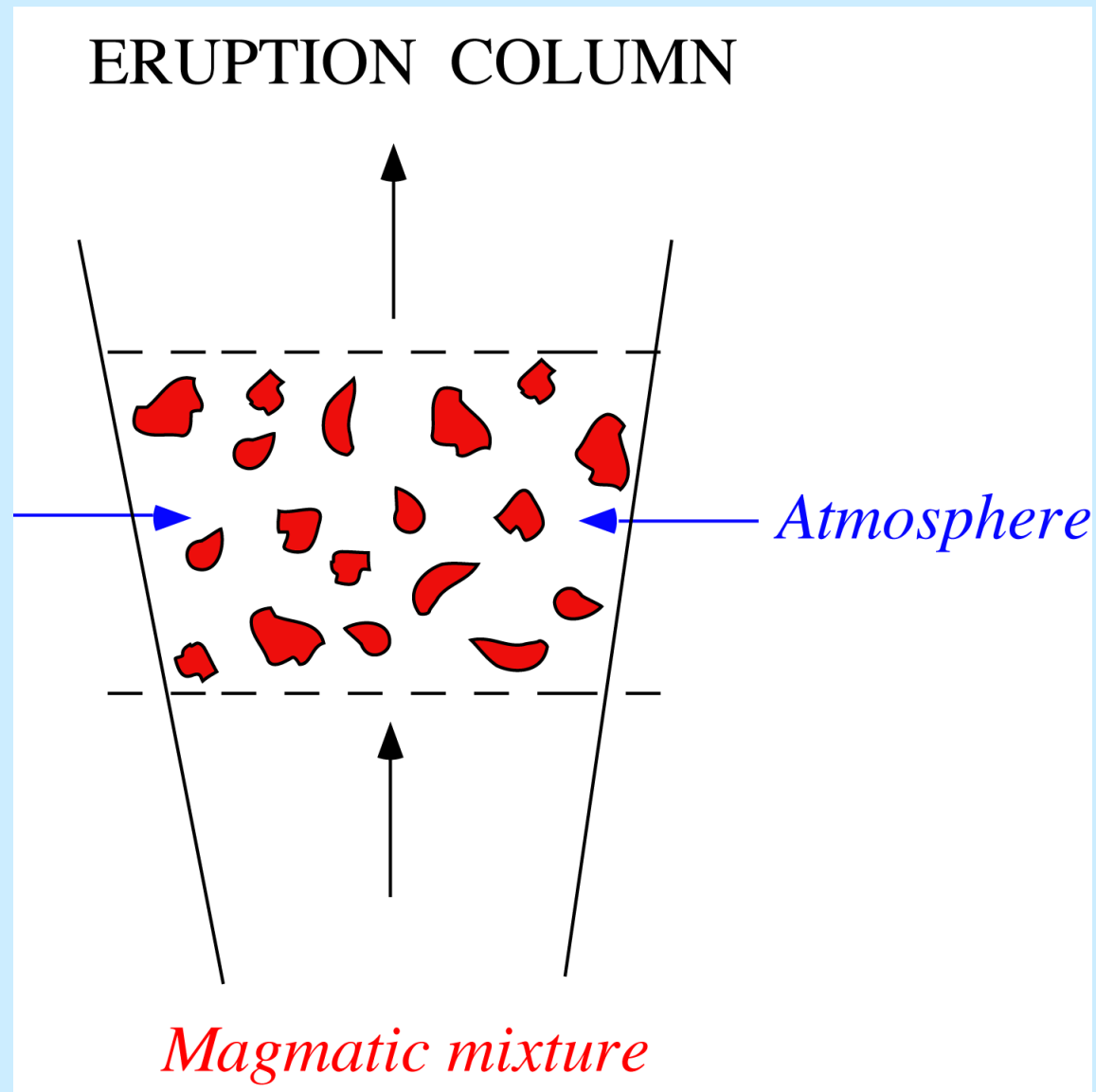
(explosive also !)



