May 2015

Issue No 8

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P3A Geology Newsletter

Subduction Leads To Orogeny

Paphos Third Age (P3A)

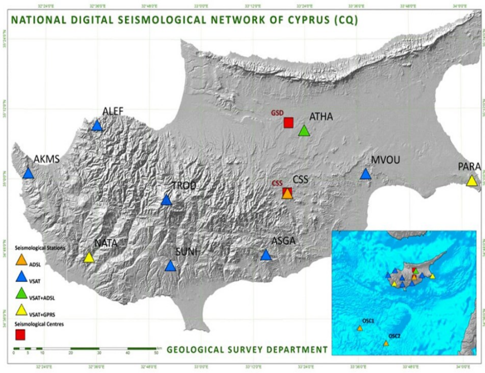
http://paphos3rdage.org/

From Small Beginnings

Little was it known, back in 2009 when we cobbled together our first seismometer that twenty Geology Group members would be guests of the seismologists at the Geological Survey Department in Nicosia.

Our visit there in February started with a detailed description of the four geological zones of Cyprus, followed by a tour of their exotic rock and mineral collection and finishing with a tour of the Seismological Centre. In the Centre the scientists monitor and evaluate data from seismic activity in the Eastern Mediterranean area. The Centre receives 24 hour real-time seismic data from ten land stations on the island and two sub-sea monitors off our southern coast.

You may read a fuller account of our day out in the March 2015 AdLib, pages 4-6

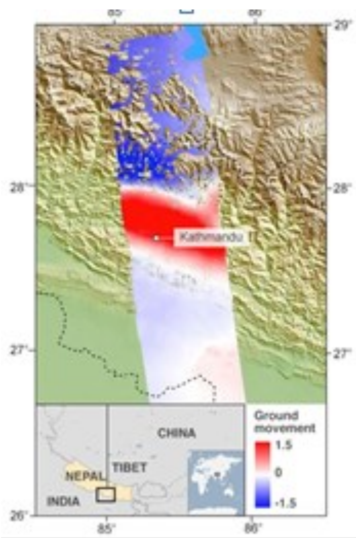


Geology Sample Collector

Many 'Apps' are available to assist the geologist. The '*Geology Sample Collector* ' app is available for Android devices. It allows you to document field work incorporating images, video, audio recordings, and text. It also allows you to track (with GPS) your path. Check suitability for your device.

Nepalese Earthquake—Himalayas Drop

The height of a swathe of the Himalayas has dropped by around an average of **one metre** as a result of the devastating Nepal earthquake.
Avalanches and landslides were triggered by the 7.8 magnitude earthquake on 25 April 2015.
Scientists compared two separate images of the same region sent by a satellite, before and after the quake. Satellite images showed areas of the mountain range had dropped by 0.7m-1.5m. However, they add that the drop will roughly be balanced by slow uplift due to tectonic activity. The study has also found that areas including the capital, Kathmandu, to the south of the Himalayan mountains have been uplifted by the quake.



They have yet to analyse satellite images of the region in which the most famous Himalayan peak - Everest - is located.
The primary stretch that had its height dropped is a 80-100km stretch of the Langtang Himal (to the northwest of the capital, Kathmandu).

Nepal Earthquake

Moon's hidden valley system revealed

Scientists have identified a huge rectangular feature on the Moon that is buried just below the surface.
The 2,500km-wide structure is believed to be the remains of old rift valleys that later became filled with lava.
Centred on the Moon's Procellarum region, the feature is really only evident in gravity maps acquired by Nasa's Grail mission in 2012.
But knowing now of its existence, it is possible to trace the giant rectangle's subtle outline even in ordinary photos.
So how was this extraordinary feature produced?
The Procellarum region contains a lot of naturally occurring radioactive elements, such as uranium, thorium and potassium.. On the early Moon, these would have heated the crust, which, when it cooled would have contracted. This shrinking, they propose, would have ripped the surface, opening deep valleys.
The geometry is the giveaway. On Earth, cooling and contraction will preferentially produce hexagons containing 120-degree angles.
The famous Giant's Causeway in Northern Ireland is a classic example on the small scale.

