

The Cascade Range



Lake Almanor

Mt Garibaldi

Mt Garibaldi, British Columbia



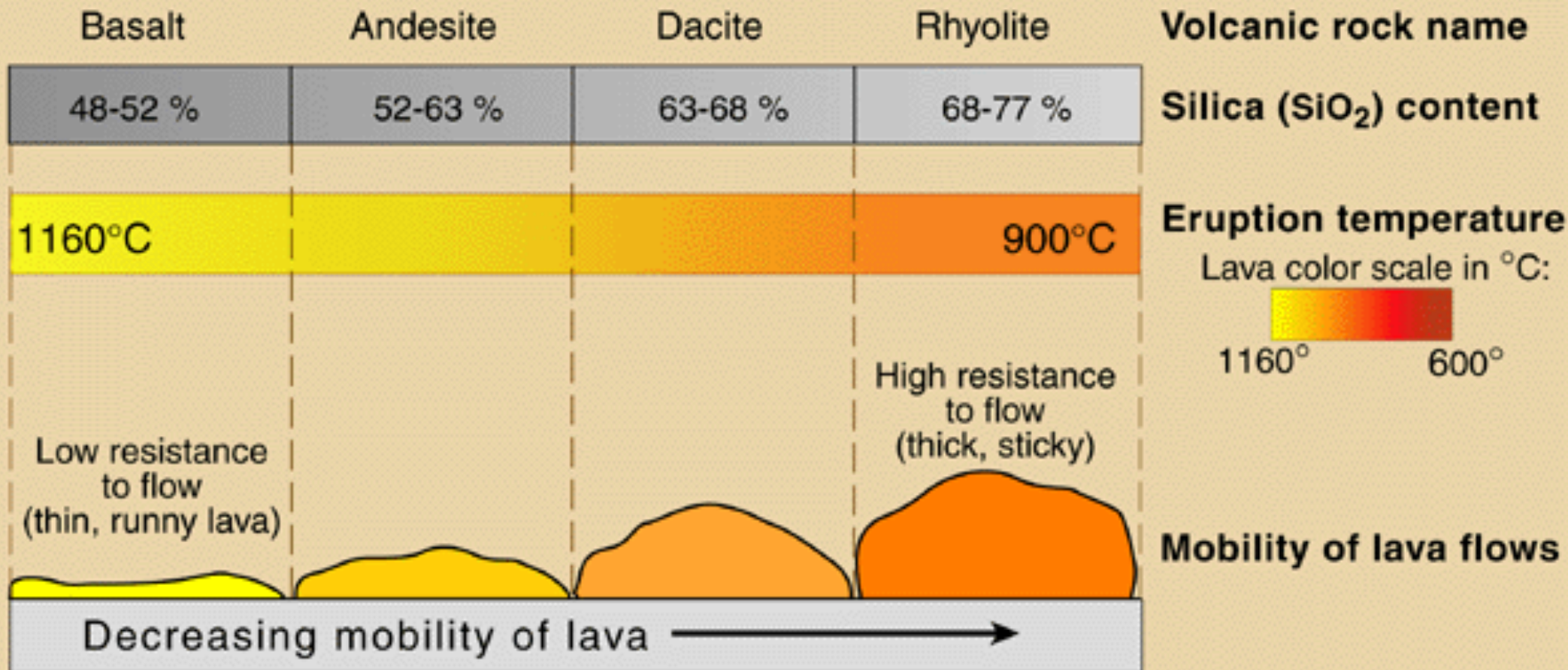
Lassen Peak from Lake Almanor, California



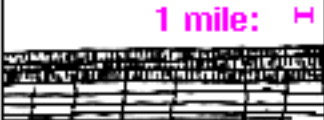
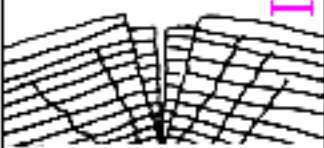



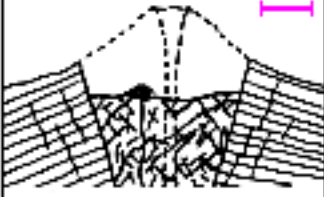
Volcanic Activity

- Diffuse degassing and fumaroles
- Hawaiian eruptions
- Lava lakes
- Strombolian eruptions
- Vulcanian eruptions
- Visuvian or sub-plinian eruptions ($M < 4$)
- Plinian eruptions ($M = 4+$)
- Pelean eruptions
- Hydrovolcanic eruptions

