April 2013

Issue No 3
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P3A Geology Newsletter

"Are these the end times?
Yes. And they have been this way since the beginning. Welcome to planet Earth, a wonderful but not entirely stable place to live." - Craig Childs

Paphos Third Age (P3A)

http://paphos3rdage.org/

Inside this issue:

Khamsin (Khamseen). From the Arabic word for 'fifty', dust-filled windstorms often blow sporadically over 'fifty' days.

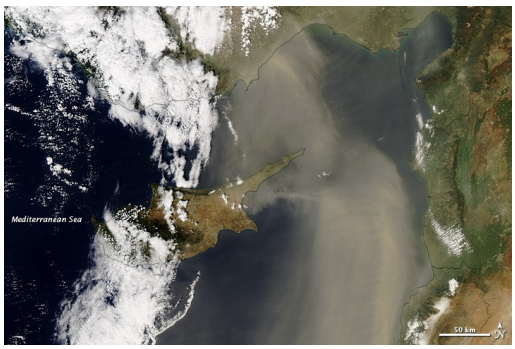
Why '***Coptic'*** Gales? Muslims in Egypt calculate the period of the Khamaseen to commence on the day immediately following the Coptic festival of Easter Sunday, and to terminate on the Day of Pentecost (or Whitsunday); an interval of forty-nine days.

Field Trip Safety

As we head towards the Cyprus summer, it is worthwhile reminding everyone to take the appropriate precautions on field trips. Ensure that as well as the appropriate protective clothing, you have applied sunscreen, have a hat and sufficient water and are well hydrated 'before' the trip starts.

Dust Plumes Over Cyprus

Early April 2013 saw unexpected dust clouds over Cyprus, not forecast by the commonly used ***'Coptic Gales'*** charts.



Thick plumes hovered off the coasts of Libya and Egypt on April 1st, 7th and 8th. They spanned the sea's eastern shoreline, reaching as far north as Turkey. The Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Aqua satellite captured this natural-colour image on April 8th. On April 7th, the plumes were thick enough to completely hide the land and water surfaces along the coasts of Libya and Egypt. Away from the Libyan coast and the fertile Nile Valley, sandy desert spans hundreds of kilometers. The sand provides ample material for dust storms, and the desert's dearth of vegetation leads to substantial daytime heating of the ground surface. This creates instability in the lowest level of the atmosphere, increasing the likelihood that wind will stir dust storms. Such storms often increase in the springtime.

On April 3, news reports from Cyprus carried warnings that sensitive individuals should stay indoors to avoid breathing dust particles.

During the period known as the ***Khamsin (Khamseen)*** season from early- to mid-February until late April, Cyprus receives a few dust storms, blowing in from N. Africa. They are often followed by a cold front which brings rain to settle the dust and sometimes violent thunderstorms.

Air Quality in Cyprus Particularly useful for vulnerable groups of the population with respiratory problems. Warnings issued by the Cyprus Government.

Dust Storm forecast map.

NASA's—Earth Observing System (EOS) Satellite

The Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Aqua satellite, captured the natural-colour image of the dust plume in the above article (Dust Plumes Over Cyprus). Approximately the size of a small school bus, the Aqua satellite carries six instruments that take coincident measurements of the Earth system. Aqua is focused on the multi-disciplinary study of Earth's interrelated processes (atmosphere, oceans, and land surface) and their relationship to changes in the Earth system. Aqua is also making critical contributions to the monitoring of terrestrial and marine ecosystem dy-

Physical Properties of Minerals continued—Lustre (or Luster)

Lustre (or **luster**) is the way light interacts with the surface of a crystal, rock, or mineral. and generally implies radiance, gloss, or brilliance. A range of terms are used to describe lustre, Lustre varies over a wide continuum, so there are no rigid boundaries between the different types of lustre. (For this reason, different sources can often describe the same mineral differently).

