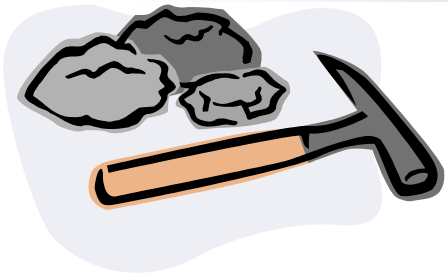
November 2012

Volume 1, Issue 1
Page 1

P3A Geology Newsletter



Geologists are down to "earth" people

Paphos Third Age (P3A)
http://paphos3rdage.org/

Inside this issue:

Special points of interest:

+Volcano Webcams

http://volcanoes.usgs.gov/images/webcams.php

+ Learn about Astrogeology

http://volcanoes.usgs.gov/images/webcams.php

This is the first publication of the Newsletter.

Generally it will not contain detailed, in-depth articles but will provide links to where the reader can find more information.

If you have any suggestions or would like to contribute a short article please use the contact details below.

Ken Jones

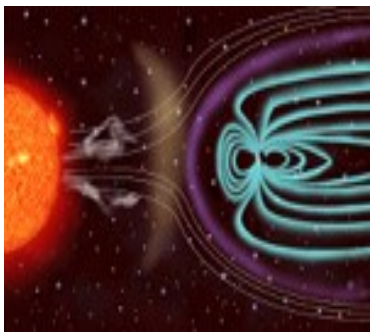
E-mail

kenfrogjones@yahoo.com

Introduction to Geomagnetism

Geomagnetism is the study of the Earth's magnetic field. This includes the fields produced by the Earth as well as those interacting with the Earth. Internal dynamo processes within the Earth create slowly changing magnetic fields. The continuous flow of particles and fields from the Sun (called the solar wind) interacts with the Earth's magnetic field. Strong, transient impulses due to solar events produce ground-level magnetic disturbance, by affecting the complex current systems in and near the Earth's atmosphere. This means that the magnetic field on the Earth's surface is different from location to location, and that it changes over time.

Some of these changes are slow, such as the centuries-long drift in the direction of the magnetic field; some of these changes are quick, such as the sudden enhancement during a geomagnetic storm that can occur in minutes.



The use of geomagnetism for navigation began with the use of compasses for orientation. Magnetic north is skewed from geographic north by an angle called declination. To navigate accurately, it is necessary to understand how declination varies over distance and time. This is why there is a long history of compiling magnetic information and maps. This information is still important today because magnetic field variations, like those seen during a geomagnetic storm, can affect GPS, directional drilling, electric power grids and other systems.

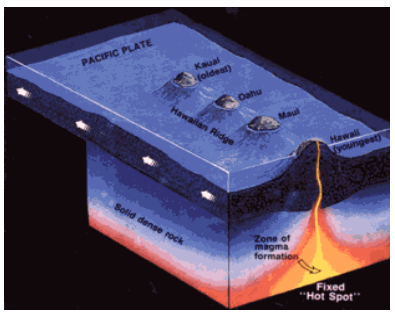
Extract from the US Geological Survey website

To learn more about Geomagnetism

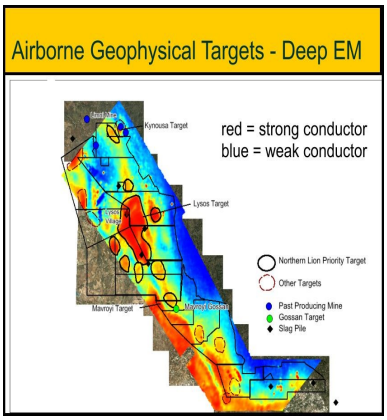
http://geomag.usgs.gov/learn/introtogeomag.php

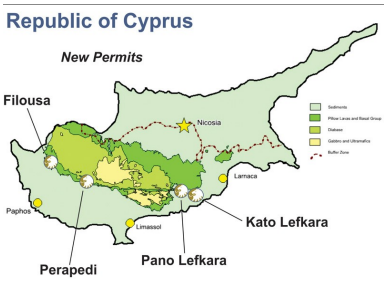
Hot Spots—Mantle Thermal Plumes

J. Tuzo Wilson, the Canadian geophysicist came up with the "hotspot" theory. Wilson noted that in certain locations such as Hawaii, volcanism has been active for very long periods of time. This could only happen, he reasoned, if relatively small, long-lasting, and exceptionally hot regions called *hotspots* existed below the plates providing localized sources of high heat energy (thermal plumes) to sustain volcanism. Heat from this hotspot produced magma by partly melting the overriding Pacific Plate. The magma, which is lighter than the surrounding solid rock, then rises through the mantle and crust to erupt onto the seafloor, forming an active seamount. Over time, countless eruptions cause the seamount to grow until it finally emerges above sea level to form an island volcano. Continuing plate movement eventually carries the island beyond the hotspot, cutting it off from the magma source, and volcanism ceases. As one island volcano becomes extinct, another develops over the hotspot, and the cycle is repeated.



