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Glossary of Volcano and Related Terminology

Aa:

- Aa (pronounced "ah-ah" - a Hawaiian term), is lava that has a rough, jagged, spiny, and generally clinkery surface In thick aa flows, the rubbly surface of loose clinkers and blocks hides a massive, relatively dense interior. *(Tilling, Heliker, and Wright, 1987)*

Active volcano:

- A volcano that is currently erupting, or has erupted during recorded history. *(Teacher's Packet)*
- A volcano that is erupting. Also, a volcano that is not presently erupting but that has erupted within historical time and is considered likely to do so in the future (there is no distinction between "active" and "dormant" in this sense). *(Foxworthy and Hill, 1982)*

Aerosol:

- Fine liquid or solid particles suspended in the atmosphere. Aerosols resulting from volcanic eruptions are tiny droplets of sulfuric acid -- sulfur dioxide that has picked up oxygen and water. *(Teacher's Packet)*

Airfall:

- Ash falling from an eruption column or ashcloud. *(Miller, 1989)*
- Volcanic ash that has fallen through the air from an eruption cloud. A deposit so formed is usually well sorted and layered. *(Foxworthy and Hill, 1982)*
- Also called: **ashfall**.

Andesite:

- A medium-colored dark gray volcanic rock containing 53-63 percent silica with a moderate viscosity when in a molten state. Intermediate in color, composition, and eruptive character between basalt and dacite.

Ash (volcanic):

- Fragments less than 2 millimeters (about 1/8 inch) in diameter of lava or rock blasted into the air by volcanic explosions. *(Teacher's Packet)*
- Fragments of lava or rock smaller than 2 millimeters in size that are blasted into the air by volcanic explosions. *(Miller, 1989)*
- Fine pyroclastic material in fragments less than 4.0 millimeters in diameter. "Ash" in this sense is quite distinct from the ash produced by common combustion because the rocks do not catch fire and burn during a volcanic event. *(Foxworthy and Hill, 1982)*

Ash cloud:

- The fine material that is generated by a pyroclastic flow and rises above it. *(Gardner, et.al., 1995)*
- Cloud of ash formed by volcanic explosions or derived from a pyroclastic flow. *(Miller, 1989)*.

Ashfall:

- See: **Airfall**.

Ash flow:

- A pyroclastic flow consisting predominantly of ash-sized (less than 4 millimeters in diameter) particles. Also called a glowing avalanche if it is of very high temperature. *(Foxworthy and Hill, 1982)*

Atmospheric shock wave:

- Strong compressive atmospheric wave driven by volcanic ejecta.

Avalanche:

- A large mass of material or mixtures of material falling or sliding rapidly under the force of gravity. Avalanches often are classified by their content, such as snow, ice, soil, or rock avalanches. A mixture of these materials is a debris avalanche. *(Foxworthy and Hill, 1982)*
- See also: **Debris avalanche**

Ballistic fragment:

- An explosively ejected rock fragment that follows a ballistic trajectory.

Basalt:

- Dark-colored, low-silica (less than 53 percent SiO2), low viscosity volcanic rock that is relatively fluid when molten; eruptions of basalt are generally nonexplosive and tend to produce relatively long thin lava flows like those common in Hawaii.
- A fine-grained, dark-colored, extrusive igneous rock that forms by the crystallization of lava flows. *(Plank and Schenck, 1998)*

Base surge:

- Turbulent, low-density cloud of rock debris and water and (or) steam that moves over the ground surface at high speed. Base surges are generated by explosions. *(Miller, 1989)*

Black Sand Beach:

- The famous "black sand" beaches of Hawaii were created virtually instantaneously by the violent interaction between hot lava and sea water. *(Tilling, 1985)*

Blocks:

- **Tephra** is the general term now used by volcanologists for airborne volcanic ejecta of any size. Historically, however, various terms have been used to describe ejecta of different sizes. ... Fragments larger than about 2.5 inches are called **blocks** if they were ejected in a solid state and **volcanic bombs** if ejected in semi-solid, or plastic, condition. *(Tilling, Heliker, and Wright, 1987)*
- Fragments of lava or rock larger than 64 millimeters in size that are blasted into the air by volcanic explosions. *(Miller, 1989)*

- See: **Tephra**.

Blowdown:
- Trees felled by a volcanic blast.

Bombs:
- **Tephra** is the general term now used by volcanologists for airborne volcanic ejecta of any size. Historically, however, various terms have been used to describe ejecta of different sizes. ... Fragments larger than about 2.5 inches are called **blocks** if they were ejected in a solid state and **volcanic bombs** if ejected in semi-solid, or plastic, condition. ... Volcanic bombs undergo widely varying degrees of aerodynamic shaping, depending on their fluidity, during the flight through the atmosphere. Based on their shapes after they hit the ground, bombs are variously described, in graphic terms, as "spindle or fusiform,", "ribbon", "bread-crust", or "cow-dung". *(Tilling, Heliker, and Wright, 1987)*
- See: **Tephra**.