CLASSIFICATION & FLOW CHARACTERISTICS OF VOLCANIC ROCKS

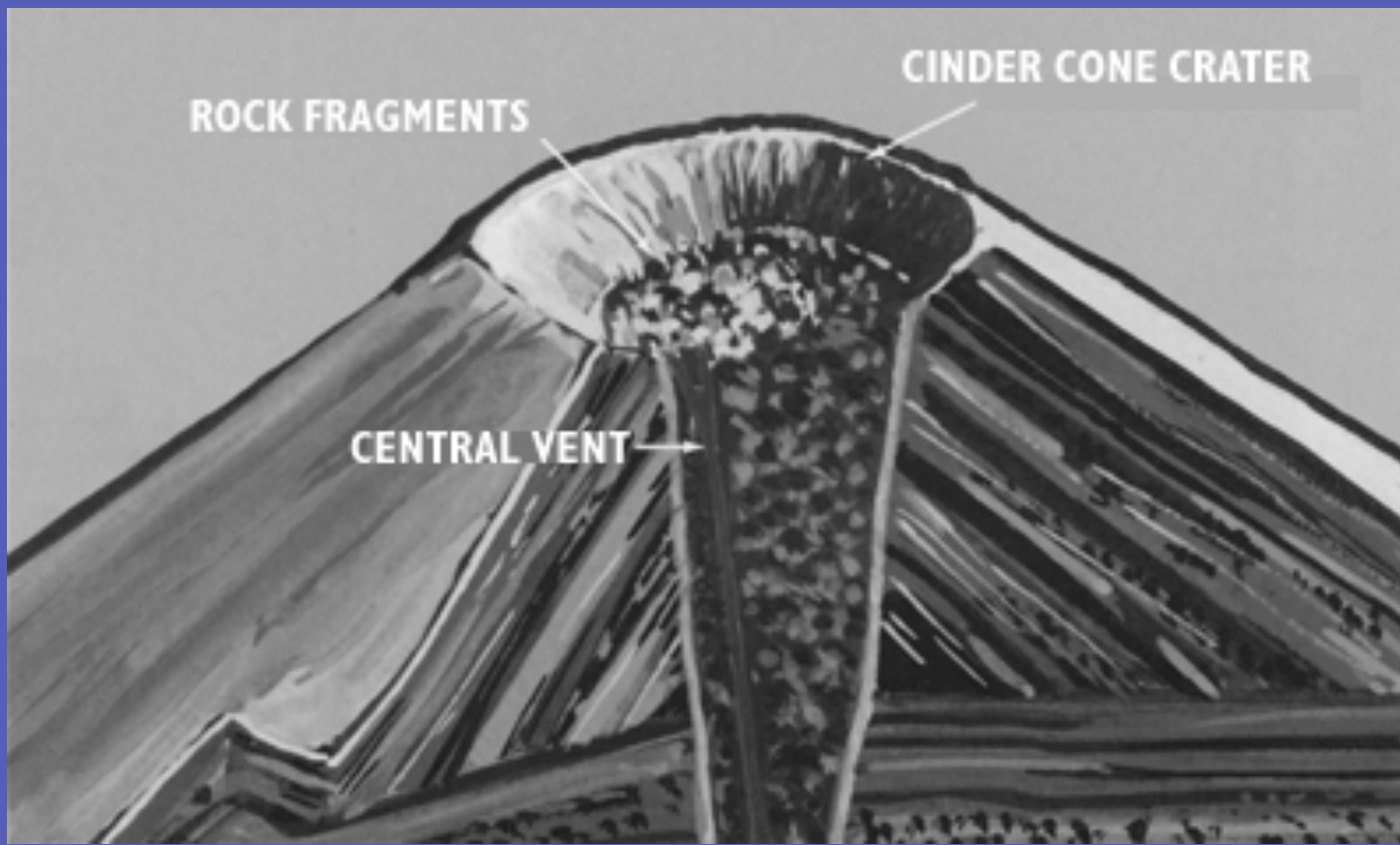


Types of Volcanoes

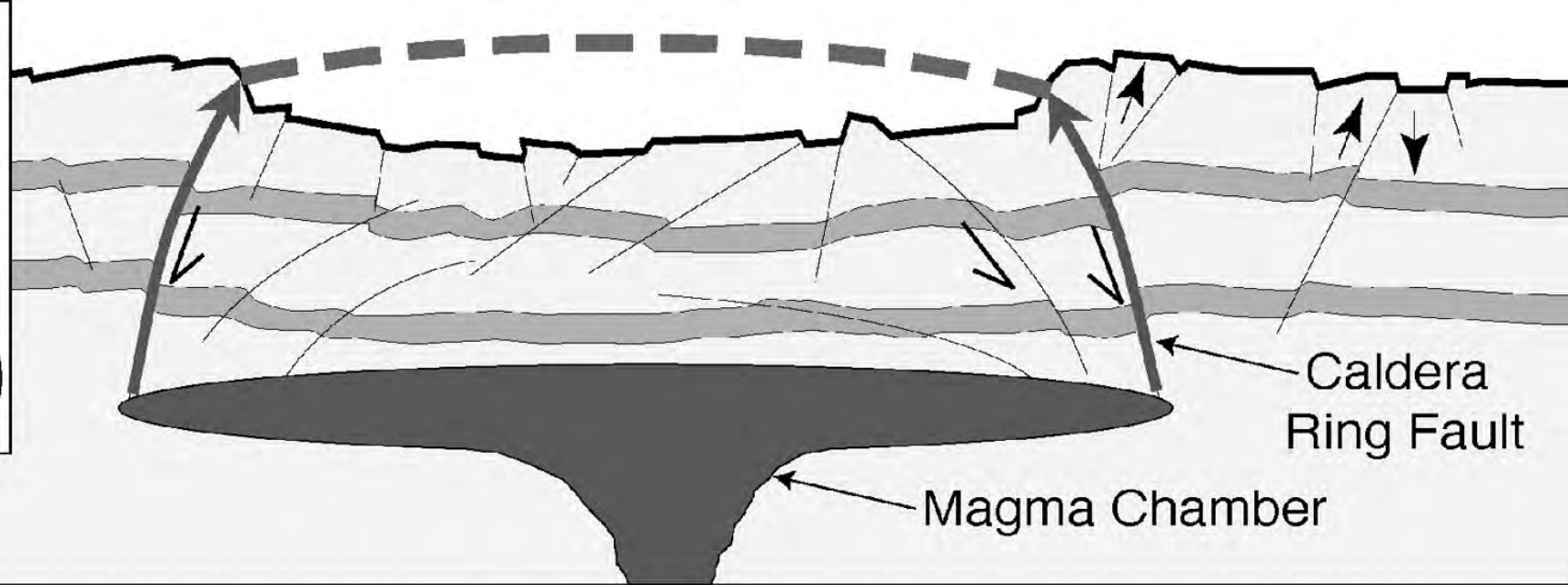
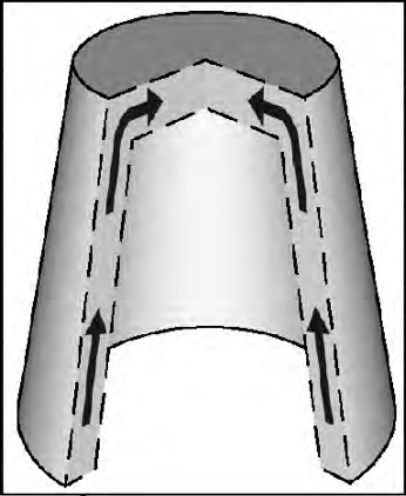
Volcano Type	Characteristics	Examples	Simplified Diagram
Flood or Plateau Basalt	Very liquid lava; flows very widespread; emitted from fractures	Columbia River Plateau	
Shield Volcano	Liquid lava emitted from a central vent; large; sometimes has a collapse caldera	Larch Mountain, Mount Sylvania, Highland Butte, Hawaiian volcanoes	
Cinder Cone	Explosive liquid lava; small; emitted from a central vent; if continued long enough, may build up a shield volcano	Mount Tabor, Mount Zion, Chamberlain Hill, Pilot Butte, Lava Butte, Craters of the Moon	
Composite or Stratovolcano	More viscous lavas, much explosive (pyroclastic) debris; large, emitted from a central vent	Mount Baker, Mount Rainier, Mount St. Helens, Mount Hood, Mount Shasta	
Volcanic Dome	Very viscous lava; relatively small; can be explosive; commonly occurs adjacent to craters of composite volcanoes	Novarupta, Mount St. Helens Lava Dome, Mount Lassen, Shastina, Mono Craters	
Caldera	Very large composite volcano collapsed after an explosive period; frequently associated with plug domes	Crater Lake, Newberry, Kilauea, Long Valley, Medicine Lake, Yellowstone	

Increasing Violence
Increasing Viscosity





Vent: Any opening at the Earth's surface through which magma erupts or volcanic gases are emitted.

