Focus on

NEW SATELLITE CONSTELLATION TO TRACK GREENHOUSE GAS EMISSIONS

The new mission will monitor human-made emissions from orbit

A new mission will track human-made emissions of greenhouse gases from space to help keep the world on track to meet climate change mitigation targets. The new mission, announced by the European Space Agency (ESA) and the European Union's Earth-monitoring program Copernicus during the 2021 UN Climate Change Conference in Glasgow on 2 November, will rely on a dedicated constellation of satellites.
The constellation, called anthropogenic CO2 emissions Monitoring and Verification Support Capacity (CO2MVS), is currently being developed by the ESA and the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT). Once in orbit, the satellites will measure concentrations of the two most common greenhouse gases, carbon dioxide and methane, in unprecedented detail and in n ear real time. Carbon dioxide, which is released during fossil fuel combustion and in agriculture, is the most common climate-warming gas, accounting for nearly 80 per cent of all greenhouse gas emissions. Methane, while only accounting for about 16 per cent of global greenhouse gas emissions, is 80 times more potent in warming up Earth's atmosphere than carbon dioxide, and therefore also a cause for concern. The new CO2MVS constellation should be up and running by 2026, in time to help the world review its progress in curbing greenhouse gas emissions as required by the Paris Agreement, the international treaty negotiated during the 2015 UN Climate Change Conference held in the French capital. That agreement requires nations to take stock of their progress every five years to ensure that countries are on track to meet their greenhouse gas reduction targets. The first such analysis is expected to conclude by 2023; the new constellation could be part of the second, due to be completed in 2028. Copernicus representatives said that the new satellite tool will be "game-changing".

Left: The constellation will be able to detect sources of emissions

FRESH MOON ROCKS ARE YOUNGER THAN THE APOLLO SAMPLES

Change 5s delivery has brought new insights about our celestial companion

New analyses of Moon rocks delivered to Earth by China's Chang'e 5 mission confirm that volcanism occurred later than previously known, but also deepen the mysteries surrounding that activity. Change 5 collected 1.73 kilograms of rock from a region called Oceanus Procellarum on the near side of the Moon in December 2020. The mission team targeted this landing area because of its apparent lower density of craters, suggesting it was significantly younger than areas sampled by the Apollo and Soviet Luna missions. The samples were first processed and catalogued, and the first batch of samples was approved for release in June. Since then, various teams of scientists have been working to learn what the rocks can tell us about the Moon and the history of our Solar System. A paper published in Science in early October dated a fragment of the samples at about 1.97 billion years old. Now a second, published in Nature on 19 October, using a similar dating method but on a different sample, gives an age of 2.03 billion years – very close, geologically speaking. This pair of dates confirms that volcanic activity was taking place in this area of the Moon around a billion years after the areas sampled by the Apollo and Luna missions had become geologically dead. That finding tells scientists about the layer of the Moon below the crust. "This means that the mantle had sufficient internal deep-mantle heat 2 billion years ago to continue to melt mantle material and produce extrusive mare basalts," said James W. Head, a professor of geological science at Brown University. Why this patch of the Moon was still active relatively late in the history Moon's remains a mystery.

Two additional papers examining the composition of Chang'e 5 samples go against previous thinking on the causes. Existing theories have focused on the heat-producing elements potassium (K in the periodic table), rare Earth elements and phosphorus, together abbreviated as KREEP. Scientists had thought that these materials would be relatively abundant in the area, helping to generate the heat required to make late volcanic activity possible. But Head's paper andNature on 19 October, using a similar dating method but on a different sample, gives an age of 2.03 billion years – very close, geologically speaking a new study in Nature both examined the composition of a portion of the Chang'e 5 samples and found only moderate KREEP content, suggesting the materials are not required for the late volcanism that created these rocks. "The jury is still out on volcanism occurred,".