EXPLOSIVE ERUPTION COLUMNS



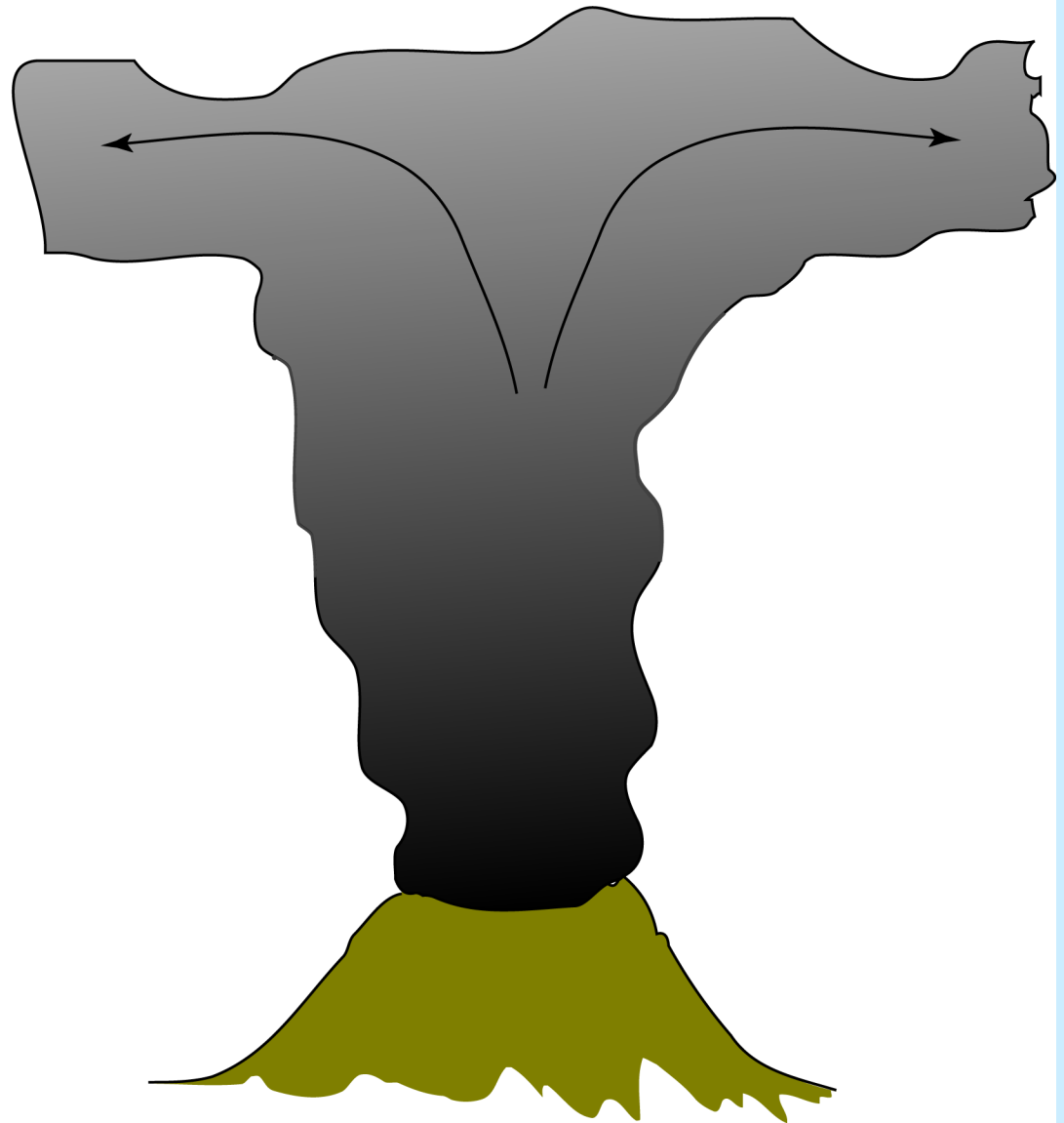
DYNAMICS OF ATMOSPHERIC ERUPTION COLUMNS



