Geology Matters

February 2018

Editorial

It being that time of year, the senior members of the Editor's family have decamped to the sun. Lunch is taken in the garden, where there are views rather like this:

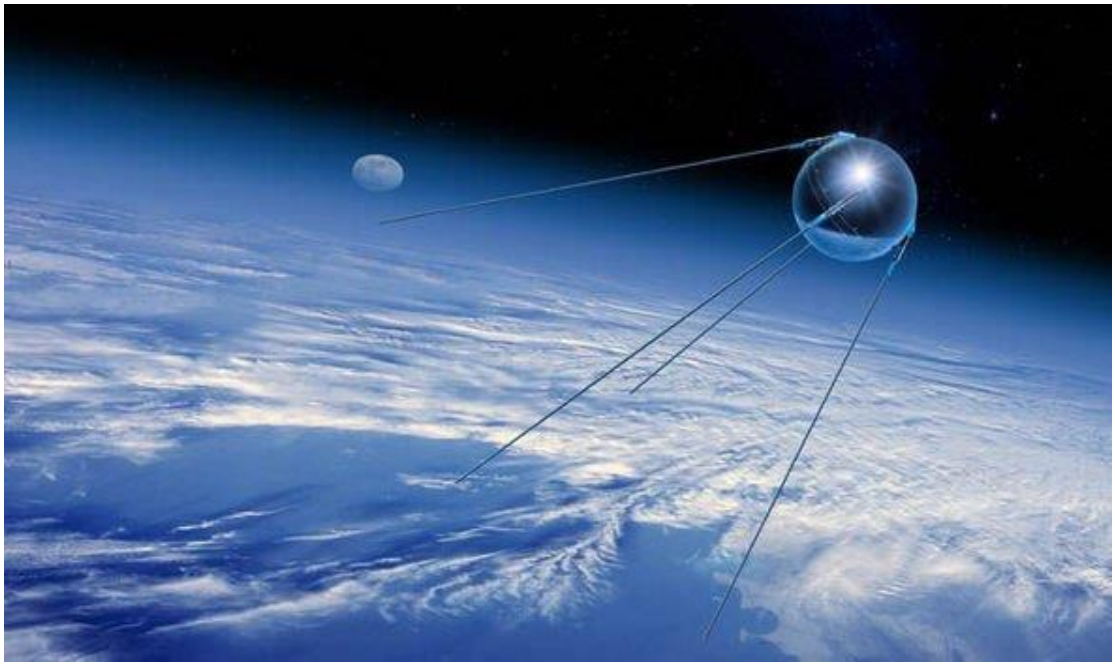
Southern Spain is (mostly) a relief from the fearsome winds, rain, frost and gloomy days that we experience in the UK, the view above on a typical day, is the Moroccan coast some 50 km distant. The country is a very rich source of minerals and particularly fossils, especially very elaborate trilobites.

This month's edition is devoted to remote sensing, with satellite views of the Earth, Mars and Saturn (plus a few odds and sods of other less remote things). Because there is such a wealth of material here I have given you hyperlinks to the material which is stored on other computers; these complicated looking. but very simple to use links are accessed using "control + click" and open up a cornucopia of material. They are well worth looking at.

If you are an early morning listener to Radio 4, you'll be aware that in December the "Today" programme had a series of guest editors. Never being shy of pinching a good idea, your editor would like to offer you the opportunity to guest-edit Geology Matters. This would be your opportunity to put a personal twist on our publication. Full support will be given and so it will not be horrendously difficult. Please let the editor know if you are interested – an informal chat will tell you what is involved,

And now for our journey into space…..

Do you remember this?



It is, of course, Sputnik 1 and the year was 1957. I was in the first year of my A level physics course and so with some very long pieces of wire and an old radio set, I was excited to be able to tune into this distinctive signal:

http://www.astrosurf.com/luxorion/Documents/sat-sputnik.wav

The space age had begun and the USSR certainly made the early running. It didn't stay like that, but this early pioneer laid a trail for spacecraft that went to the moon, and then the other planets in the solar system. The rate of progress has been quite remarkable and the technological achievements, to say the least, impressive; how easy must it be to plot the orbit of a comet and then launch a spacecraft, that 13 years later would intercept the comet, go into orbit around it and then launch a science package to land on it ? Its rocket science of course !

