



✚ **Cumbre Vieja volcano on La Palma:** The volcano has been erupting continuously since the 19th September 2021 and has destroyed around 1,200 buildings. There have been many spectacular videos online and on the news broadcasts. However, as well as the destruction, the lava is creating new land as it meets the sea. Eventually the map of La Palma will have to be re-drawn to record the new land mass. This process is all part of the 'Rock-Cycle', as described by Rob in our last meeting. Of particular interest to me



was the concern expressed in the news of the [hazardous gasses](#) produced when the lava eventually flowed into the sea. What could be more hazardous than the gasses already being released during the eruption? As magma rises towards the surface and pressure decreases, gases are released from the liquid portion of the magma (melt) and continue to travel upward and are eventually released into the atmosphere. By far the most abundant volcanic gas is water vapour, which is on its own harmless but produces an acidic fall-out when mixed with other volcanic gasses. Significant amounts of carbon dioxide, sulphur dioxide, hydrogen sulphide and hydrogen halides can also be emitted from volcanoes. Depending on their concentrations, these gases are all potentially hazardous to people, animals, agriculture, and property. The 1991 eruption of Mt. Pinatubo is thought to have injected more than 250 megatons of gas into the upper atmosphere on a single day. In my mind the lava reaching the sea would be a big benefit, as the fluid lava would solidify trapping any remaining gasses. Unfortunately, the news items did not detail what specific hazardous gasses were of concern, when the lava cooled in the sea. A little investigation found that as hot lava boils cool



APTOPIX Spain Volcano

Lava from a volcano reaches the sea on the Canary Island of La Palma, Spain in the early hours of Wednesday Sept. 29, 2021. Lava from the new volcano on the Canary Island of La Palma reached the Atlantic ocean last night, at the area known as Los Guirres beach, also known as Playa Nueva

seawater, a series of chemical and physical reactions create a mixture of condensed, acidic steam, hydrochloric acid gas (Chlorine from sea salt + Hydrogen from the water produces a pH between 1.5 and 3.5 - equivalent to battery acid) and 'tephra'. Tephra is molten spatter, tiny glass fragments and long glass filaments known as "[Pele's hair](#)",

these are explosively ejected in what is called a ‘tephra jet’. The tiny glass fragments can irritate the eyes and lungs and in rare cases cause permanent damage. Blown by wind, this plume creates a noticeable downwind haze, known as "laze" (short for ‘lava haze’). In addition the explosive force of the steam can throw cooled lava boulders a huge distance, as well as creating small tsunamis of ‘boiling’ water.

['River of Lava' Spills After Canary Island Volcano's Cone Collapses](#)

[New Land Formed by La Palma Lava Seen in Aerial Footage](#)

[Lava Tsunami La Palma](#)

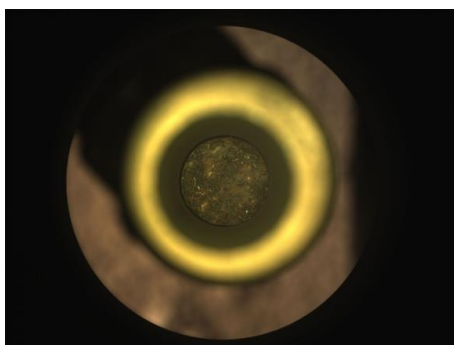
Granulometry: is the measurement of the size distribution in a collection of grains.

Grain size scale (USCS)	
Clay : <0.002mm	Gravel : 2 - 64mm
Silt : 0.002 - 0.063mm	Cobble : 64 - 256mm
Sand : 0.063 - 2.0mm	Boulder : <256mm



To geologists and sedimentologists, grain size is important as the most basic attribute of sediments. In Earth Science we refer to clays, silts, sands etc but each is defined by its specific particle size. Particle size is a fundamental property of sedimentary materials that may tell much about their origins and history. The size distribution is also an essential property for assessing the likely behaviour of granular material under applied fluid or gravitational forces. Granulometry is used to classify soils for engineering and influences the design of earthen dams, levees and landfills. Agronomists use particle size and distribution information to assist with drainage or nutrient delivery to crops.

NASA's Perseverance Rover Collects First Mars Rock Sample: On 6th September the Perseverance rover completed the collection of the first sample of Martian rock, a core from Jezero Crater. NASA and ESA (European Space Agency) are planning a series of future missions to return the rover's sample tubes to Earth for closer study. Along with identifying and collecting



samples of rock and regolith (broken rock and dust) while searching for signs of ancient microscopic life, Perseverance's mission includes studying the Jezero region to understand the geology and ancient habitability of the area, as well as to characterize the past climate. Perseverance



photographed in detail a prominent rock outcrop the team calls “Kodiak.” In its ancient past, Kodiak was at the southern edge of a delta. The rover’s images revealed for the first time the stratigraphy – the order and position of rock layers, which provides information about the relative timing of geological deposits. The inclined and horizontal layering photographed is what a geologist would expect to see in a river delta on Earth. Perseverance’s observations all confirm the presence of a lake and river delta at Jezero in Mar’s distant past. In similar near-by scarps distinct layers contained boulders up to 5 feet [1.5 meters] across that could only have been placed there during fast moving flash floods. [Mars: Jezero's watery past](#)