1. Enough atmospheric air can be entrained into eruption column

Column rises to very high altitude

Plinian column



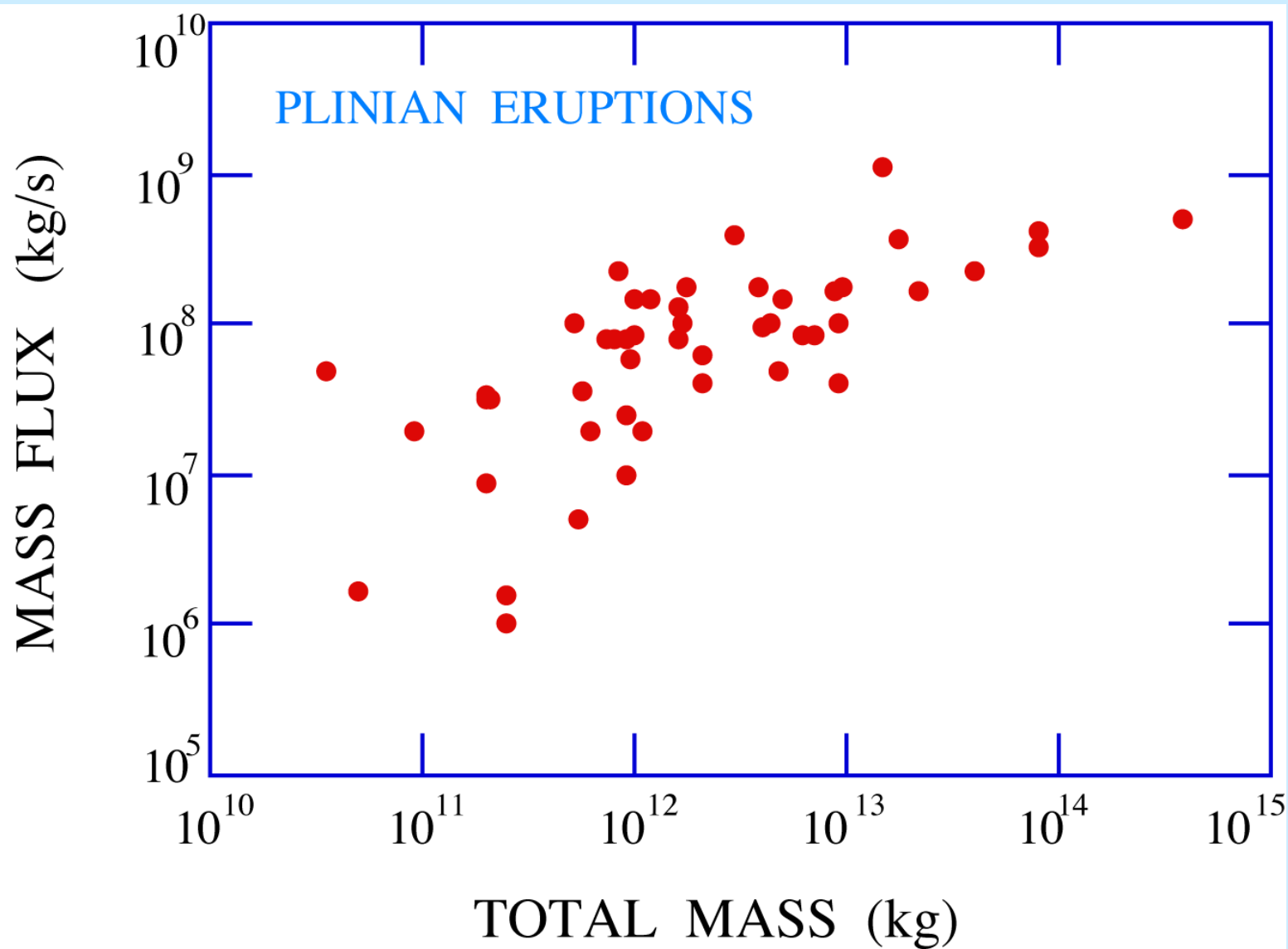
PLINIAN COLUMN : Mount Pinatubo





PLINIAN FALL DEPOSIT : NAPLES