Words	Description	Example
dull / earthy	very dull, mainly in minerals that are porous	kaolinite, orthoclase
waxy	like the surface of a candle	opal, chalcedony
greasy / oily	resembles fat or grease to touch	Nepheline
Pearly	like a pearl, play of colors, light	talc, muscovite mica
Silky	has a shiny surface like a piece of silk cloth	some varieties of gypsum, kernite, ulexite & in fibrous minerals
glassy/vitreous	looks like glass	quartz, many rock-forming minerals, obsidian – "nature's glass"
Resinous	looks like freshly-broken shellac, usually yellow-brown	Sphalerite
Adamantine	high luster, almost brilliant, "diamond-like"	Sphalerite
sub-metallic	silvery or metallic luster but mineral is transparent or translucent when in small slivers	Hematite
metallic	very shiny, like processed metals, highly reflective, opaque minerals	pyrite, gold, silver

Lustre: Optical phenomena—**Asterism** is the display of a star-shaped luminous area ; **Aventurescence** (or **aventurization**) is a reflectance effect like that of glitter. **Chatoyant** minerals display luminous bands, which appear to move as the specimen is rotated. **Color change** is most commonly found in Alexandrite, a variety of chrysoberyl gemstones. **Schiller**, from German for "twinkle", is the metallic iridescence originating from below the surface of a stone as seen in moonstone and labradorite.

Triboluminescence

Triboluminescence is a flash of light produced when a material is subjected to friction, impact or breakage. The phenomenon is also known as fractoluminescence and mechanoluminescence.

Triboluminescence is common in minerals. About 50% of crystalline materials are thought to exhibit the property. It is also observed in many noncrystalline materials. The phenomenon of triboluminescence is poorly understood. Some researchers believe that scratching or hitting materials together provides an input of energy that excites electrons within the materials. When the electrons fall from their excited state a flash of light is produced. within the crystal to glow. To observe triboluminescence get two milky quartz pebbles, large enough to easily hold. Take them into a darkened room and wait for a few minutes to allow your eyes to adjust to the darkness. Hold one piece of quartz in each hand. Firmly press an edge of one piece of quartz against the other and while maintaining a firm pressure, quickly drag it across the surface in a motion similar to striking a large match. If you do this properly and if you have pieces of quartz that are triboluminescent you will see a brief flash of light that penetrates deeply into the translucent quartz. Experiment with different speeds, different amounts of pressure and directions of drag to maximize the flash of light. Some specimens will also produce small amounts of light if you bang them together.

The Sliding Rocks of Racetrack Playa

One of the most interesting mysteries of Death Valley National Park is the sliding rocks at Racetrack Playa (a playa is a dry lake bed). These rocks can be found on the floor of the playa with long trails behind them. Somehow these rocks slide across the playa, cutting a furrow in the sediment as they move. Some of these rocks weigh several hundred pounds. No one knows for sure exactly how these rocks move and no-one has ever seen them in motion! Racetrack playa is lake bed that is almost perfectly flat and almost always dry. The surface is covered with mud cracks and the sediment is made up mainly of silt and clay. The climate in this area is arid. It rains just a couple of inches per year and the run-off from the mountains converts the playa floor into a broad shallow lake. When wet, the surface of the playa is transformed into a very soft and very slippery mud. A lack of disturbed mud around the rock trails eliminates the possibility of a human or animal pushing or assisting the motion of the rocks. The favourite explanation is the rocks are moved by a combination of the wind and ice collars formed around the rock. The tracks made by the rocks tend to be parallel to the prevailing wind direction. Algae, which blooms when the surface wets, may further reduce the amount of friction.

Sliding Rocks—Geology.com

Volcanoes continued—What are Magma & Lava

Magma (from Greek μάγμα "mixture") is a mixture of molten or semi-molten rock, volatiles and solids that is found beneath the surface of the Earth. The word **"Lava"** comes from Italian, and is probably derived from the Latin word 'labes' which means a fall or slide.

The difference between magma and lava depends upon location. Magma is the molten material beneath the Earth's crust. It usually collects in a magma chamber beneath a volcano, and can then be injected into cracks in rocks or issue out of volcanoes in eruptions. The temperature of magma ranges between 700 C and 1300 C.

When it reaches the surface and comes out of a volcano during a non-explosive effusive eruption, magma becomes lava. The temperature of lava when it is first ejected from a volcanic vent can vary between 700 and 1,200 degrees C (1,300 to 2,200 F). When it has stopped moving, lava solidifies to form igneous rock.

