

# Space News

looking back over

November 2019

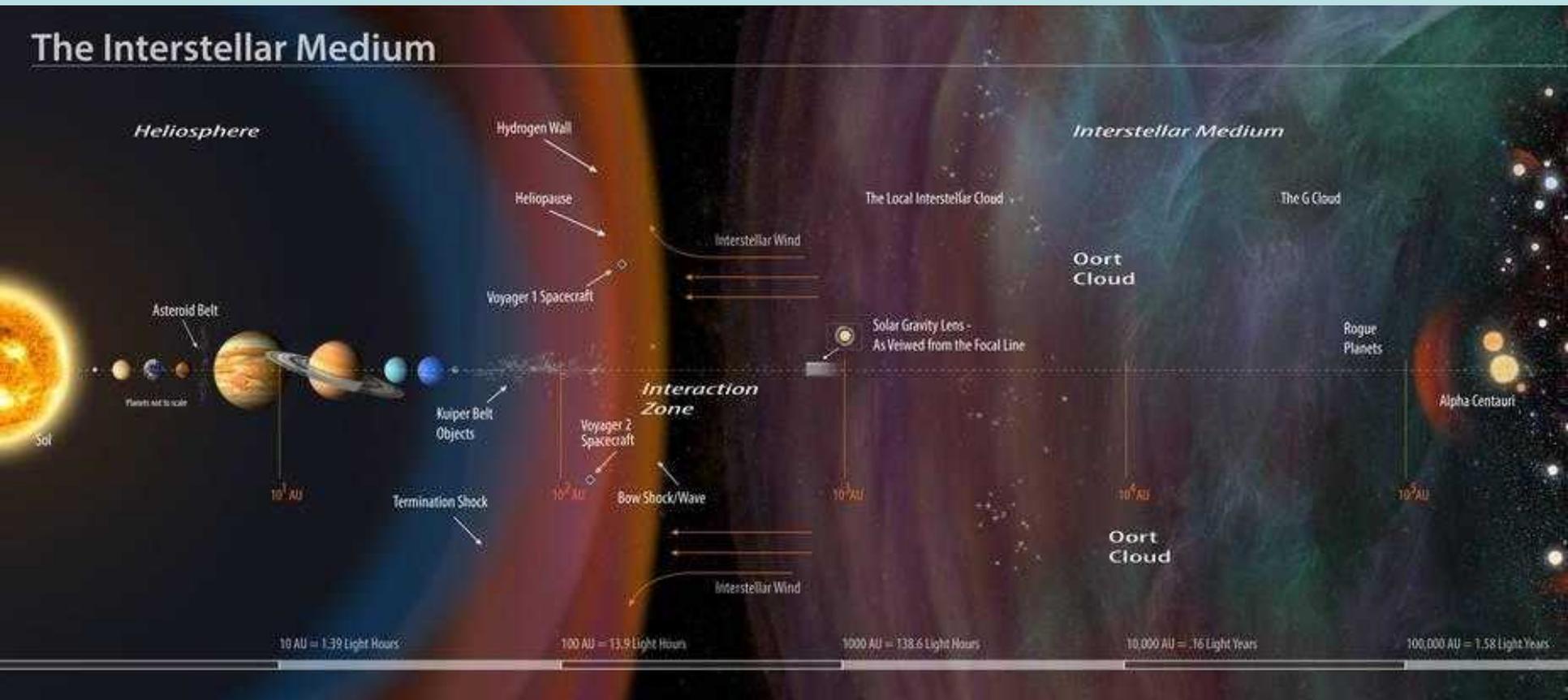
## It's Bake-off - Off-World!!



**2<sup>nd</sup> Nov:** A Cygnus capsule took off for the ISS carrying a *very interesting* set of experiments – including a special “Space Oven”, pieces of Lamborghini car and new radiation protection vest. Also on-board was a batch of cookie dough provided by ‘Hilton DoubleTree’ so that the astronauts can bake fresh cookies in orbit. This is part of seeing what food can be available for long-duration zero-gravity space trips.

# V2 Leaves the Solar System

## The Interstellar Medium



**4<sup>th</sup> Nov:** Voyager 2 passed into the interstellar void a year ago – at 11 billion miles from Earth. Unlike its twin, it is not yet in undisturbed space, but in a perturbed transitional place where the heliopause is interacting with the interstellar medium. This boundary varies with solar activity, so that the quantity of cosmic rays and heliospheric plasma particles fluctuates. The spacecraft's remaining 5 operational instruments continue to return useful data to Earth...