Bread-crust bombs:
- See: **Bombs**.

Caldera:
- A large volcanic collapse depression, commonly circular or elliptical when seen from above.

Cenozoic:
- An era of geologic time from the beginning of the Tertiary period, spanning the time between 66 million years ago to the present. The Cenozoic contains the Tertiary (66-2) and the Quaternary (2-present) periods.

Cinders:
- Cinders are lava fragments about 1 centimeter (about 1/2 inch) in diameter. *(Teacher's Packet)*

Cinder cone:
- A steep-sided volcano formed by the explosive eruption of cinders that form around a vent. *(Teacher's Packet)*
- A small conical-shaped volcano formed by the accumulation of ejected cinders and other volcanic debris that falls back to Earth close to the vent area. *(Gardner, et.al., 1995)*

Composite volcano:
- A steep-sided volcano built by lava flows and tephra deposits. *(Teacher's Packet)*
- A steep-sided volcano composed of many layers of volcanic rocks, usually of high-viscosity lava and fragmented debris such as lahar and pyroclastic deposits. *(Brantley, 1994)*
- Composite volcanoes erupt episodically over tens to hundreds of thousand of years and can display a wide range of eruption styles. See also **Monogenetic volcanoes**. *(Walder, et.al., 1999)*
- Also called: **Stratovolcano**

Conduit (volcanic):
- A subterranean passage through which magma reaches the surface during volcanic

activity.

"Continental" Volcanoes:

- In the typical "continental" environment, volcanoes are located in unstable, mountainous belts that have thick roots of granite or granitelike rock. Magmas, generated near the base of the mountain root, rise slowly or intermittently along fractures in the crust. During passage through the granite layer, magmas are commonly modified or changed in composition and erupt on the surface to form volcanoes constructed of nonbasaltic rocks. *(Tilling, 1985)*

Contour lines:

- Parallel lines used on topographic maps to show the shape and elevation of the land. They connect points of equal elevations. *(Teacher's Packet)*

Crater:

- The circular depression containing a volcanic vent. *(Teacher's Packet)*
- A steep-sided, usually circular depression formed by either explosion or collapse at a volcanic vent.

Crust:

- The Earth's outermost layer. *(Teacher's Packet)*

Dacite:

- Typically light-colored, fairly silica-rich (63 to 68 percent SiO2) volcanic rock with a high viscosity when in a molten state; eruptions are commonly explosive (e.g., Mount St. Helens' eruption of May 18, 1980) and may produce voluminous tephra, pyroclastic flows, and lava domes.

Debris avalanche:

- A rapid and unusually sudden sliding or flowage of unsorted masses of rock and other material. As applied to the major avalanche involved in the eruption of Mount St. Helens (1980), a rapid mass movement that included fragmented cold and hot volcanic rock, water, snow, glacier ice, trees, and some hot pyroclastic material Most of the May 18 deposits in the upper valley of the North Fork Toutle River and in the vicinity of Spirit Lake are from the debris avalanche. *(Foxworthy and Hill, 1982)*
- The very rapid and usually sudden sliding and flowage of an unsorted mixture of soil and weathered (altered) rock *(Gardner, et.al., 1995)*
- Moves away from a volcano at high speed.

Debris flow:

- A flowing mixture of water and rock debris, sometimes referred to as a **lahar** (originating at a volcano) or **mudflow**. *(Gardner, et al., 1995)*
- See also: **Lahar**.

Density Current:

- A gravity-induced flow of one current through, over, or under another fluid media, owing to density differences. Factors affecting density differences include temperature, salinity, and concentration of suspended particles. *(AGI Glossary of Geology)*

Deposit:

- Earth material that has accumulated by some natural process. For example, a flowing **mixture of water and rock debris is called a debris flow, but when the flow ceases to**

move, a layer of fine and coarse rock is left which is called a debris-flow deposit. *(Gardner, et.al., 1995)*

Diatreme:

- A general term for a volcanic vent or pipe drilled through enclosing rocks (usually flat-lying sedimentary rocks) by the explosive energy of gas-charged magmas. The diamond-bearing kimberlite pipes of South Africa are diatremes. *(Dict.Geological Terms, 1962)*

Dike:

- A tabular igneous body that cuts across the planar structures of the surrounding rocks.