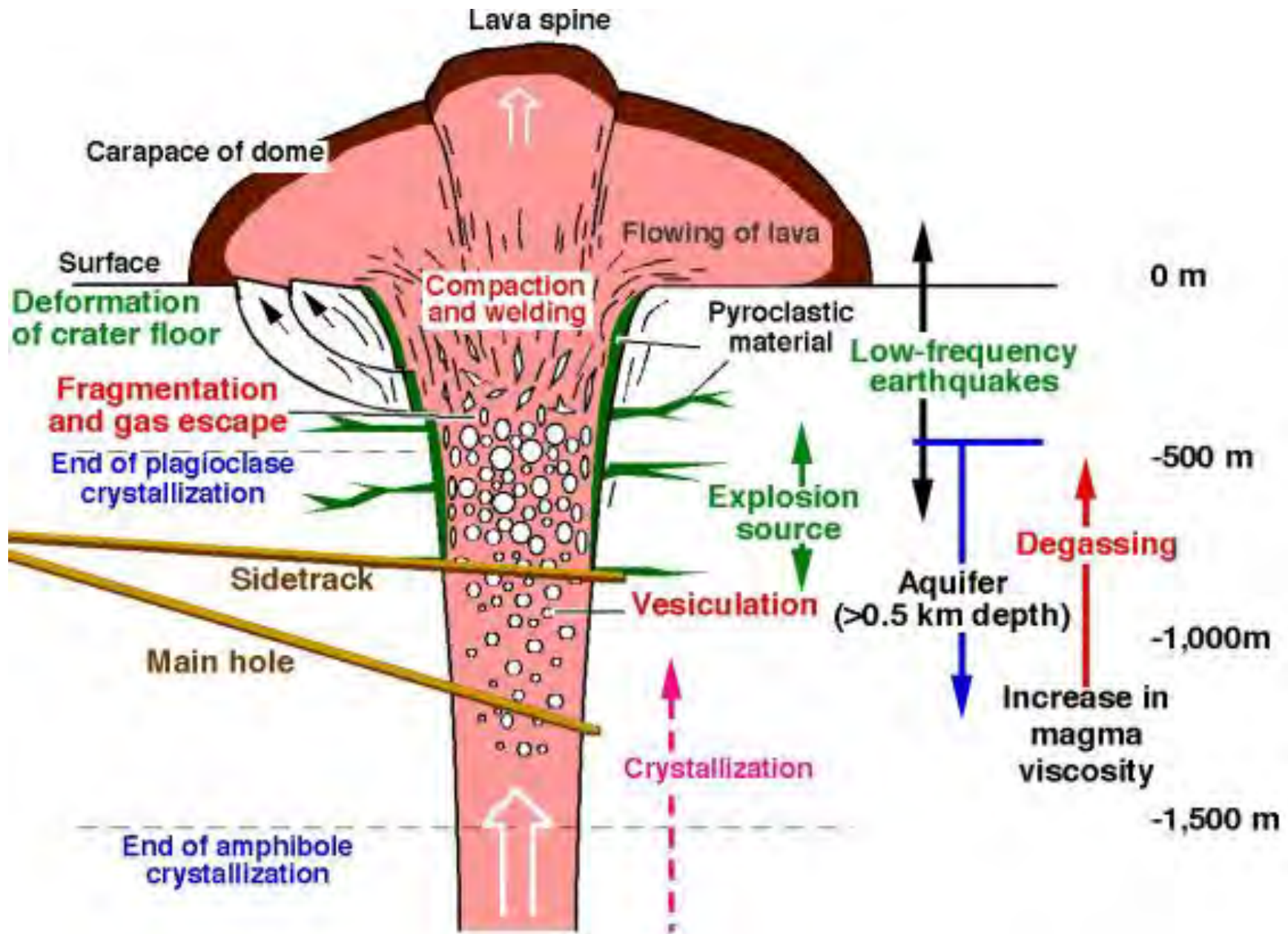


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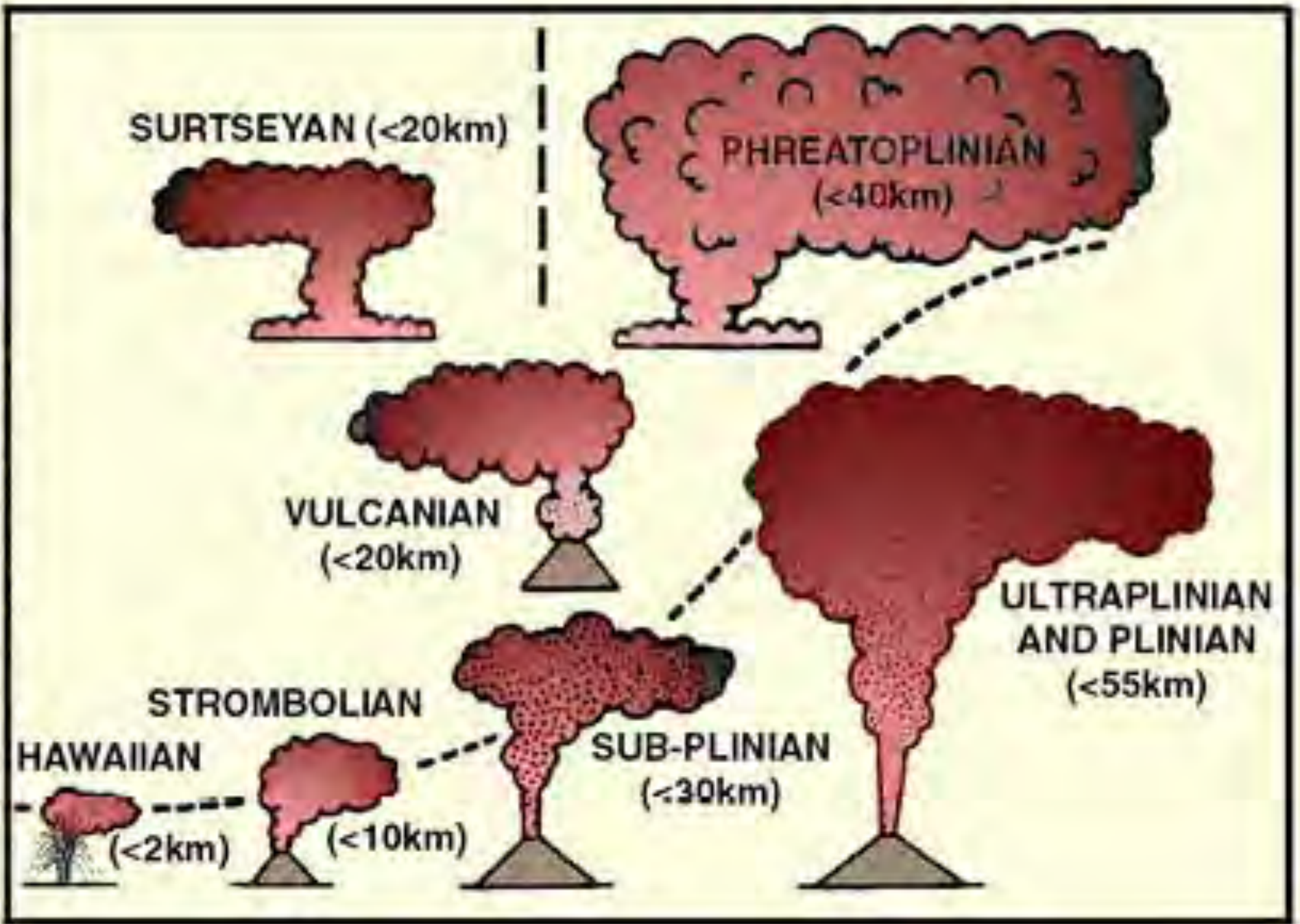
Caldera: A large basin-shaped volcanic depression with a diameter many times larger than include volcanic vents; may range from 2 to 50 km (1 to 30 mi) across. Commonly formed when magma is withdrawn or erupted from a shallow underground magma reservoir. The removal of large volumes of magma may result in loss of structural support for the overlying rock, thereby leading to collapse of the ground and formation of this type of large depression. Calderas are different from craters, which are smaller, circular depressions created primarily by explosive excavation of rock during eruptions.