Early civilian satellites were dedicated to communications and weather but the rise of earth sciences led to some remarkably useful images for the geologist. So read on and learn more.

The earth's geology - an eclectic collection

Our visit to the Canarian island of La Palma was quite a revelation and a complete contrast to the UK's volcanoes, all of which are many million years old and eroded almost to extinction. Here was a huge caldera with a deeply incised canyon on its westerly flank. An

active volcanic spine, which had erupted in the 1950s and again in 1970s, a phreato-magmatic crater on the east coast of the island and all easily visible from this image. Looking at it doesn't replace the first hand experience but it does provide a detailed and spectacular overview.

So here now is a link to an educational website with an interesting mixture of geological/geomorpological images of our planet.

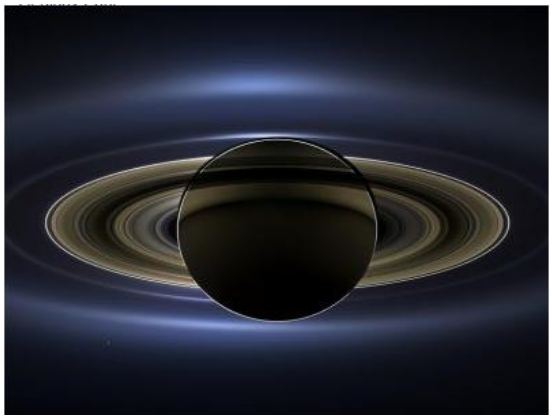
https://www.lpi.usra.edu/publications/slidesets/geology/index.shtml

Cassini

It was 1997 when this thunderous departure occurred at Cape Canaveral.

https://www.youtube.com/watch?v=Pdc5ORHonp8

It was to be the start of a twenty year saga that produced a wealth of scientific data and images (around 453 000 of those) and which finished with a fiery high speed entry into Saturn's atmosphere. Here is one of the more beautiful

I . 

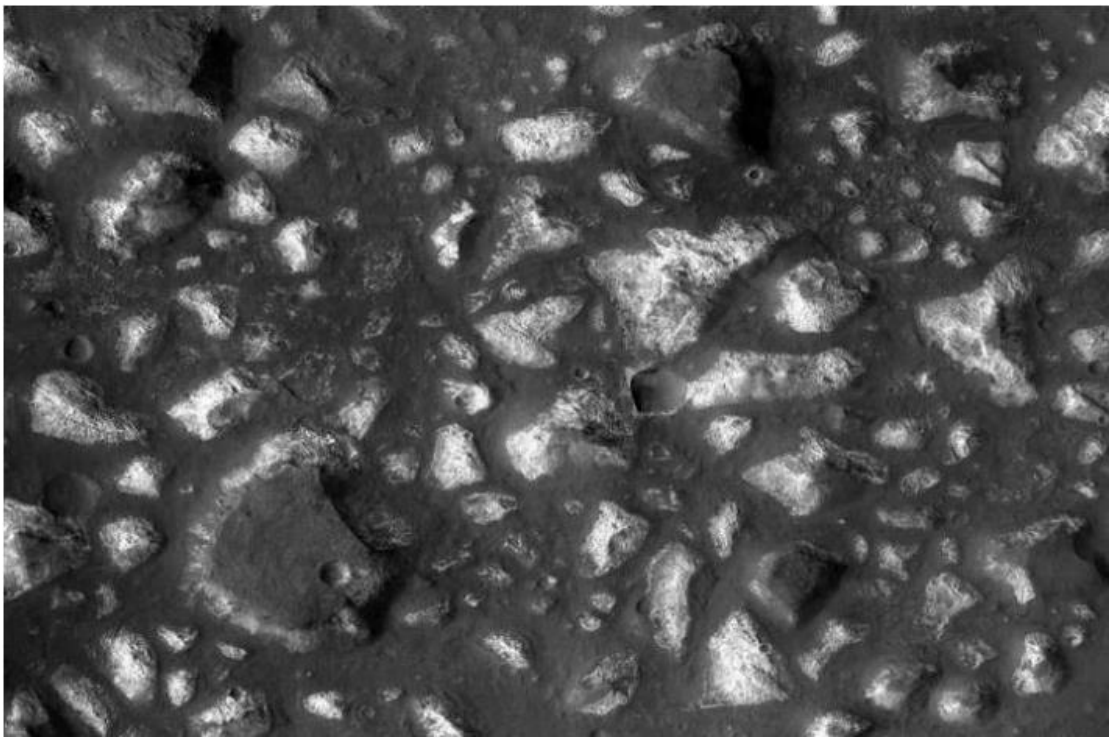
Now if you would care to follow the link below you will find more of them, and particularly featuring the rather "unusual" geology of Saturnian moons.