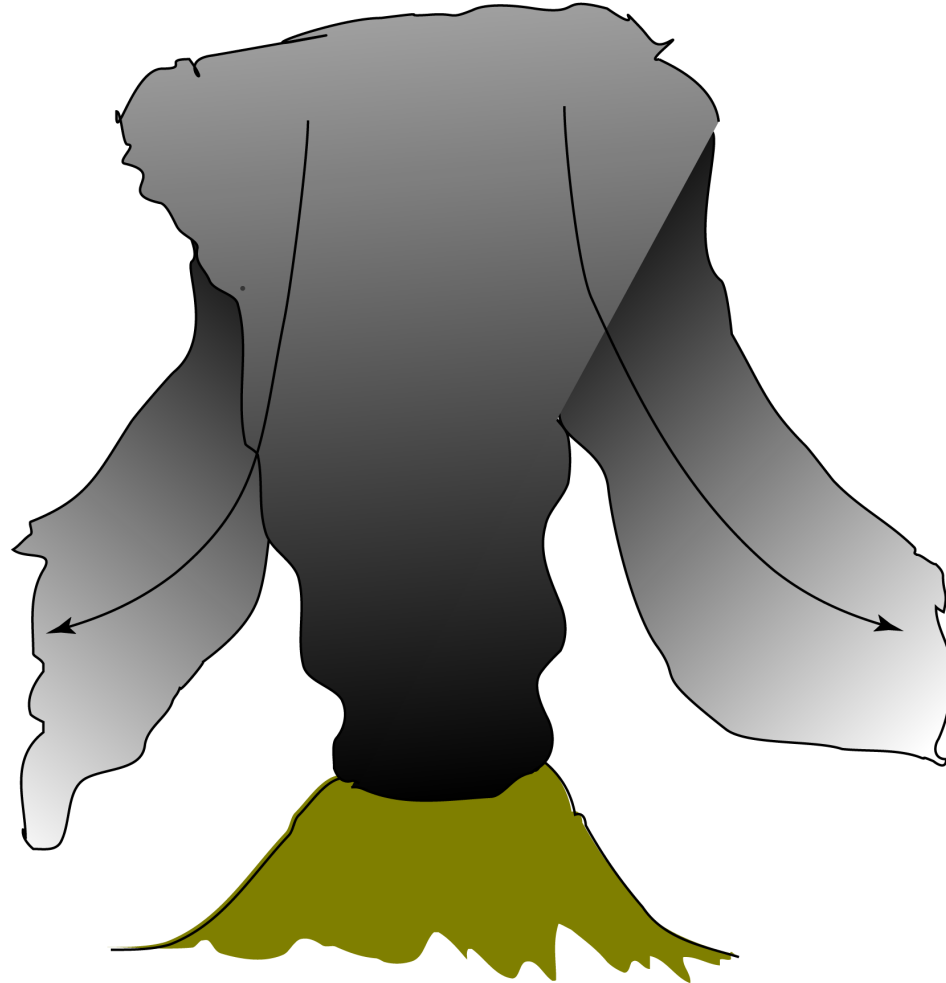




Pyroclastic Flow

2. Not enough
atmospheric air
can be entrained
into
the eruption column

Column collapses
at low altitude
and feeds
pyroclastic flows