<https://volcanoes.usgs.gov/vsc/glossary/caldera.html>

Model of Unzen Volcanic Dome, Japan



EXPLOSIVENESS ↑



Shield Volcanoes



Belnap Crater, McKenzie Pass

Belnap Crater



AA lava flow

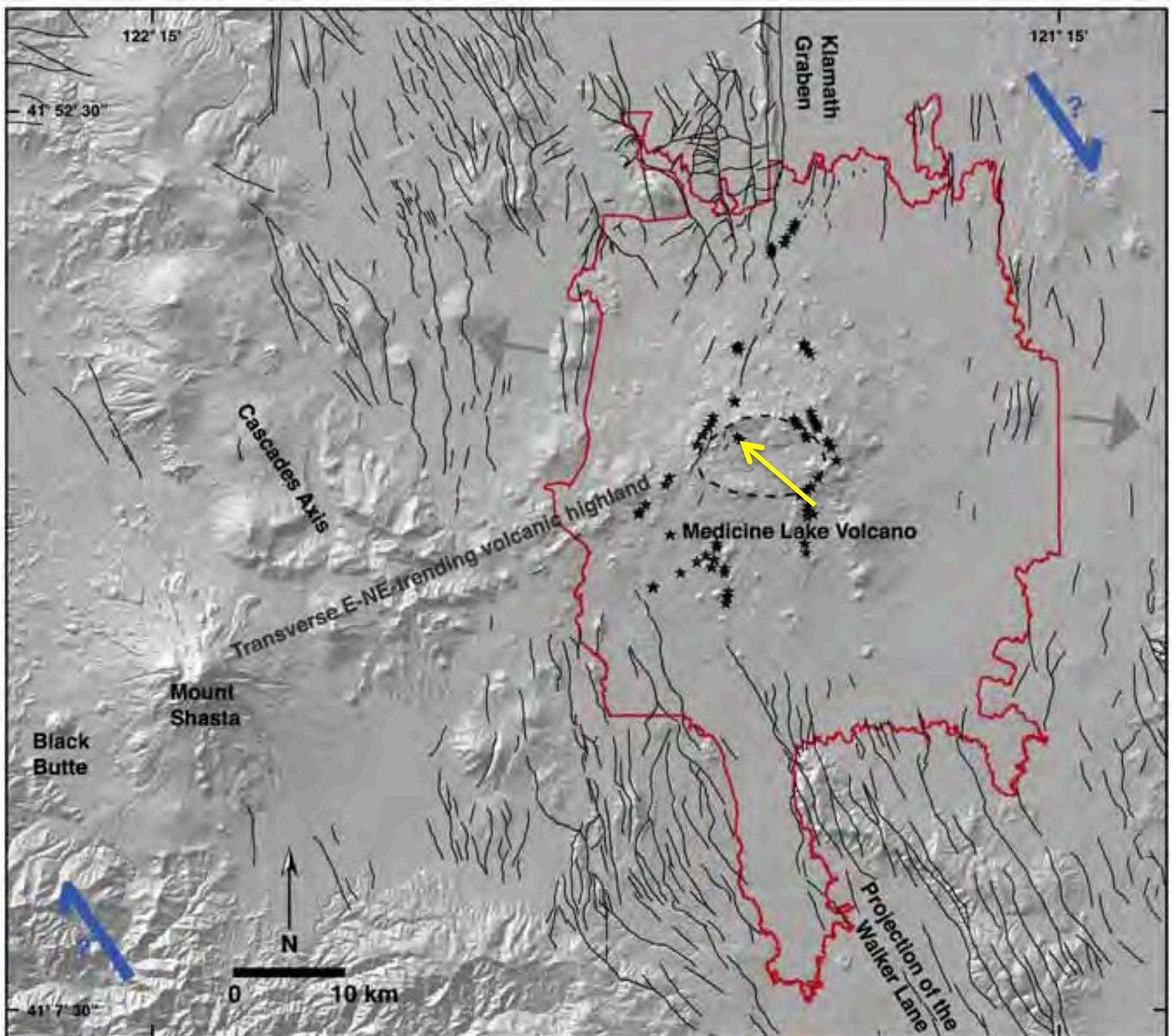


Imagery Date: 7/8/2013 44°17'05.79" N 121°50'32.04" W elev 6742 ft eye alt 16.44 ml

Medicine Lake Shield volcano



Imagery Date: 7/4/2014 41°34'10.42" N 121°36'41.63" W elev 6968 ft eye alt 24.38 mi