https://saturn.jpl.nasa.gov/the-journey/timeline/#launch-from-cape-canaveral

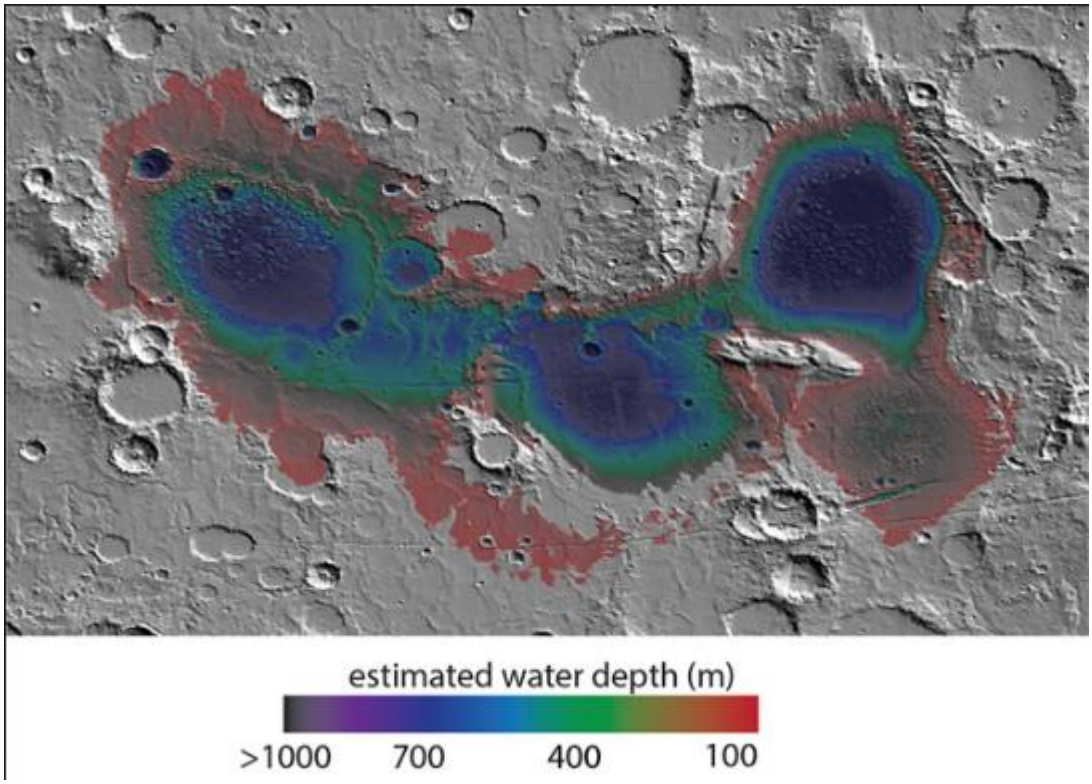
The geology of Mars

Our near neighbour has attracted a lot of attention over the years. Not only have there been orbiters, but also landers that have, and still continue, to provide a wealth of geological data. Although the canals proved to be illusory, there is plenty of evidence that this now dry, cold planet once had abundant water and a host of other features that we would find very familiar (and some we wouldn't).

Here, a dust devil snakes its way across a desert region. But the image below



is one , that despite its unexciting appearance, has caused the greatest stir. It shows the remains of a sea filled basin of southern Mars that contained hot water vents and has subsequently been filled by volcanic deposits. This next image shows the extent of the sea area and its depth.



On Earth, hydrothermal undersea vents of a similar age are known to have been areas where primitive life existed – so why not on Mars? This question may well need a human landing to investigate, and that is only a matter of years away. Watch this space!