PYROCLASTIC FLOW DEPOSIT : NAPLES



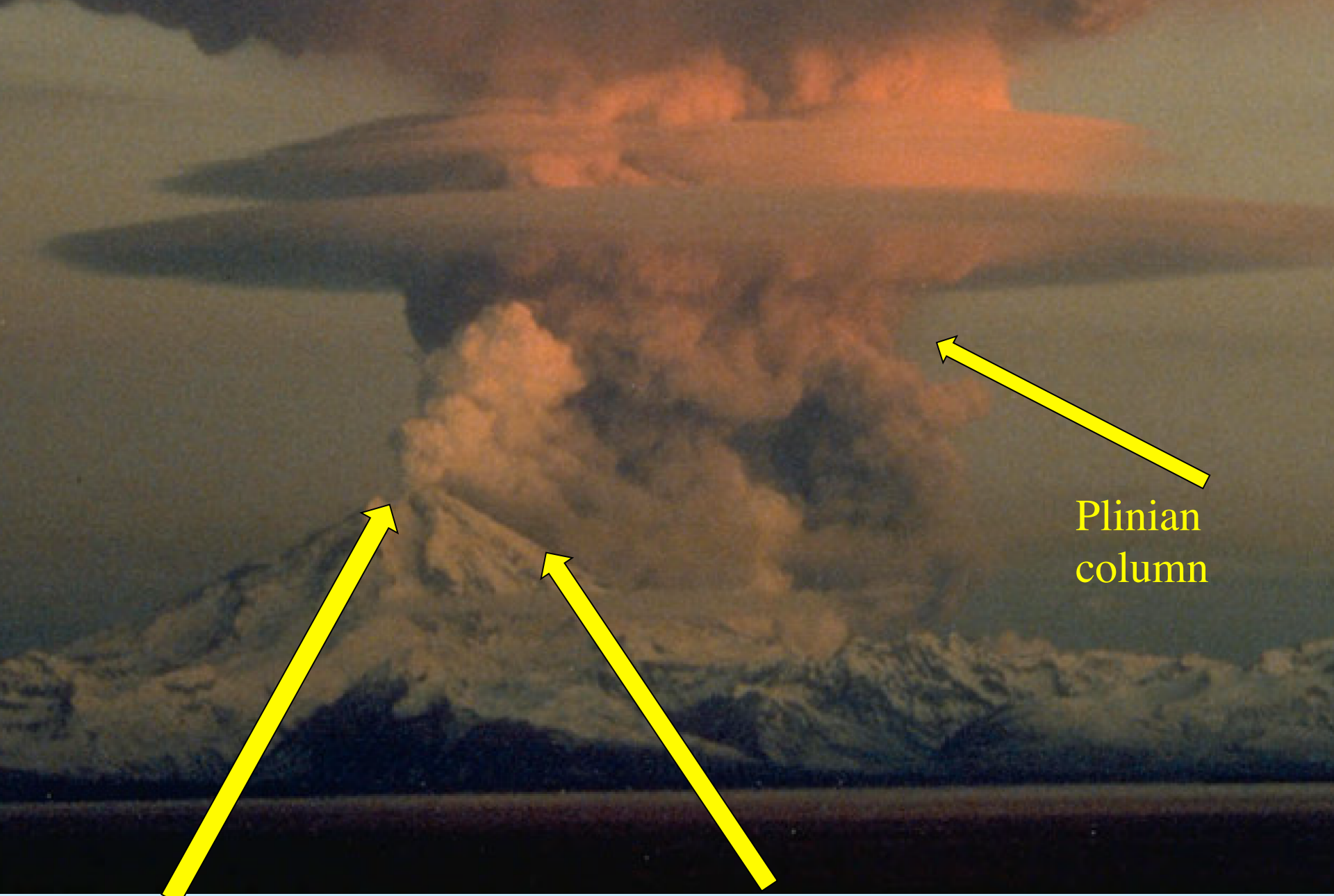


Mount Redoubt, Alaska

Both types of flows can occur at the same time



Mount Redoubt, Alaska



Eruptive vent

Pyroclastic flow

Plinian
column