Mining Survey in Cyprus





Some of you may be aware that a Canadian mining company, based in Frankfurt, has been carrying out surveys during 2012. The following is an extract from their website.

http://www.northernliongold.com/s/Cyprus.asp?ReportID=480221

Northern Lion Gold Corp's current portfolio of projects include a number of exploration licenses in the Republic of Cyprus where the company will actively pursue under-explored Copper-Gold opportunities.

2012 Exploration Program: Northern Lion started the 2012 drill program by drilling the Pano Leftkara permit. The Company has also identified high priority targets from a Versatile Time-Domain Electromagnetic (VTEM) and aeromagnetics survey flown over two areas of western Cyprus. Lysos and Kynousa are two areas that warrant a follow up drill program. The Lysos target area hosts a cluster of seven anomalies and the Kynousa target is located in an area of historic copper production.

To see photographs of their activities in Cyprus go to:

http://www.northernliongold.com/s/Maps_Photos.asp

What is a Mineral?

Cinnabar, HgS is the principal ore of mercury.

Mineral Oxide—Magnetite (chemical formula Fe_3O_4)

We often talk about 'Minerals' but what is a mineral? A **mineral** is a naturally occurring substance that is solid and stable at room temperature, representable by a chemical formula, and has an ordered atomic structure. It is different from a rock, which can be an aggregate of minerals or non-minerals, and does not have a specific chemical composition. The study of minerals is called mineralogy. There are over 4,900 known mineral species. The silicate minerals compose over 90% of the Earth's crust. The diversity and abundance of mineral species is controlled by the Earth's chemistry. Silicon and oxygen constitute approximately 75% of the Earth's crust, which translates directly into the predominance of silicate minerals.

The definition of a Mineral is not without its exceptions; Mercury is classified as a volatile element. Its geochemical cycle starts with volcanic activity as magma invades sedimentary rocks. Mercury vapours and compounds rise toward the surface, condensing in porous rocks mostly as the sulfide HgS, cinnabar.

For more information on Minerals:

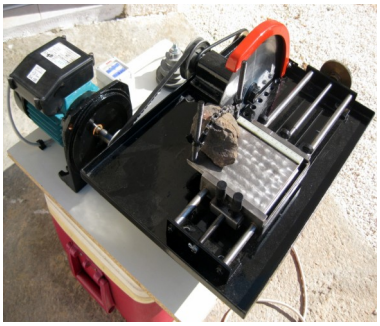
http://geology.about.com/od/mineralsresources/a/whatsamineral.htm

http://en.wikipedia.org/wiki/Minerals

Rock Cutting Machine

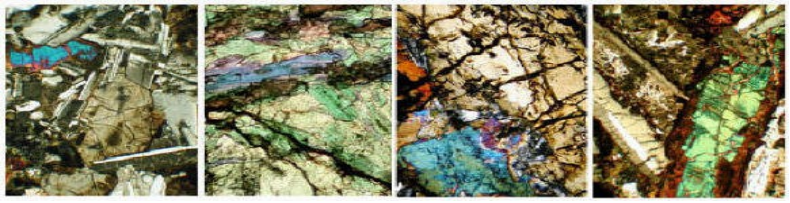
Geology group member David May donated to the P3A a previously used rock cutting machine, with a diamond edged cutting disk and automated feed tray. The machine will be used in the preparation of Petrographic thin sections. (Petrographic: the branch of petrology dealing with the description and classification of rocks, especially by microscopic examination).

It was a joint P3A effort to rebuild the machine with bearings, motors and other assistance provided by the membership. Thin slices of rocks (billets) are cut, then ground by hand on both sides to a thickness of 30 microns. The sections are mounted on glass slides. At this thickness, the thin section will easily transmit light. Various optical tests can thus be performed or fossils and structures studied, with the aid of the petrographic microscope.



Picador Rock Cutting Machine

To view Petrographic slides: http://www.petrologyslides.com/catpg1.htm



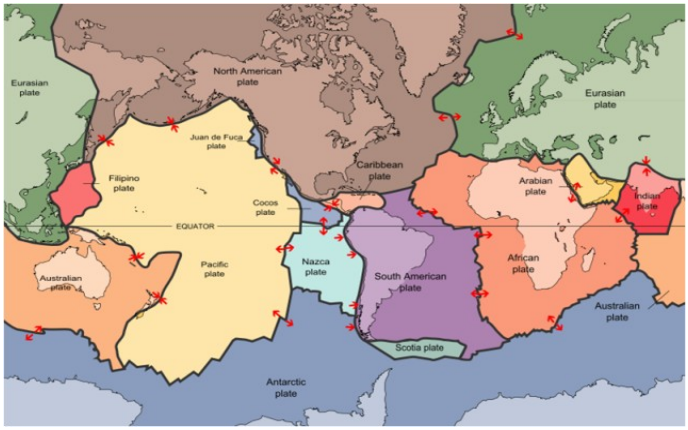
Petrographic slides viewed through polarising microscope