But now for more Martian images, please follow the link below:

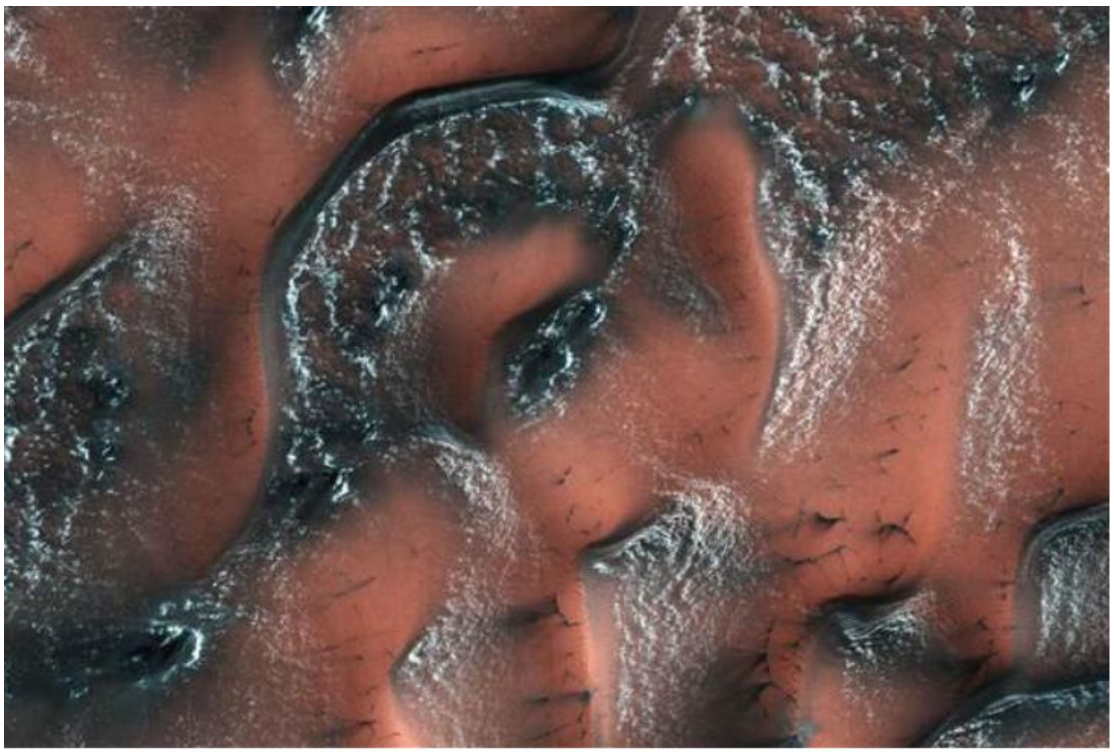
https://www.slideshare.net/wwlittle/geol-111-25c-planetary-geology-mars-12-1105-reduced

Rock of the month

Since this is an extra-terrestrial edition of the newsletter, it seemed appropriate to have an extra-terrestrial rock image. This 8 kg lump, which was found in the happy hunting ground of Antarctica, is a Martian meteorite. A dark fusion crust, created during high speed entry through the Earth's atmosphere, covers most of the exterior, and the light coloured basaltic interior is visible where the fusion crust has broken off. The photograph was taken in the Meteorite Processing Lab at NASA-JSC, which houses a collection of over 22 000 specimens from Mars, the Moon and the Asteroids.

No comment follows on

But to be more serious again



Snow and ice covering dunes on Mars' Northern hemisphere in a photo taken by NASA's Mars Reconnaissance Orbiter in May 2017. NASA / AFP - Getty Images file

There is very clear evidence from satellite images, of Martian sediment flows, but the mechanism remained elusive until some recent research by the Open University. Because the atmospheric pressure on Mars is so low, in the summer time any surface or near-surface water will boil and the gas formed will lift rock particles clear of the surface so that gravity will then move them off down slope. Well that's a one sentence summary of an academic paper, but if you would like to read the fine detail the follow this link:

https://www.nature.com/articles/s41467-017-01213-z

Not to be outdone, another research group has been researching how surface gullies form and has proposed another intriguing mechanism to explain them:

https://www.nature.com/articles/s41598-017-14132-2

Feedback

Did you think that the editorial team were rather incoherent last month? Well here is a possible explanation:
https://www.youtube.com/watch?v=I8K17mzV-QU
But in any case, please let us have your feedback.

And for the romantics ,,,,,Il giorno di San Valentino