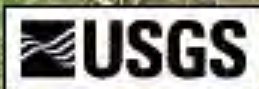


Glass Mountain Obsidian Flow, Medicine Lake Volcano



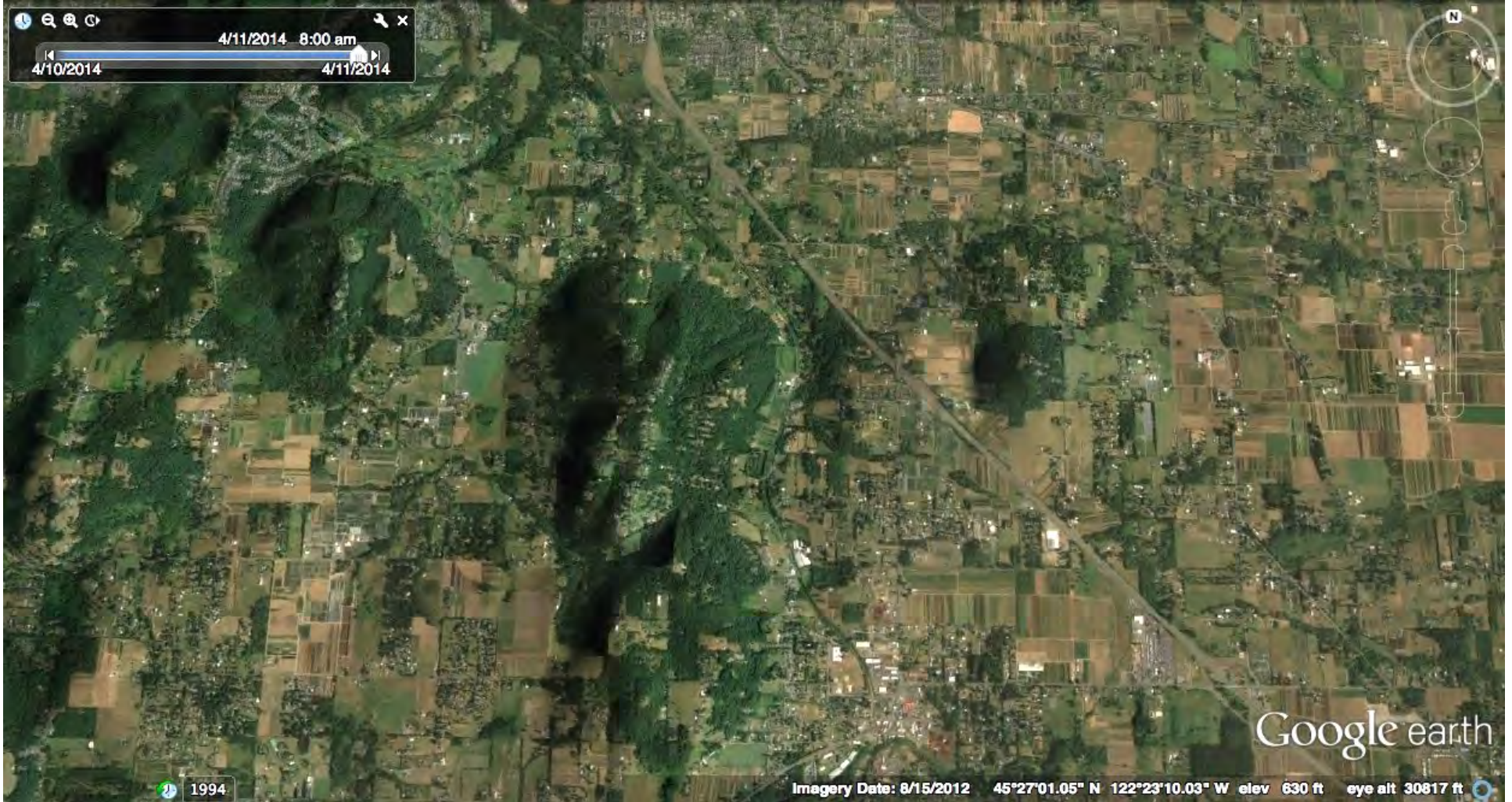


Larch Mountain: Shield Volcano

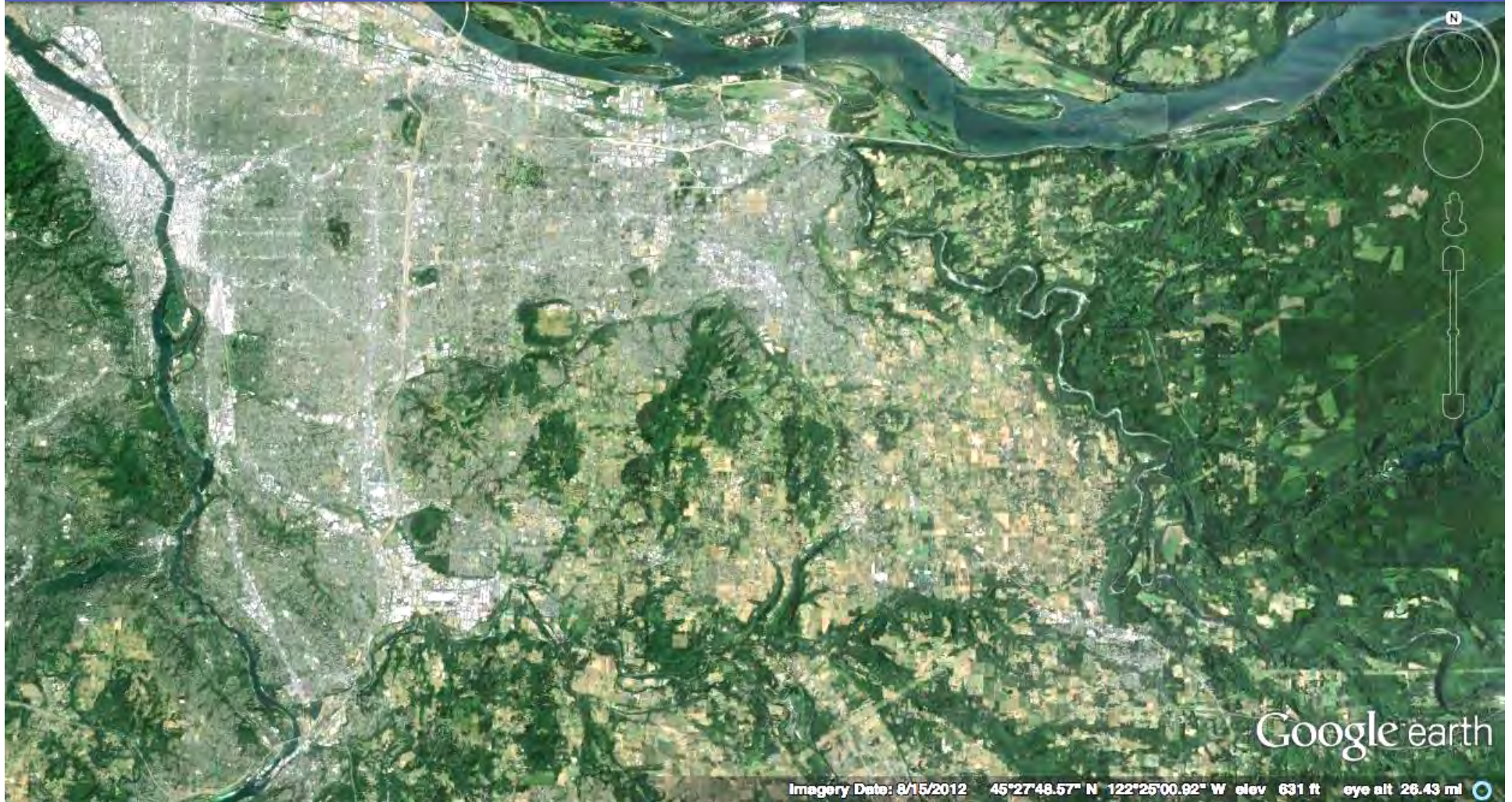


USGS Photo by Lyn Topinka, July 3, 2003, Larch Mountain, Or., as seen from Washougal, Wa.

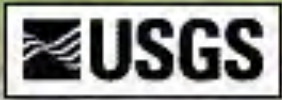
Boring Volcanoes: a monogenetic volcano field



Portland, Oregon: part of the Boring Volcano field



Rocky Butte: a monogenetic volcano in the Boring Volcano Field



USGS Photo by Lyn Topinka, May 23, 2003, Rocky Butte from Interstate-205, Portland, Oregon