The team cannot tell when the rifting occurred, but the dating of Moon rocks brought back by Apollo would suggest the valleys were filled by volcanic lavas about 3.5 billion years ago.

Hunga Tonga volcano eruption forms new S Pacific island

A new island has been formed in the South Pacific after the eruption of an underwater volcano in Tonga.
Images have emerged of the island's surface, 45km (28 miles) north-west of Tonga's capital, Nuku'alofa.
The island- which is 500m (1,640 feet) long - was formed after an eruption at the Hunga Tonga volcano that started in December 2014.
The volcano - the full name of which is Hunga Tonga-Hunga Ha'apai - erupted for the second time in five years in December.
Video showed fast-rising plumes of gas emerging from the sea.
Satellite images taken within days of the eruption showed new rock formations, and more sediment in the sea. Next to one of the two islands that previously made up Hunga Tonga-Hunga Ha'apai was a large circular crater. This is made from very loose and unconsolidated material, formed by fragmentation of magma, so it's basically small pieces of rock on top of each other that have formed an island. It is not known yet if the island is stable enough to become permanent.

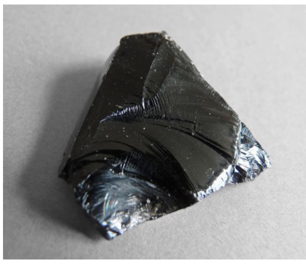
A satellite image of Hunga Tonga before the eruption

A large new crater emerged after the eruption last December

Physical Properties of Minerals continued—Fracture

Fracture is breakage that is not flat. A mineral may have good cleavage in one or two directions but fracture in another direction. Fracture differs from cleavage in that the latter involves clean splitting along the cleavage planes of the mineral's crystal structure, as opposed to more general breakage.

Conchoidal fracture is a curved breakage that resembles the concentric ripples of a mussel shell. It often occurs in amorphous or fine-grained minerals such as flint, opal or obsidian, but may also occur in crystalline minerals such as quartz.



Earthy fracture is reminiscent of freshly broken soil. It is frequently seen in relatively soft, loosely bound minerals, such as limonite, kaolinite and aluminite.

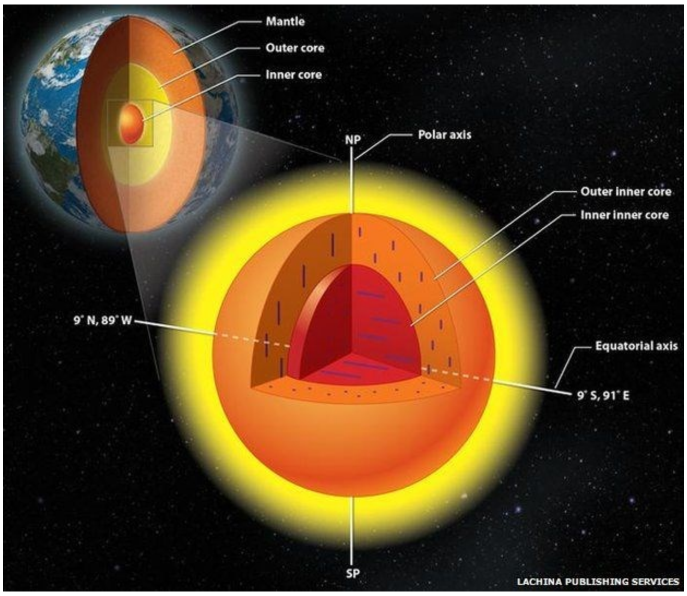
Hackly fracture (also known as **jagged fracture**) is jagged, sharp and not even. It occurs when metals are torn, and so is often encountered in native metals such as copper and silver.