Diorite:

- A coarse, uniformly grained rock composed of a feldspar and less than 50% amphibole or pyroxene. A quartz diorite has the composition of a diorite plus quartz and biotite, whereas a granodiorite has the composition of a diorite plus quartz and two feldspars. An intrusive igneous rock. *(Plank and Schenck, 1998)*

Directed blast:

- A hot, low-density mixture of rock debris, ash, and gases that moves at high speed along the ground surface. Directed blasts are generated by explosions. *(Miller, 1989)*

Dome:

- A steep-sided mount that forms when very viscous lava is extruded from a volcanic vent. *(Teacher's Packet)*
- A steep-sided mound that forms when viscous lava piles up near a volcanic vent. Domes are formed by andesite, dacite, and rhyolite lavas. *(Brantley, 1994)*
- A steep-sided mass of viscous (doughy) lava extruded from a volcanic vent, often circular in plan view and spiny, rounded, or flat on top. Its surface is often rough and blocky as a result of fragmentation of the cooler, outer crust during growth of the dome. *(Foxworthy and Hill, 1982)*
- Also called **Lava dome**.

Dormant volcano:

- An active volcano that is in repose (quiescence) but is expected to erupt in the future. *(Teacher's Packet)*
- A volcano that is not presently erupting but that is considered likely to erupt in the future. *(Foxworthy and Hill)*

Earthquake:

- The abrupt shaking of the ground caused by an abrupt shift of rock along a fracture in the Earth.

Ejecta:

- Material that is thrown out by a volcano, including pyroclastic material (tephra) and, from some volcanoes, lava bombs. *(Foxworthy and Hill, 1982)*

Eocene:

- An epoch of the Tertiary period, spanning the time between 58 and 37 million years ago.

Extinct volcano:

- **A volcano that is not expected to erupt again. (Teacher´s Packet)**

- A volcano that is not presently erupting and is not likely to do so for a very long time in the future. *(Foxworthy and Hill, 1982)*

Fumarole:

- A vent that releases volcanic gases, including water vapor (steam). *(Gardner, et.al., 1995)*
- An opening at the Earth's surface from which water vapor and other gases are emitted, often at high temperature. *(Foxworthy and Hill, 1982)*
- An vent or opening in the ground from which hot water vapor (steam) and (or) volcanic gases are emitted.

Fumarolic activity

- Volcanic gas emissions, that may be accompanied by a change in the temperature of the gases or fluids emitted. *(Gardner, et.al., 1995)*

Gabbro:

- A coarse-grained rock composed of greenish-white feldspar (mostly plagioclase) and pyroxene. Gabbro is usually very dark in color. It is the intrusive equivalent of basalt. An intrusive igneous rock. *(Plank and Schenck, 1998)*

Geologic Time Scale -- *to: Geologic Time Scale*

Glaciers: -- *to· Glossary of Glacier Terminology*

Glacier outburst flood:

- A sudden release of melt water from a glacier or glacier-dammed lake sometimes resulting in a catastrophic flood, formed by melting of a channel or by subglacial volcanic activity. *(Gardner, et.al., 1995)*

Graben:

- An elongate crustal block that is relatively depressed (downdropped) between two fault systems. *(Foxworthy and Hill, 1982)*

Granite:

- Igneous rocks are formed from melted rock that has cooled and solidified. When rocks are buried deep within the Earth, they melt because of the high pressure and temperature; the molten rock (called magma) can then flow upward or even be erupted from a volcano onto the Earth's surface. When magma cools slowly, usually at depths of thousands of feet, crystals grow from the molten liquid, and a coarse-grained rock forms. When magma cools rapidly, usually at or near the Earth's surface, the crystals are extremely small, and a fine-grained rock results. A wide variety of rocks are formed by different cooling rates and different chemical compositions of the original magma. Obsidian (volcanic glass), granite, basalt, and andesite porphyry are four of the many types of igneous rock. *(Barker, 1997)*
- A coarse-grained, light-colored rock composed of quartz and two feldspars (plagioclase and orthoclase), with lesser amounts of mica or amphibole. An intrusive igneous rock. *(Plank and Schenck, 1998)*

Harmonic Tremor:

- Continuous rhythmic earthquakes in the Earth's upper lithosphere that can be detected by seismographs. Harmonic tremors often precede or accompany volcanic eruptions. *(Teacher's Packet)*
- **A continuos release of seismic energy typically associated with the underground**

movement of magma. It contrasts distinctly with the sudden release and rapid decrease of seismic energy associated with the more common type of earthquake caused by slippage along a fault. *(Foxworthy and Hill, 1982)*

Hawaiian eruption:

- "Hawaiian" eruptions may occur along fissures or fractures that serve as linear vents, such as during the eruption of Mauna Loa Volcano in Hawaii in 1950, or they may occur at a central vent such as during the 1959 eruption in Kilauea Iki Crater of Kilauea Volcano, Hawaii. In fissure-type eruptions, molten, incandescent lava spurts from a fissure on the volcano's rift zone and feeds lava streams that flow downslope. In central-vent eruptions, a fountain of fiery lava spurts to a height of several hundred feet or more. Such lava may collect in old pit craters to form lava lakes, or form cones, or feed radiating flows. *(Tilling, 1985)*

Holocene:

- An epoch of the Quaternary period, spanning from 8,000 years ago until the present.