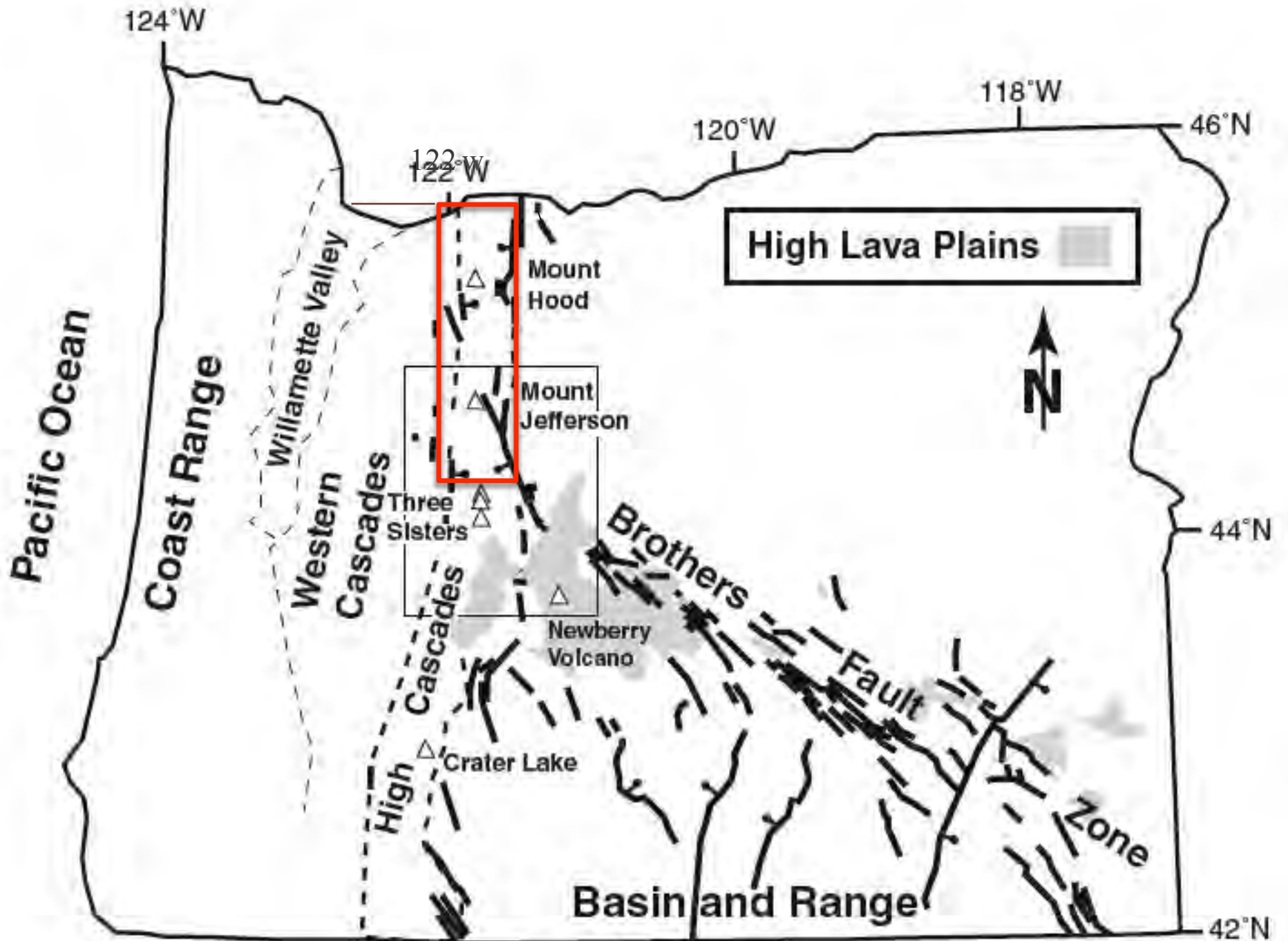


Beacon Rock, volcanic plug, Columbia River Gorge



Hood River Valley

Lava flow
?Boring Volcano
?Mt Hood Volcano



Medicine Lake Shield Volcano

Cinder Cones



Ball Butte Cinder cone, Sisters Wilderness Area

Lava Butte, cinder cone south of Bend, OR





Cascade Composite Volcanoes





South Face, composite volcano Mt Rainier



Mt St Helens October 1980. NB mud flows (X), Ape Cave Bst (A)



Basalt flow Mt St Helens-log cast



Basalt flow south flank Mt St Helens



Mt St Helens 2003-Southeast side-Shoestring glacier



Shoestring glacier mudflow



Shoestring glacier mudflow



West Side Mt Hood: Sandy River Glacier and valley



Sandy River Glacier Volcano, buried by Mt Hood



Andesite flow, Illumination rock, Mt Hood

Illumination Rock

Illumination Saddle

Castle Crags



Illumination Saddle

Castle Crags



Illumination Rock



Crater Rock



Steel Cliffs



Mt Hood Summit from south side



Mt Hood from north side



Mt Hood Summit from north side



Mt Hood Summit from north side



Mt Hood Summit from west side



Mt Hood Summit from west side



Mt Hood Summit from west side



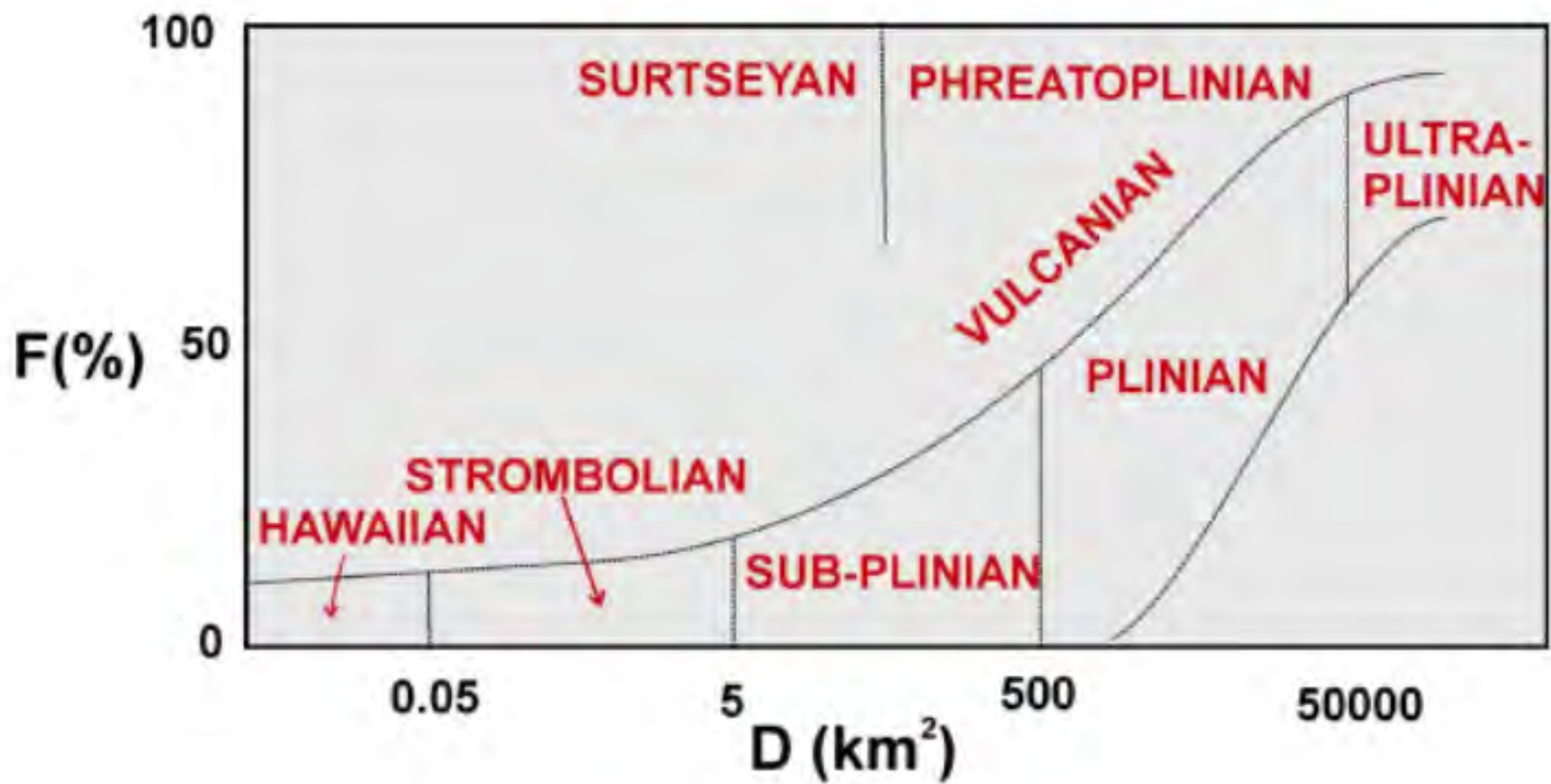


Andesite flow, Timberline Road, Mt Hood

Mt Hood South Side one kilometer above Timberline Lodge. View to southwest.