Splintery fracture comprises sharp elongated points. It is particularly seen in fibrous minerals such as chrysotile, but may also occur in non-fibrous minerals such as kyanite.

Uneven fracture is a rough surface or one with random irregularities. It occurs in a wide range of minerals including arsenopyrite, pyrite and magnetite.

Heart of Earth's inner core revealed

Scientists say they have gained new insight into what lies at the very centre of the Earth.
Research from China and the US suggests that the innermost core of our planet has another, distinct region at its centre.
The team believes that the structure of the iron crystals there is different from those found in the outer part of the inner core.
The findings are reported in the journal Nature Geoscience.
Without being able to drill into the heart of the Earth, its make-up is something of a mystery.
So instead, scientists use echoes generated by earthquakes to study the core, by analysing how they change as they travel through the different layers of our planet. The waves are bouncing back and forth from one side of the Earth to the other side of the Earth. Data suggests that the Earth's inner core - a solid region that is about the size of the Moon - is made up of two parts. The seismic wave data suggests that crystals in the "innermost part of the inner core" are aligned in an east-to-west direction - flipped on their side, if you are looking down at our planet from high above the North Pole.
Those in the "outer inner core" are lined up north to south, so appear vertical if peering down from the same lofty vantage point.



Glossary & General

Acknowledgements:

- BBC
- Wikipedia

What do you call a periodic table with gold missing?
- **"Au revoir"**

Coursera

Some of you may not be aware that a number of Geology group members have been participating in a series of on-line 'free' educational courses run by Coursera Coursera is an education platform that partners with top universities and organizations worldwide, to offer courses online for anyone to take. A good course to start with is The Dynamic Earth: This course is organised by the American Museum of Natural History

Future Articles

If anyone would like to contribute to the P3A Geology newsletter then please contact me (Ken Jones) or if you have any ideas about future subjects that could be included in the Newsletter please let me know.

I am considering in future issues looking in more detail at the Geologic Time Scale, which was generally addressed in issue 6 of the newsletter — do you think this would be useful? Also I will probably include in future issues an article on the 'Rocks & Minerals of Cyprus'.

Any articles will be gratefully received—contact me if you need any help or guidelines for articles.

Glossary: *To continue in the next issue*

H

Holocene — The time period from 10 000 years ago to the present day.

Hum — A conical residual hill (formed by solution) that penetrates through the sediment that covers the otherwise flat floor of poljes.

Hydrological cycle — The movement of water through the environment by the processes of evapotransporation, condensation, wind transportation, precipitation, runoff, infiltration and interception.

Hydrostatic pressure — The weight of the water higher in the cave system, exerts a pressure on the water lower down, forcing it to flow through passages and up joints towards regions of low hydrostatic pressure, such as resurgences.

I

Ice age — A long period of glaciation. An informal term for a time when global temperatures were greatly reduced and glaciers, ice fields, pack ice, etc advanced. There have been several 'ice ages' during the last 600 million years or so. The last one to affect Britain occurred during the last million years (ending about 10 000 years ago). This was a time of contrasts between phases of glaciation interspersed by warmer phases (sometimes warmer than today).

Ice sheet — A glacier of more than 50 000 km² with a flattened dome that buries the landscape.

Igneous rock — A rock that originated when a molten magma or lava cooled and solidified.

Infiltration — The downward flow of surface water into the soil.

Interglacial — A phase of relatively warm temperatures between glacials. See glacial.

Interpolated / Interpolation — The process by which software *invents* new data to fill gaps in an image or grid.

Ironstone — A mudstone or sandstone with a high iron content.

Isostasy — The theoretical equilibrium that tends to exist in the Earth's crust; this can alter sea level on a local scale. For example, glacial ice can push down the crust so that when it melts the crust will uplift thus causing sea level in the area to decline. Compare with Eustasy.

Isotopes — Atoms of an element that have the same number of electrons and protons but different numbers of neutrons.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z