Hot Spot:

- An area in the middle of a lithospheric plate where magma rises from the mantle and erupts at the Earth's surface. Volcanoes sometimes occur above a hot spot. *(Teacher's Packet)*

Hummocky ground:

- A ground surface that has lots of small hills and swales; uneven ground. *(Gardner, et.al., 1995)*

Hydrothermal:

- Pertains to hot water or the action of heated water, often considered heated by magma or in association with magma. *(Gardner, et.al., 1995)*

Hydrothermal alteration:

- Alteration of rocks or minerals by the reaction of hot water (and other fluids) with pre-existing rocks. The hot water is generally heated groundwater and dissolved minerals. *(Gardner, et.al., 1995)*

Igneous:

- Solidified from a magma; also applied to processes related to the formation of igneous rocks.

Igneous rocks:

- Igneous rocks are formed from melted rock that has cooled and solidified. When rocks are buried deep within the Earth, they melt because of the high pressure and temperature; the molten rock (called magma) can then flow upward or even be erupted from a volcano onto the Earth's surface. When magma cools slowly, usually at depths of thousands of feet, crystals grow from the molten liquid, and a coarse-grained rock forms. When magma cools rapidly, usually at or near the Earth's surface, the crystals are extremely small, and a fine-grained rock results. A wide variety of rocks are formed by different cooling rates and different chemical compositions of the original magma. Obsidian (volcanic glass), granite, basalt, and andesite porphyry are four of the many types of igneous rock. *(Barker, 1997)*

"Island Arc" Volcanoes:

- **In a typical " environment, volcanoes lie along the crest of an arcuate,**

crustal ridge bounded on its convex side by a deep oceanic trench. The granite or granitelike layer of the continental crust extends beneath the ridge to the vicinity of the trench. Basaltic magmas, generated in the mantle beneath the ridge, rise along fractures through the granitic layer. These magmas commonly will be modified or changed in composition during passage through the granitic layer and erupt on the surface to form volcanoes built largely of nonbasaltic rocks. *(Tilling, 1985)*

Jökulhlaup:
- Icelandic term for **Glacial outburst floods**

K-Ar dating:
- Determination of ;the age of a mineral or rock in years based on the known radioactive decay rate of potassium-40 to argon-40

Lahar:
- A flowing mixture of water-saturated rock debris that forms on the slopes of a volcano, and moves downslope under the force of gravity, sometimes referred to as **debris flow** or **mudflow**. The term comes from Indonesia.

Lahar-runout flow:
- Hyperconcentrated streamflow transitional in sediment concentration between a lahar and normal streamflow.

Lapilli:
- Fragments of lava or rock between 2 and 64 millimeters in size that are blasted into the air by volcanic explosions. *(Miller, 1989)*

Lateral blast:
- A sideways-directed explosion from the side or summit of a volcano. *(Teacher's Packet)*
- An explosive event in which energy is directed horizontally instead of vertically as in an eruption column. *(Gardner, et.al., 1995)*

Lava:
- The term used for magma once it has erupted onto the Earth's surface. *(Teacher's Packet)*
- Molten rock that erupts from a vent or fissure. *(Gardner, et.al., 1995)*
- See also: **Magma**

Lava dome:
- See: **Dome**.

Lava flow:
- Stream of molten rock that erupts relatively nonexplosively from a volcano and moves slowly downslope. *(Miller, 1989)*
- An outpouring of lava onto the land surface from a vent or fissure. Also, a solidified tonguelike or sheetlike body formed by outpouring lava. *(Foxworthy and Hill, 1982)*

Lava lake:
- Another common lava product is the *ponded flow* or *lava lake*. The surface of lava that is ponded is smooth, broken only by polygonal cooling cracks, formed in much the same way as shrinkage cracks in mud that has been dried by the sun. ... The

formation of the lava lake's solid crust by cooling can be compared to the formation of a sheet of ice on top of a body of water during a winter freeze. *(Tilling, Heliker, and Wright, 1987)*

Lava tube:

- During long-lived eruptions, lava flows tend to become "channeled" into a few main streams. Overflows of lava from these streams solidify quickly and plaster on to the channel walls, building natural *levees* or *ramparts* that allow the level of the lava to be raised. Lava streams that flow steadily in a confined channel for many hours to days may develop a solid crust or roof and thus change gradually into streams within lava tubes Because the walls and roofs of such tubes are good thermal insulators, lava flowing through them can remain hot and fluid much longer than surface flows. Tube-fed lava can be transported for great distances from the eruption sites. *(Tilling, Heliker, and Wright, 1987)*

Lithic (volcanic):

- Pertains to pyroclastic deposits that contain abundant fragments of previously-formed rocks and/or dense fragments.