Note material in foreground



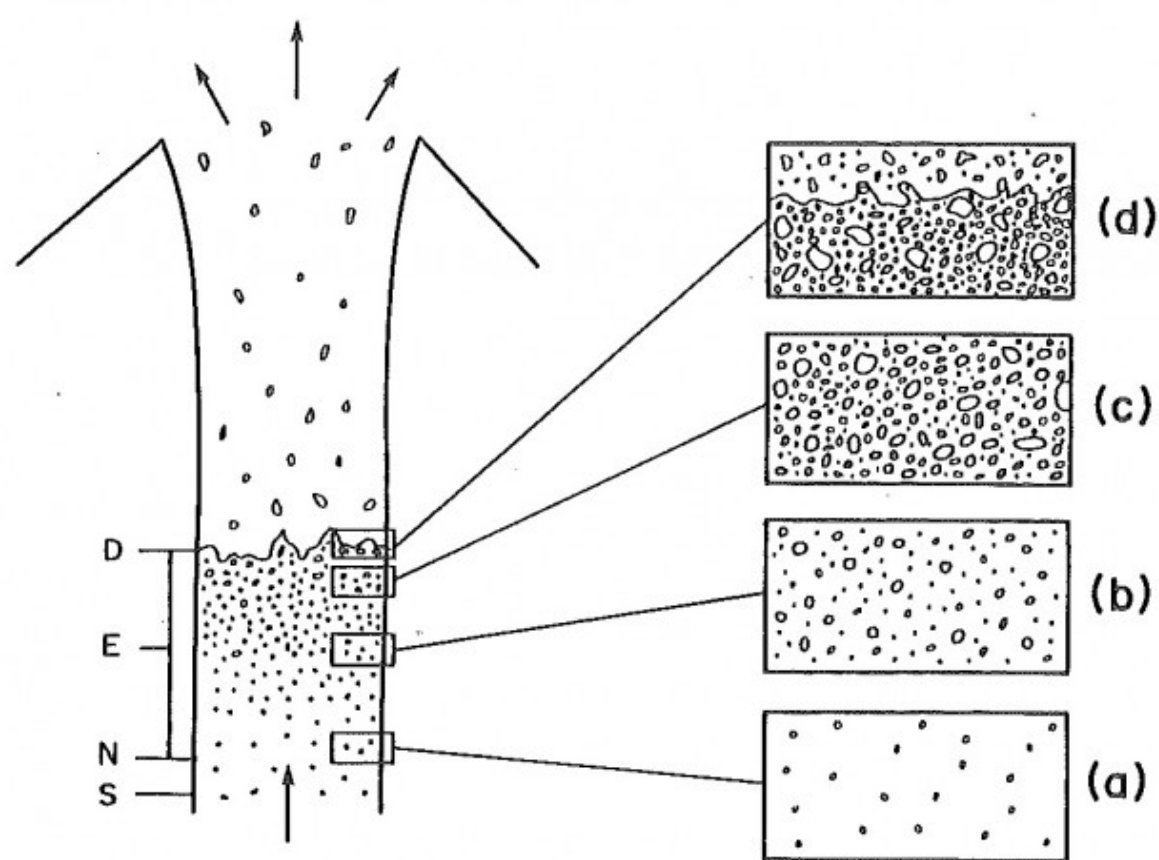


Figure 3.4 Gas bubble nucleation, growth and disruption sequence in a magma column in an open vent. S is the level of gas saturation, N is the level of bubble nucleation, E is the interval of bubble growth and exsolution, D is the level of magma disruption. Degrees of progressive exsolution and bubble growth stages are represented schematically in (a)–(d): (a) at early stages nucleation occurs and bubbles grow uninhibited; (b) growth continues and new nuclei are created; the larger bubbles begin to interfere with one another's growth; (c) the magma froth is saturated with bubbles and growth rates are retarded and eventually cease; (d) the fragmentation surface engulfs the froth and propagates down by the bursting of bubbles. (After Sparks 1978a.)

