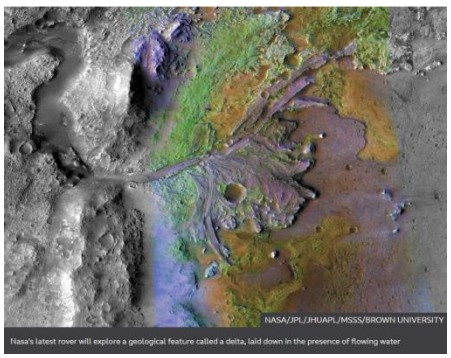
- **Banded iron formations** (**BIF**s) - are important as they provide important evidence of a time period when the Earth's atmosphere and the shallow ocean first experienced a rise in oxygen, approximately 2.4–2.0 Ga (billion years ago) during the Paleoproterozoic era. BIFs are sedimentary rock consisting of alternating layers of iron oxides and iron-poor chert. They can be up to several hundred meters in thickness and extend laterally for several hundred kilometers. Banded iron formations are thought to have formed in sea water as the result of oxygen production by photosynthetic cyanobacteria. The oxygen combined with dissolved iron in Earth's oceans to form insoluble iron oxides, which precipitated out, forming a thin layer on the ocean floor. Banded iron formation provided some of the first evidence for the timing of the Great Oxygenation Event.

The following link is to a short online GEO Podcast: Banded Iron Formations - Great Oxygenation event.

- **The Water on Mars** – It was once thought that almost all of the ancient water on Mars had been lost into space. However, recent research indicates that vast amounts, anywhere from 30 % to 60%, may still be locked into the outer layers of Mars – the crust. The ancient water exists in the form of minerals contained within Martian rocks. There are also indications that water may exist in as many as 4 large underground lakes.



Mars may have vast amounts of water locked in the crust.

Mars- buried lakes of liquid water

- **Our Beautiful Earth – from Space** - Over the past 60 years, astronauts have shot more than 1.5 million photographs of Earth from the International Space Station and other spacecraft. Most have been catalogued by the Earth Science and Remote Sensing (ESRS) unit at NASA's Johnson Space Center. The link below shows a selection of the best photographs and video clips.
  Picturing the Earth

- **Remains of impact that created the Moon may lie deep within Earth –** It is

generally accepted that around 4.5 billion years ago a protoplanet, that was named 'Theia' the size of Mars struck the Earth. Our moon is a product of that collision. A team of scientists have proposed that the remains of this collision can be found in two continent-size layers of rock buried deep in Earth's mantle. Remains of Impact that formed the moon may lie deep in the Earth

- As a slight aside to the above article. - With all the fantastic names given to the moons in our solar system (*Enceladus, Titan, Alborix, Calypso, Eplmetheus, Hyperion* etc.) the Earth's satellite is just called 'The Moon'. The protoplanet that struck the Earth was given the name *Theia.* In Greek mythogy the daughter of *Theia* and the Titan *Hyperion* was *'Selene'*. The Greeks used to call our moon '*Selene*' – which I think is a far more fitting name (the Roman equivalent is *Luna*).

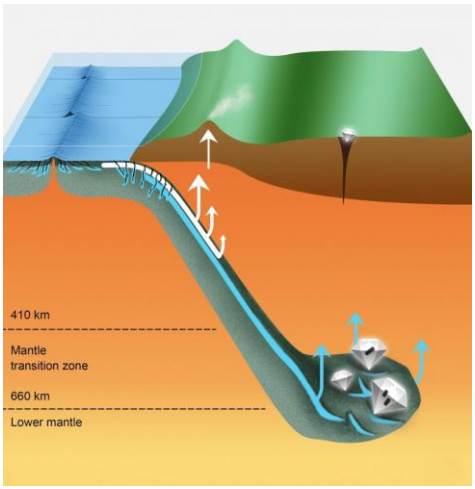
Detail of Selene from a Roman sarcophagus

- **Volcanic Activity** – There seems to have been a large amount of volcanic activity in recent months. Maybe more noticeable than usual as nearby Etna has been giving a spectacular display and some of the ash possibly landing on Cyprus. There is satellite data indicating that ash and sulphur dioxide clouds over Lake Michigan originated from the eruption of Mount Etna. At present there are at least 26 volcanoes actively erupting and around 20 more with eruption warnings.