Lithospheric Plates:

- A series of rigid slabs (16 major ones at present) that make up the Earth's outer shell These plates float on top of a softer, more plastic layer in the Earth's mantle. *(Teacher's Packet)*
- Also called: **Tectonic Plates**.

Loess:

- A well-sorted deposit of windblown silt-sized particles that forms a blanket over the landscape.

Maars:

- Also called "tuff cones", maars are shallow, flat-floored craters formed above diatremes as a result of a violent expansion of magmatic gas or steam. Maars range in size from 200 to 6,500 feet across and from 30 to 650 feet deep, and most are commonly filled with water to form natural lakes.

Mafic:

- Term used to describe volcanic rock or magma composed chiefly of dark-colored, iron- and magnesium-rich minerals. *(Miller, 1989)*

Mafic volcano:

- Mafic volcanoes typically erupt for brief time intervals (weeks to perhaps centuries), but some can grow almost as large as composite volcanoes. Subsequent eruptions in the region typically issue from new vents and, over tens to hundreds of thousands of years, build broad fields of many volcanoes. *(Scott, et.al., 2001)*

Magma:

- Molten rock containing liquids, crystals, and dissolved gases that forms within the upper part of the Earth's mantle and crust. When erupted onto the Earth's surface, it is called **lava**. *(Teacher's Packet)*
- Molten rock that contains dissolved gas and minerals. When magma reaches the surface it is called **lava**. *(Gardner, et.al., 1995)*

Magnetic polarity:

- Direction of magnetic poles (either normal or reversed) preserved in igneous rocks after they cool through their Curie temperatures.

Magnitude:
- A numerical expression of the amount of energy released by an earthquake, determined by measuring earthquake waves on standardized recording instruments (seismographs) The number scale for magnitudes is logarithmic rather than arithmetic; therefore, deflections on a seismograph for a magnitude 5 earthquake, for example, are 10 times greater than those for a magnitude 4 earthquake, 100 times greater than for a magnitude 3 earthquake, and so on. *(Foxworthy and Hill, 1982)*

Mantle:
- A zone in the Earth's interior between the crust and the core that is 2,900 kilometers (1,740 miles) thick. (The lithosphere is composed of the topmost 65-70 kilometers (39-42 miles) of mantle and the crust). *(Teacher's Packet)*

Mesozoic:
- The era of geologic time between the Paleozoic and the Cenozoic, spanning the time between 250 and 66 million years ago The Mesozoic is dividing into the Triassic (250-205), Jurassic (205-135), and Cretaceous (135-66) periods.

Metamorphic rocks:
- Sometimes sedimentary and igneous rocks are subject to pressures so intense or heat so high that they are completely changed. They become metamorphic rocks, which form while buried within the Earth's crust. The process of metamorphism does not melt the rocks, but instead transforms them into denser, more compact rocks. *(Barker, 1997)*

Miocene:
- An epoch of the Tertiary period, spanning the time between 24 and 5 million years ago.

Monogenetic volcano:
- Monogenetic volcanoes typically erupt for only brief time intervals -- weeks to perhaps centuries -- and generally display a narrower range *(as compared to **composite volcanoes**)* in eruptive behavior. Most monogenetic volcanoes are basaltic in composition. *(Walder, et.al., 1999)*

Mudflow:
- The flowing mixture of water and debris (intermediate between a volcanic avalanche and a water flood) that forms on the slopes of a volcano. Sometimes called a **debris flow** or **lahar**, a term from Indonesia where volcanic mudflows are a major hazard *(Teacher's Packet)*
- A flowage of water-saturated earth material possessing a high degree of fluidity during movement. A less-saturated flowing mass is often called a **debris flow**. A mudflow originating on the flank of a volcano is properly called a **lahar**. *(Foxworthy and Hill, 1982)*
- See. **Lahar**.

Nuees Ardente: See: **Pyroclastic Flow**.
See: **Pelean eruption**.