Pyroclastic flows: nuées ardentes

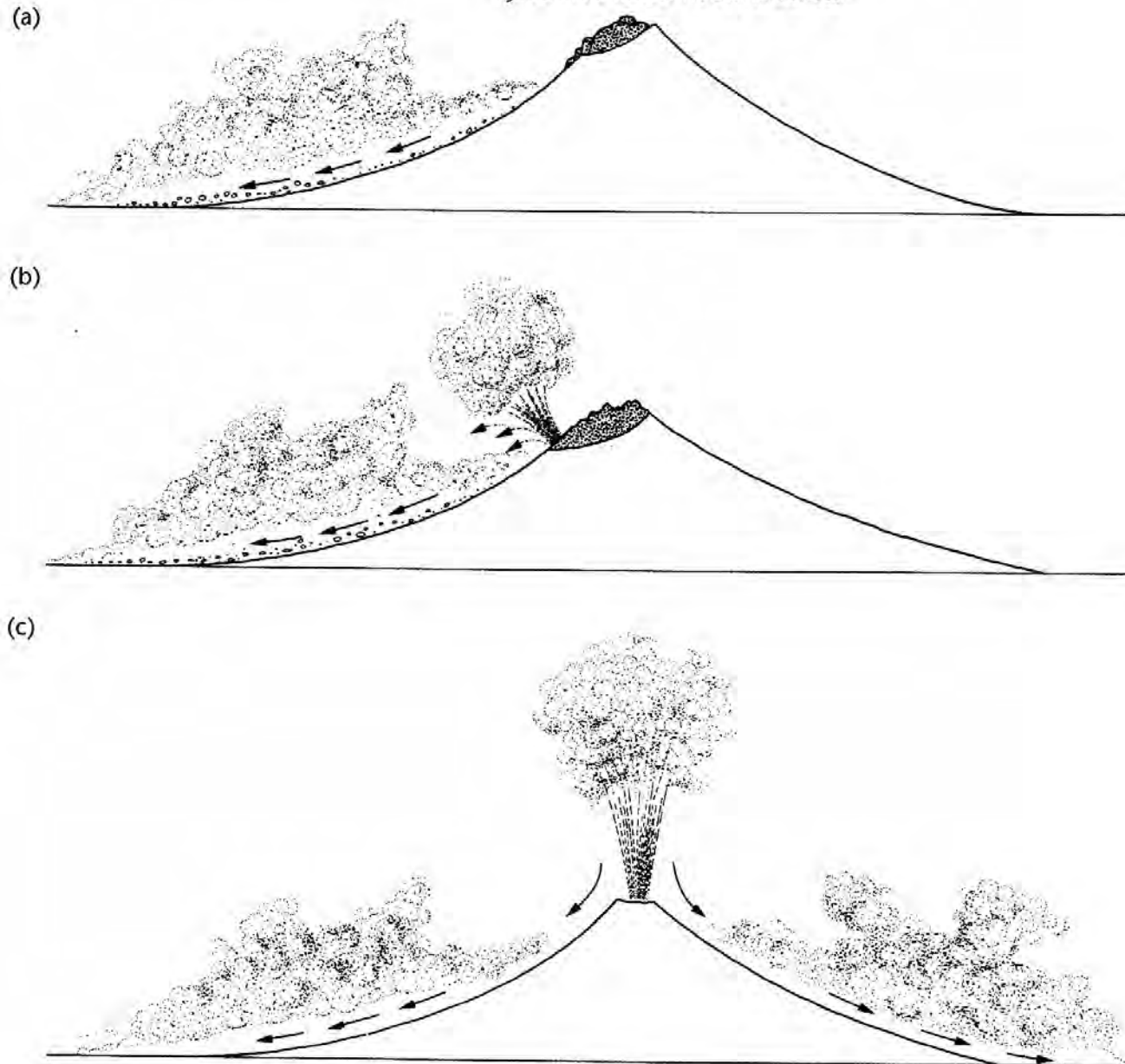


Fig. 9.7 Three common mechanisms for generating PDCs. (a) Simple gravitational collapse of a growing lava dome or flow on a volcano (merapi type). (b) Explosive disruption of growing lava dome (peléean type). (c) Collapse from eruption column (soufrière type).

Mt Hood
South Side
White River Canyon

NB tree stumps





Mudflow

Pyroclastic flow

White River Canyon, Mt Hood

Mudflows



Old Maid Flat, south flank, Mt Hood



Sandy River Delta-? Distant portion of Mt Hood?

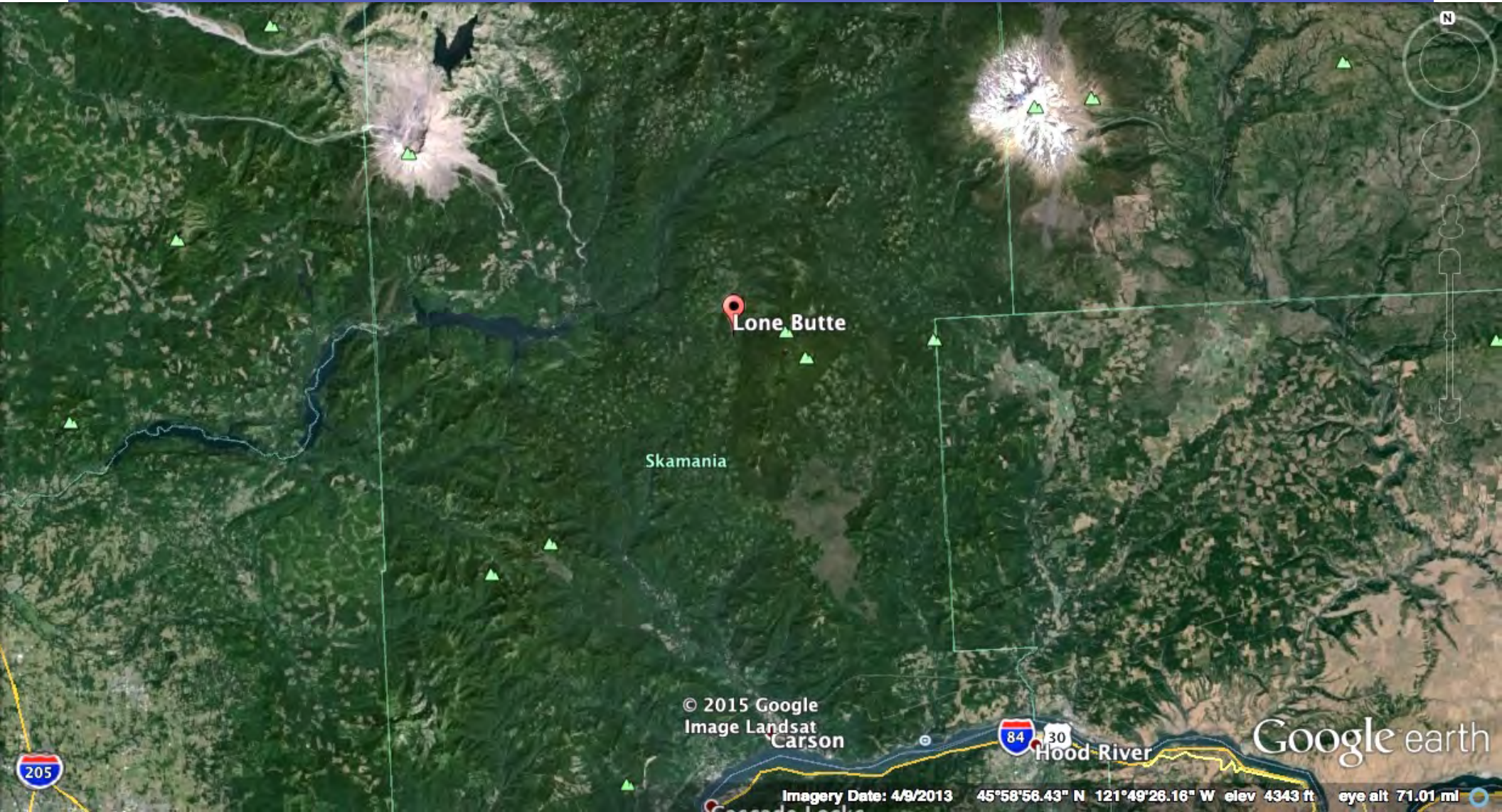
Sub-Glacial Eruptions



Gjalp, Iceland, 1996

http://www.swisseduc.ch/glaciers/earth_icy_planet/icons-09/08.jpg

Lone Butte , Skamania County, Washington





Lone Butte, Washington Cascades



Lone Butte-bedded hyoclastic debris



Lone Butte-lava tube



Lone Butte-lava and bedded hyaloclastic debris: sub-glacial

Three Sisters Wilderness Area



North Sister

Middle Sister

South Sister

Broken Top

Google earth

Imagery Date: 7/6/2014 44°06'40.15" N 121°44'58.36" W elev 7798 ft eye alt 19.73 mi



Google earth

Imagery Date: 7/7/2013 44°04'15.42" N 121°45'53.43" W elev 6728 ft eye alt 52443 ft

South Sister



South Sister, southwest face



Devil's Lake obsidian flow, above Sparks Lake, Sisters Wilderness



Rock Mesa dacite flow, South Sister, west side



Broken Top, Sisters Wilderness



Broken Top summit area