Types of Volcano: Another View

From Oregon State University's "Volcano World" website:

http://volcano.oregonstate.edu/education/vwlessons/lessons/lesson6.html

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Many people are interested in ways to classify volcanoes. There is probably a natural human instinct to try and give labels to all things. This is not a bad instinct and many times it makes it easier to understand the particular thing that is being classified. For example, you start to identify patterns when you classify things and these patterns may lead to a better understanding of whatever it is you are classifying.

However (and that is a big "however"), when you are classifying natural things (they might be fish, plants, birds, oceans, minerals, volcanoes, or whatever), you MUST remember that the classification scheme is made up by human beings and Nature might decide to not follow the rules exactly. There will ALWAYS be exceptions to your classification scheme and there will ALWAYS be things that fall into more than one category. As long as you realize this and it doesn't bother you, you'll be just fine.

Certainly there are different ways to classify volcanoes and all of them have particular benefits and drawbacks. These include classifying by lava chemistry, tectonic setting, size, eruptive character, geographic location, present activity, and morphology. As an example of how these can get mixed together, note that there are basaltic strato volcanoes (i.e. Mt. Fuji), big basaltic calderas (i.e. Taal), big gradual-sloped basaltic shields (i.e. Mauna Loa) and big steep-sloped basaltic shields (i.e. Fernandina). Additionally, although most volcanoes associated with subduction zones are steep-sided andesite or dacite cones, there are a few basaltic shields along these zones as well (i.e. Masaya, Westdahl, Tolbachik). These examples highlight the above-mentioned hurdle that any student of the Earth needs to get over - Nature makes exceptions to human rules.

Unfortunately, there is one particular volcano classification system that many people think is the ONLY system. Not only is it not the only system, it is not a very good system. This is the famous "3 types of volcanoes" (shield volcanoes, strato [or composite] volcanoes, and cinder cones), and it is found in many textbooks from elementary school to college. Why is this 3-types scheme so bad?

First, it has no place in it for large caldera complexes (such as Yellowstone), flood basalts, monogenetic fields, or mid-ocean spreading centers. These are important types of volcanoes that you would never hear about if you thought there were only 3 types. Second, although you can occasionally find a cinder cone sitting somewhere all by itself, it is way more common for a cinder cone to either be one of many vents on a large (polygenetic) volcano or a member of a monogenetic field. Finally, if you actually think about the system you run into logical problems, as a teacher from Pittsburgh pointedly complained to VolcanoWorld about: She wanted to know how Pu'u 'O'o could be a cinder cone on Kilauea if cinder cones are a type of volcano and Kilauea is a shield volcano. The answer is that Pu'u 'O'o is one of hundreds of vents on Kilauea, and it happens to be a cinder cone.

Who knows what the origin of this 3-volcano system is, but the sad thing is that many people use it without thinking as carefully as the Pittsburgh teacher did. The cinder cone part may come from the fact that some cinder cones have names such as "This Volcano" or "Volcan That" even when they are just vents on a larger volcano. In these cases the cinder cone is probably all that has ever erupted in the collective memory of the local folks. They logically consider it to be "the volcano" and may think of the larger structure that hasn't erupted since they've been around (and may in part be highly eroded or vegetated) to be "just" a mountain.

For most volcanological applications a classification based on morphology is probably the most useful. In their excellent book *Volcanoes of the World*, Tom Simkin and Lee Siebert list 26 morphological "types" of volcanoes. That's certainly thorough but kind of extreme. You can account for probably >90% of all volcanoes with 6 types. Additionally, any system will be more useful if you use modifiers from the other potential classification schemes with the morphological types (i.e. active andesite strato volcano, extinct hotspot shield volcano, etc.).

Volcano World then goes on to recommend this list of volcano types based on their "morphology", a fancy word for "shape":

- **Shield volcanoes** – As in your handouts and textbook.
- **Strato** or **composite volcanoes** – As in your handouts and textbook.
- **Rhyolite caldera complexes** – The most explosive type of volcano, so explosive that they completely destroy themselves (leaving a deep crater) when they erupt even once. The last eruption of this type was in the year 83 AD, but Yellowstone National Park is an example that has not yet erupted, and will someday.
- **Monogenetic fields** – A large area with many small vents, sort of like spreading out a "normal" volcano's eruptions into a bunch of small ones over the whole area.
- **Flood basalts** – Extremely large areas (thousands of square kilometers) of thick lava deposits, whose origin is STILL UNKNOWN and being actively studied.
- **Mid-ocean ridges** – As in your handouts and textbook, but listed here as a "type" of volcano instead of just being a feature of the ocean floor.

Name: _____ Period: _____ Date: _____

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Please answer the following questions with complete sentences. You will not earn full credit for answers that are in fragments.

1) The article talks about the difficulty of classifying things that we find in nature. What advice do they give for people who are studying or using classification schemes?

2) The article lists seven different ways that volcanoes could be classified. What are they?

3) Mt. Fuji is usually classified as a composite cone or "stratovolcano". According to your handouts, what sort of lava normally comes from composite cones? What does the article say is different about Mt. Fuji?

4) What are the author's three objections to the "shield, composite, cinder" scheme?

5) The article mentions a teacher in Pittsburgh as an example – what did the teacher ask about, and what was the answer to her question?

6) How many types of volcano does Volcano World recommend we think about?

7) If you look at their list of types, you'll see that "Cinder Cone" – one of the three "main" types that most books talk about – isn't on there. What does the article itself say about cinder cones that explains this?