Tectonic Plates

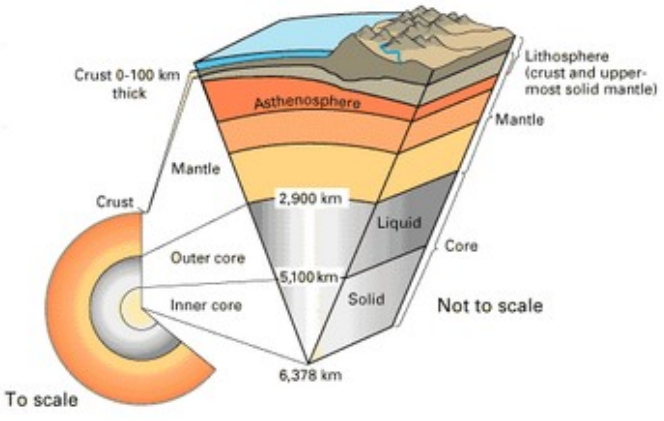
Tectonic Plates are the sections into which the Lithoshere (Greek: *'rocky', 'sphere'*) is cracked. There are 7 major plates and 8 minor. There are also micro plates but the boundaries of these are less clear. The plates float on the fluid-like (visco-elastic solid) asthenosphere (Greek: *'weak', 'sphere'*) Continental plates are up to 200km thick and Oceanic plates are thinner (50-100km). The larger South American plate and African plate consist of both Continental and Oceanic crust. The Pacific plate is almost entirely Oceanic crust.

More information and test yourself on plate tectonics

http://www.geolsoc.org.uk/en/Plate-Tectonics



The tectonic plates of the lithosphere on Earth



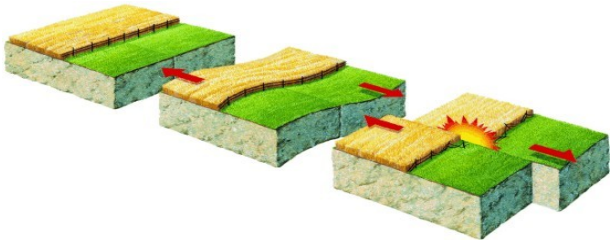
Earth cutaway from core to crust.

What is an earthquake?

Movements within the Earth's crust cause stress to build up at points of weakness and rocks to deform.

Stored energy builds up in the same way as energy builds up in the spring of a watch when it is wound. When the stress finally exceeds the strength of the rock, the rock fractures along a fault, often at a zone of existing weakness within the rock.

The stored energy is suddenly released as an earthquake.



Intense vibrations, or seismic waves, spread out from the initial point of rupture, the focus, like ripples on a pond.

These waves are what makes the ground shake and can travel large distances in all directions. Most earthquakes occur at the boundaries of tectonic plates.

http://www.bgs.ac.uk/discoveringGeology/hazards/earthquakes/whatIs.html

Two members of the P3A have seismometers monitoring earthquakes in the Cyprus area. One is connected to the Quake-Catcher Network (QCN) at Stanford University. QCN is a distributed computing network that links volunteer hosted computers into a real-time motion sensing network.

More in future issues

Glossary: *To continue in the next issue*

A

Albedo — The amount of solar radiation that is reflected back off a surface.

Alum — A chemical compound that can be processed from clays. It has been used for industrial purposes (e.g. tanning leather and dyeing) and in medicine.

Altitude — Height above sea level.

Anglian — One of the glaciations during the last Ice Age, about half a million years ago, when glaciers reached as far south as the Severn–Thames estuaries in the UK.

Anticline — Upwardly arched folds of Sedimentary rocks put under pressure by movement in the Earth.

Aquifer — One of many types of permeable rock. Pore spaces (tiny holes) between the grains, or fractures (cracks) allows water to flow through and accumulate in an aquifer rock.

Aquiclude — An impermeable layer of rock which water cannot flow through because there are no pore or fracture voids, or such voids are not connected together.

Aquitard — A rock with limited permeability that allows some water to pass through it, but at a very reduced rate.

Aragonite — An unstable form of calcium carbonate which changes into calcite.

Ash — In Limestone Landscapes we use this term to mean small (less than 2 mm) fragments of rock and volcanic glass ejected during volcanic eruptions.

Atmosphere — The atmosphere is a thin layer of gas and suspended particles surrounding the Earth and is composed mainly of nitrogen and oxygen but also small quantities of argon, carbon dioxide, neon, helium, methane, krypton, nitrous oxide, hydrogen, xenon and ozone (in order of decreasing amounts). The atmosphere has four layers: the troposphere up to an altitude of about 18 km, the stratosphere from 18 km to about 50 km, and the mesosphere from about 50 km to 82 km, beyond which is the thermosphere. Above 80 km the gases begin to thin out eventually leaving just oxygen in its atomic form.

Atoll — A reef that formed around an island. The island sank, but the continued growth of the coral resulted in a rounded reef.