Whether lava is thick or thin doesn't depend on the temperature of the lava. Instead it's caused by the minerals in the lava. Lava can be classified into three chemical types. The coolest lavas are felsic (or silicic) lavas, which can erupt at temperatures as low as 650-750 C. Most felsic lava flows are extremely viscous, and typically fragment as they extrude. Next are the andesitic (intermediate) lavas, which erupt in the range of 750-950 C. They tend to be less viscous. Greater temperatures tend to destroy polymerized bonds within the magma, promoting more fluid behaviour

ETNA 2011

Basaltic (mafic) lavas typically erupt at temperatures above 950 C. They tend to produce low-profile shield volcanoes or "flood basalt fields", because of the very low viscosity, they can flow as much as 4 km away from the source and have a thickness of 10 meters. Thicker lava flows only get about 1 kilometer away from the source, but can be as thick as 100 meters.

Acknowledgements

Geology.com

Universe Today.com

Wikipedia

NASA

Cyprus Mineral Display

Does anyone already have a comprehensive Cyprus Mineral/rock Collection? If not, is anyone, or a group of people, prepared to put together a display of Cyprus rocks? It would be a good aid for identifying samples and as an introduction for newcomers to the P3A Geology group.

Glossary: *To continue in the next issue*

C

Calcite — Calcium carbonate ($CaCO_3$). It forms a large proportion of limestones.

Cambrian — The period of time between 545 and 495 million years ago. Calcium carbonate (CaCO3). It forms a large proportion of limestones.

Carbonate Minerals — A group of minerals with different chemical compositions, but all containing the carbonate ion CO_3. In Limestone Landscapes, we concentrate on Calcite -$CaCO_3$ with trigonal crystals, aragonite -$CaCO_3$ with orthorhombic crystals, Dolomite $CaMg(CO_3)$.

Carboniferous — A period of time between 290 and 354 million years ago.

Carbonaceous — A rock or sediment that is rich in carbon.

Carbon cycle — The natural cycling of carbon atoms between rocks, vegetation, oceans and the atmosphere.

Carbon sink — A part of the carbon cycling where carbon accumulates such as in calcium carbonate rocks.

Catchment area — The region from which a river receives its water supply. The margin of the area is usually the hill tops that surround it, called the watershed or divide (beyond this water flows away into other river systems).

Cement — The material, usually a very fine-grained mineral growth, which forms after a rock is deposited and bonds the grains of sediment together.

Chalk — A soft limestone formed mainly of coccolith skeletons.

Clay — A sedimentary rock with grains smaller than 0.002 millimeters in diameter and plastic when wet. Its main mineral is hydrated silicates of aluminium. It is often used to manufacture bricks and pottery.

Climate — Average atmospheric conditions of an area. This is controlled by the latitude of the area, which determines how much solar radiation it receives, the distribution of land masses and oceans, the altitude and topography of the area, and the influence of ocean currents. See weather.

Clints — A rectangular block of limestone in a limestone pavement, separated from the neighbouring blocks by fissures (clints).

Coal — A fossil fuel comprising rocks with a large proportion of fossil plant remains that have been altered to carbon.

Coccoliths — Calcareous skeletons of microscopic, single celled, photosynthesising algae called coccolithophores.

Cockpits — A karst feature in hot humid countries comprising small, rounded or conical hills (up to 120 m high), with star-shaped depressions between. They occur in groups of up to 30 per square kilometre.

Combe — A hollow or short valley in the side of limestone uplands or chalk down lands in southern England.

Coral reef — A structure rising from the sea floor composed of the calcareous skeleton of corals.

Corrie — A large, semi-circular hollow in the side of a mountain that was eroded by the action of snow and ice. Corries are found in areas where glaciers once formed. In Wales this type of hollow is called a 'cwm' but the French name 'cirque' is used by some people.

Crag — In the sense used in limestone landscapes, a cliff of limestone on the side of a hill or steep valley.

Cretaceous — The period of time about 65 and 142 million years ago.

Crust — The outermost solid layer of the Earth up to about 70 km thick. There are two types: continental crust (which is older and thicker) and oceanic crust (which is younger and much thinner).

Cwm — see 'corrie'.