"Oceanic" Volcanoes:

- In a typical "oceanic" environment, volcanoes are alined along the crest of a broad ridge that marks an active fracture system in the oceanic crust. Basaltic magmas, generated in the upper mantle beneath the ridge, rise along fractures through the basaltic layer. Because the granitic crustal layer is absent, the magmas are not appreciably modified or changed in composition and they erupt on the surface to form basaltic volcanoes. *(Tilling, 1985)*

Oligocene:

- An epoch of the Tertiary period, spanning the time between 37 and 24 million years ago.

Pahoehoe:

- Pahoehoe (pronounced "pah-hoy-hoy" - a Hawaiian term), is lava that in solidified form is characterized by a smooth, billowy, or ropy surface. *(Tilling, Heliker, and Wright, 1987)*

Paleocene:

- An epoch of the Tertiary period, spanning the time between 66 and 58 million years ago.

Paleozoic:

- An era of geologic time, from the beginning of the Precambrian to the beginning of the Mesozoic, spanning the time between 570 and 250 million years ago. The Paleozoic era contains the Cambrian (570-500), Ordovician (500-425), Silurian (425-400), Devonian (400-365), Mississippian (365-310), Pennsylvanian (310-290), and Permian (290-270) periods.

Pegmatite:

- An igneous rock with very large (usually > one inch), well-formed crystals. A granitic pegmatite has the mineralogy of a granite and abnormally large grains, whereas a gabbroic pegmatite has the mineralogy of a gabbro and very large grains An intrusive igneous rock. *(Plank and Schenck, 1998)*

Pelean eruption:

- In a "Pelean" or **"Nuee Ardent"** (glowing cloud) eruption, such as occurred on the Mayan Volcano in the Philippines in 1968, a large quantity of gas, dust, ash, and incandescent lava fragments are blown out of a central crater, fall back, and form tongue-like, glowing avalanches that move down-slope at velocities as great as 100 miles per hour. Such eruptive activity can cause great destruction and loss of life if it occurs in populated areas, as demonstrated by the devastation of St Pierre during the 1902 eruption of Mount Pelee on Martinique, West Indies. *(Tilling, 1985)*

Phreatic eruption:

- An explosion of steam, water, mud, and other material. May result from heating of groundwater by magma, and may generate base surges. *(Miller, 1989)*
- A type of volcanic explosion that occurs when water comes in contact with hot rocks or ash near a volcanic vent, causing steam explosions. *(Brantley, 1994)*
- An explosive volcanic eruption caused when water and heated volcanic rocks interact to produce a violent expulsion of steam and pulverized rocks. Magma is not involved. *(Foxworthy and Hill, 1982)*
- **The eruption of Taal Volcano in the Philippine Islands in 1965 typifies "Phreatic" (or**

steam-blast) behavior. Here, a great column of steam, dust, ash, and cinders is blasted to a height of several thousand feet. This type of violent eruption is believed to occur when a large quantity of ground or surface water comes in contact with hot rock or magma in a volcanic vent and is instantly and explosively flashed to steam. *(Tilling, 1985)*

Phreatomagmatic eruption:

- An explosion composed of magmatic gases and steam derived from groundwater or surface water, combined with lava and other debris. *(Miller, 1989)*

Pillow Lava:

- Fluid lava erupted or flowing under water may form a special structure called pillow lava. Such structures form when molten lava breaks through the thin walls of underwater tubes, squeezes out like toothpaste, and quickly solidifies as irregular, tongue-like protrusions. This process is repeated countless times, and the resulting protrusions stack one upon another as the lava flow advances underwater. The term *pillow* comes from the observation that these stacked protrusions are sack- or pillow-shaped in cross section. Typically ranging from less than a foot to several feet in diameter, each pillow has a glassy outer skin formed by the rapid cooling of the lava by water. Much pillow lava is erupted under relatively high pressure created by the weight of the overlying water; there is little or no explosive interaction between hot lava and cold water. The bulk of the submarine part of a Hawaiian volcano is composed of pillow lavas. *(Tilling, Heliker, and Wright, 1987)*

Pleistocene:

- An epoch of the Quaternary period, spanning the time between 2 million years ago and the beginning of the Holocene at 8,000 years ago.

Pliocene:

- An epoch of the Tertiary period, spanning the time between 5 and 2 million years ago.

Pluton:

- Pertaining to igneous rock bodies that form at great depth.

Precambrian:

- All geologic time before the Paleozoic era. This includes about 90% of all geologic time and spans the time from the beginning of the earth to 570 million years ago.

Ponded flow:

- See: **Lava lake**

Pumice:

- A light-colored, frothy volcanic rock, usually of dacite or rhyolite composition, formed by the expansion of gas in erupting lava. Commonly perceived as lumps or fragments of pea size and larger but can also occur abundantly as ash-size particles. *(Foxworthy and Hill, 1982)*
- Because of its numerous gas bubbles, pumice commonly floats on water.