✚ **Cyprus to get first new copper mine in decades:** *Venus Minerals* and *Hellenic Copper Mines* have agreed on a partnership for the creation of a copper mine in Apliki, a village in the Nicosia district. Hellenic Copper Mines operate the neighbouring mine of Skouriotissa, which the P3A Earth Science group has visited on a number of occasions. Hellenic Copper Mines will provide their experience in the extraction of ores in the area, as well as in the field of civil engineering and the application of the copper ore extraction method. The Skouriotissa copper mine is considered to be one of the oldest operational mines in the world. [Copper mining in Cyprus](#) dates back to the 4th millennium BC and is believed to have given the island its Greek name Kúpros (Cyprus). Operations at the Skouriotissa mine ceased operations in 1993, when Hellenic Ltd suspended its recovering of copper from leaching waste, but operations at the site resumed in 1996. Venus Minerals also conducted exploratory drilling at Kokkinovia, identifying the deposits as a mixture of copper, gold and zinc. There have been a number of proposals for a new copper mine in Cyprus in recent years but none have reached fruition. [New Copper Mine in Cyprus?](#)



✚ **A Meeting of Ice and Dunes:** Where in the world does a large expanse of ice nestle amongst rolling sand dunes? My first thought was the high desert of the Atacama where ice does form. The photograph is taken from the International Space Station (ISS) of [Ulaagchinii Khar Nuur](#) in the cold steppe of western Mongolia at an altitude of 2,000m. Due to the altitude and the cold air from Siberia the area is subjected to an extended cold winter below 0° C. [Ice & Dunes](#)

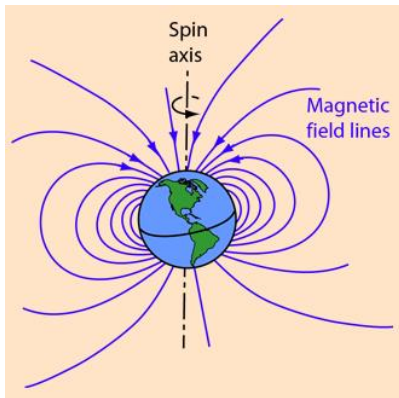


Earth Sciences Field Trip - Tuesday 19th October: A good turn-out for the field



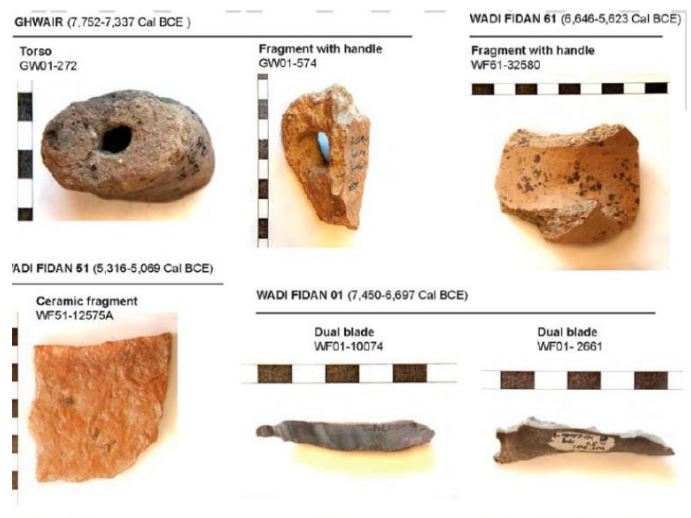
trip – the longest drive I have had in around 20 months! We revisited some locations in the Dhiarizos Valley with some interesting facts on the geology and history of the area from Rob and Rodger. It’s always interesting to visit the ‘Geological Time Wall’ at Trachypedoula. No field trip would be complete without lunch and a chance to chat. The Oasis Cafe is a good find by Keith.

Unlocking the Secrets of Earth’s Magnetic Field From 9,000-Year-Old Recordings : Pottery and burnt flints are being used to estimate the Earth’s magnetic field (Geomagnetic Field) strength in the Middle East approximately 8,000 to 10,000 yrs ago. The magnetic field is generated by electric currents due to the motion of convection currents of molten iron and nickel in the [Earth's outer core](#): these convection currents are caused by heat escaping from the core, a natural process called a [geodynamo](#). The Geomagnetic Field protects the planet from the continued bombardment by cosmic radiation. Its strength and direction are constantly shifting and it is connected to various phenomena in the atmosphere and



the planet’s ecological system, including possibly having a impact on climate. The magnetic information remains “frozen” (until another heating event) within tiny crystals of ferromagnetic minerals. Basalt from volcanic eruptions is frequently used for determining field strength and direction. While in geology dating is on the scale of thousands years at best, in archaeology the artifacts and the magnetic field strength they have recorded can be dated at a resolution of hundreds and sometimes even tens of years. [Earths Magnetic Field Strength from Pottery](#)

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2021/10/20 - Mt. Aso (Japan) erupted at 11:43am: As I was finishing off this E.S.



eNews, my [Volcano & Earthquake app](#) informed me of an eruption of Mt Aso in Japan. The eruption was caught on the visitor centre cameras. Anneke soon afterwards sent me another [video of the eruption](#). Comments below the video classify it as a Plinian eruption with Pyroclastic flow. Large ballistic projectiles can be seen ejected from the centre of the explosion. The eruption is supposed to be a [Phreatic](#) type explosion (steam driven) as a large pocket of overheated water under the crater suddenly flashed to steam as it decompressed. Watch the people in the car park and hikers running down the hillside! One group neatly assemble at the emergency assembly point then return to the building! No injuries are reported.

- **Plinian/Vesuvian** eruptions are marked by columns of [volcanic debris](#) and hot gases ejected high into the stratosphere)
- **Pyroclastic flow** is a fast-moving current of hot gas and volcanic matter (collectively known as [tephra](#)) that flows along the ground away from a volcano at average speeds of 100 km/h but is capable of reaching speeds up to 700 km/h. The gases and tephra can reach temperatures of about 1,000 °C.

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Fossil of the future



Quiz

Volcanoes

Acknowledgements