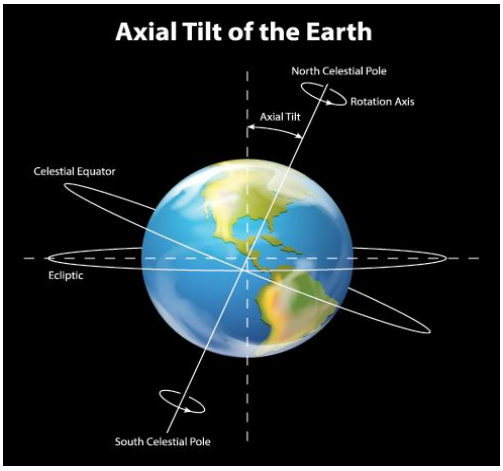
Etna Eruption You may now have to log into YouTube via Google!! Alternatively, search YT for 'CRAZY VIDEO! Etna volcano eruption in Sicily, Italy (March 4, 2021)'

You can obtain details of volcanic activity from the Volcano Discovery website. There is also an app available for your phone to receive notifications of volcanic activity.
For some spectacular photographs of volcanoes see: Volcano photographs.
Short Film of Iceland's Eruption Views it as a Collective Human Experience
Perhaps the greatest show on earth volcano and northern-lights

- **Diamonds That Formed Deep in the Earth's Mantle Contain Evidence of Deep-Earth Recycling Processes -** The shallow rock recycle process, in the top layer of the crust (around 410 km depth), is quite well understood. Subduction of this material feeds into arc volcanoes. Research into the inclusions of tiny minerals, trapped during diamond crystallization, provides evidence into a deeper recycling pathway (approx. 660-700 km depth). Water infiltrating fractures in the seafloor hydrates the rocks in the interior of the plate, forming "serpentinite", and these hydrated rocks can sometimes be carried down to the top of the lower mantle. The diamonds studied had a higher ratio of heavy to light iron isotope inclusions than typically found in most mantle minerals. This indicates that they probably didn't originate from deep-Earth geochemical processes but from iron-rich minerals formed when oceanic plate peridotite transformed to serpentinite on the seafloor. Evidence of deep Earth recycling processes in diamonds.



- **Climate crisis has shifted the Earth's axis -** The Earth spins around an axis like a top. If the weight of a spinning top is moved, the top would start to lean and wobble as its rotational axis changes. The same thing happens to the Earth as weight is shifted from one area to the other. The impact that humans have on the Earth's climate has caused a marked shift in the Earth's axis of rotation since the 1990s, some scientists say. This is a result of global heating resulting in the melting of glaciers which results in a change in how the Earth's mass is distributed around the planet. It is estimated that since 1980, the poles' positions have moved about 4



meters (13 feet). The data leading to this conclusion was gathered from the Gravity Recovery and Climate Experiment (GRACE) twin satellites. Natural factors, such as ocean currents, periodic melting of glaciers and the convection of hot rock in the deep Earth also contributed to the drifting pole positions. Humans impact on the climate has shifted the Earth's axis

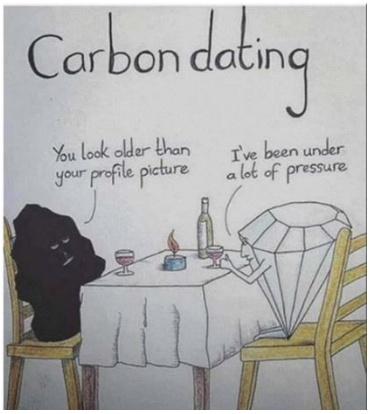
- How to read rocks - Letters combine to make words that combine to make sentences, as elements combine to form minerals to make rocks. Learning how to read rocks is a fundamental skill for geologists and is required in order to begin to unravel the secrets of our earth. The link below leads to an easy to understand article from 'Open Learn' (Free Learning from the Open University).

  Open Learn - How to read a rock

  Mini Lecture - How to read a rock

Quiz

Take the volcanoes quiz



Acknowledgements