Pyroclastic:

- Pertaining to fragmented (clastic) rock material formed by a volcanic explosion or ejection from a volcanic vent. *(Foxworthy and Hill, 1982)*

Pyroclastic flow:

- A hot, fast-moving and high-density mixture of fine and coarse particles and gas formed during explosive eruptions or from the collapse of a lava dome. *(Gardner, et.al., 1995)*
- Lateral flowage of a turbulent mixture of hot gases and unsorted pyroclastic material (volcanic fragments, crystals, ash, pumice, and glass shards) that can move at speed (50 to 100 miles an hour). The term also can refer to the deposit so formed. *(Foxworthy and Hill, 1982)*
- A hot (300-800 degrees C (570-1470 degrees F)), dry, fast-moving (10 to more than 100 meters per second (20 to more than 200 miles per hour)) and high-density mixture of ash, pumice, rock fragments, and gas formed during explosive eruptions or from the collapse of a lava dome. Moves away from a volcano at high speeds.

Pyroclastic surge:

- Similar to a pyroclastic flow but of much lower density (higher gas to rock ratio). *(Gardner, et.al., 1995)*
- Turbulent, low-density cloud of hot rock debris and gases that moves over the ground surface at high speed.

Quaternary:

- Period of geologic time from about 2 million years ago until the present. It contains the Pleistocene (2 million - 8,000) and Holocene (8,000 - present) epochs.

Reticulite:

- During the exceptionally high fountaining episodes of some eruptions, an extremely vesicular, feathery light pumice, called **reticulite** or **thread-lace scoria**, can form and be carried many miles downwind from the high lava fountains. Even though reticulite is the least dense kind of tephra, it does not float on water, because its vesicles are open and interconnected. Consequently, when it falls on water, it becomes easily waterlogged and sinks. *(Tilling, Heliker, and Wright, 1987)*

Rhyolite:

- Volcanic rock (or lava) that characteristically is light in color, contains 69 percent silica or more, and is rich in potassium and sodium. *(Foxworthy and Hill, 1982)*
- Typically a light-colored crystalline or black glassy volcanic rock or magma, containing more than 68 percent silica with a very high viscosity when in a molten state.

Satellite vent:

- A secondary vent of flank vent at a volcanic center.

Scoria:

- Scoria forms when blobs of gas-charged lava are thrown into the air during an eruption and cool in flight, falling as dark volcanic rock containing cavities created by trapped gas bubbles. *(Clynne, et.al., 1998)*

Seismicity:

- Pertaining to earthquakes or earth vibration.

Seismograph:

- A scientific instrument that detects and records vibrations (seismic waves) produced by earthquakes. (Teacher´s Packet)

Shield volcano:

- A volcano that resembles an inverted warrior's shield. It has long gentle slopes produced by multiple eruptions of fluid lava flows. *(Teacher's Packet)*
- A volcano shaped like an inverted warrior's shield with long gentle slopes produced by eruptions of low-viscosity basaltic lava. *(Brantley, 1994)*

Silica:

- The molecule formed of silicon and oxygen (SiO2) that is the basic building block of volcanic rocks and the most important factor controlling the fluidity of magma. The higher a magma's silica content, the greater its viscosity or "stickiness." *(Brantley, 1994)*

Silicic:

- Term used to describe silica-rich volcanic rock or magma. *(Miller, 1989)*

Spreading Ridges:

- Places on the ocean floor where lithospheric plates separate and magma erupts. About 80 percent of the Earth's volcanic activity occurs on the ocean floor. *(Teacher's Packet)*

Stratovolcano:

- See **Composite volcano**.

Strombolian eruption:

- In a "Strombolian"-type eruption observed during the 1965 activity of Irazu Volcano in Costa Rica, huge clots of molten lava burst form the summit crater to form luminous arcs through the sky. Collecting on the flanks of the cone, lava clots combined to stream down the slopes in fiery rivulets *(Tilling, 1985)*

Subduction Zone:

- The place where two lithosphere plates come together, one riding over the other. Most volcanoes on land occur parallel to and inland from the boundary between the two plates. *(Teacher's Packet)*

Tectonic:

- Pertaining to the forces involved in the deformation of the Earth's crust, or the structures or features produced by such deformation.

Tectonic Plates: See: **Lithospheric Plates.**

Tephra:

- Solid material of all sizes explosively ejected from a volcano into the atmosphere. *(Teacher's Packet)*
- **Tephra** is the general term now used by volcanologists for airborne volcanic ejecta of any size. Historically, however, various terms have been used to describe ejecta of different sizes. Fragmental volcanic products between 0.1 to about 2.5 inches in diameter are called **lapilli**; material finer than 0.1 inch is called **ash**. Fragments larger than about 2.5 inches are called **blocks** if they were ejected in a solid state and **volcanic bombs** if ejected in semi-solid, or plastic, condition. *(Tilling, Heliker, and Wright, 1987)*
- See: **Ash, Lapilli, Blocks, Bombs**.

Tertiary:

- Period of geologic time from about 66 million years ago until 2 million years ago. It contains the Paleocene (66-58), Eocene (58-37), Oligocene (37-24), Miocene (24-5), and Pliocene (5-2) epochs.

Thread-lace scoria:

- See: **Reticulite.**

Topographic map:

- A map that uses contour lines to represent the three-dimensional features of a landscape on a two-dimensional surface. *(Teacher's Packet)*

Tremor:

- See: **Harmonic Tremor**

Tuff:

- Used loosely as a collective term for all consolidated pyroclastic rocks.

Tuff Cones:

- See: **Maars.**

Tuya:

- A volcano that erupted under a glacier. *(British Columbia Ministry of Environment, Lands & Parks, 2000)*
- A tuya is a volcano that erupts initially beneath a glacier, melts through the ice, and develops an upper, subaerial part, which commonly consists of a flat-to0ped form capped by a lava flow. *(Hammond, 1987)*

VEI Scale:

- Some scientists recently proposed the Volcanic Explosivity Index (VEI) to attempt to standardize the assignment of the relative size of an explosive eruption, using ejecta volume as well as the other criteria mentioned earlier. The VEI scale ranges from 0 to 8 A VEI of 0 denotes a nonexplosive eruption, regardless of volume of erupted products. Eruptions designated a VEI of 5 or higher are considered "very large" explosive events, which occur worldwide only on an average of about once every 2 decades. The May 1980 eruption of Mount St. Helens rated a VEI of 5, but just barely; its lateral blast was powerful, but its output of magma was rather small The VEI has been determined for more than 5,000 eruptions in the last 10,000 years. None of these eruptions rates the maximum VEI of 8. For example, the eruption of Vesuvius Volcano in A.D. 79, which destroyed Pompeii and Herculaneum, only rates a VEI of 5. Since A.D. 1500, only 22 eruptions with VEI 5 or greater have occurred: one VEI 7 (the 1815 Tambora eruption), four of VEI 6 (including Krakatau in 1883), and seventeen of VEI 5 (counting Mount St. Helens in 1980 and El Chichon, Mexico, in 1982). Considered barely "very large," the eruption of Mount St. Helens in May 1980 was smaller than most other "very large" eruptions within the past 10,000 years and much smaller than the enormous caldera-forming eruptions-which would rate VEI's of 8-that took place earlier than 10,000 years ago. *(Tilling, et.al., 1990)*

Vent:

- The opening at the Earth's surface through which volcanic materials (lava, tephra, and gases) erupt. Vents can be at a volcano's summit or on its slopes; they can be circular (craters) or linear (fissures). (Teacher´s Packet)

- An opening in the Earth's surface through which volcanic materials (magma and gas) escape. *(Gardner, et.al., 1995)*

Vesuvian eruption:
- In a "Vesuvian" eruption, as typified by the eruption of Mount Vesuvius in Italy in A.D.79, great quantities of ash-laden gas are violently discharged to form a cauliflower-shaped cloud high above the volcano. *(Tilling, 1985)*

Viscosity:
- Measure of the fluidity of a substance. Taffy and molasses are very viscous; water has low viscosity. *(Teacher's Packet)*
- Basalt is less viscous than dacite.

Volcano:
- A vent (opening) in the surface of the Earth through which magma erupts; it is also the landform that is constructed by the erupted material. *(Teacher's Packet)*

Volcanic avalanche:
- A large, chaotic mass of soil, rock, and volcanic debris moving swiftly down the slopes of a volcano. Volcanic avalanches can also occur without an eruption as a result of an earthquake; heavy rainfall; or unstable soil, rock, and volcanic debris. *(Teacher's Packet)*
- Also called: **Debris Avalanche**

Volcanic bombs:
- See: **Bombs**.

Volcanic cone or edifice:
- Used to describe the uppermost slopes and summit area of a volcano. *(Gardner, et.al., 1995)*

Volcanic fields:

Volcanic landslide:
- The downslope movement of soil, rock debris, and sometimes glacial ice, with or without water, from the flank of a volcano. *(Brantley, 1994)*
- See: **Debris Avalanche**.

Vulcanian eruption:
- The eruptive activity of Paricutin Volcano in 1947 demonstrated a "Vulcanian"-type eruption, in which a dense cloud of ash-laden gas explodes from the crater and rises high above the peak. Steaming ash forms a whitish cloud near the upper level of the cone. *(Tilling, 1985)*

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