# Human Activities Are Drying Out the Amazon



**5<sup>th</sup> Nov:** A new NASA study shows that over the last 20 years, the atmosphere above the Amazon rainforest has been drying out, increasing the demand for water and leaving ecosystems vulnerable to fires and drought. It also shows that this increase in dryness is primarily the result of human activities, most significantly, the burning of forests to clear land for agriculture and grazing. The combination of these activities is causing the Amazon's climate to warm and giving dry seasons of up to 4/5 months (=> Fires)!

# Can we do without GPS Tools?



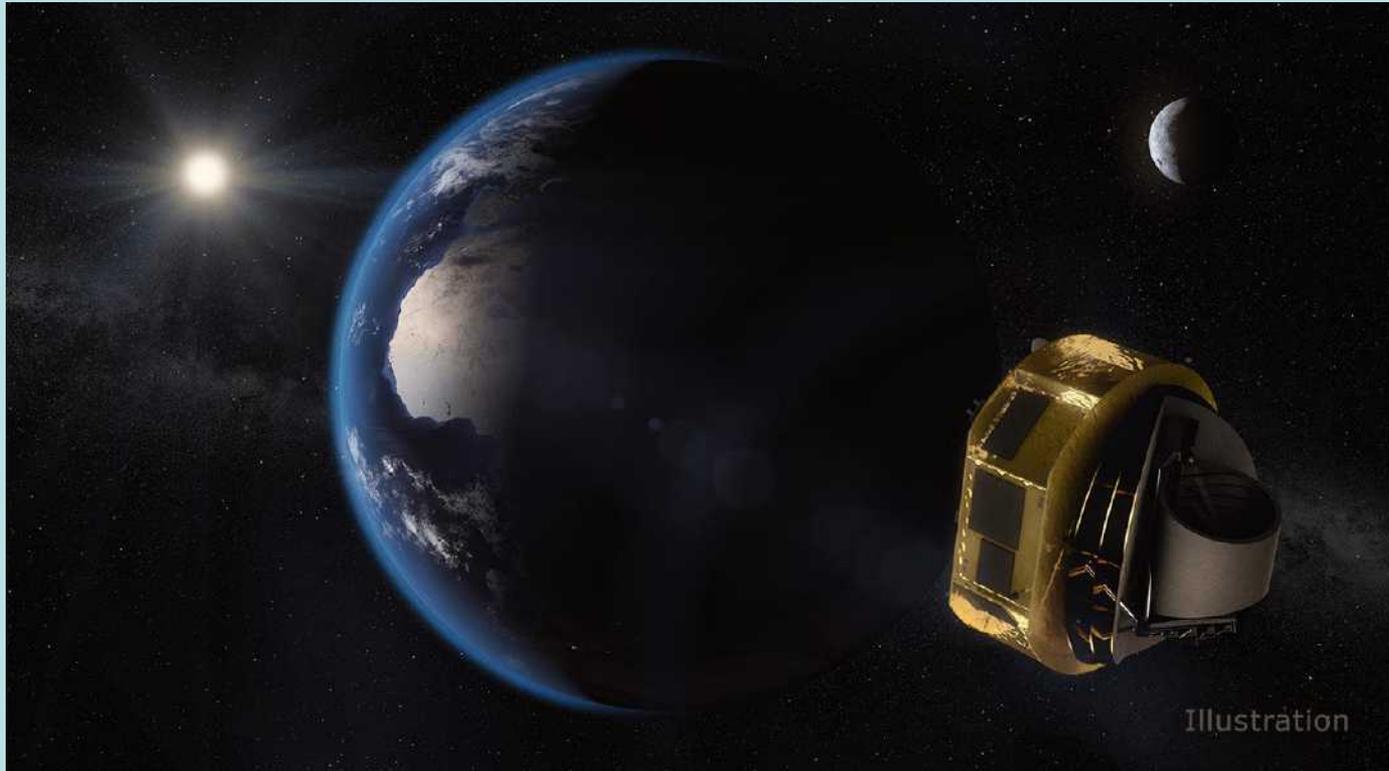
**6<sup>th</sup> Nov:** We all know about ‘idiots’ that can’t use Satnav – but what how would we manage if the GPS systems were taken away? So many aspects of everyday life depend on accurate global positioning: taxi, ship and lorry fleets, parcel vans, ‘just-in-time’ food and materials deliveries, et cetera. UK Govt. estimates loss of GPS as £820m per day, just for the first 5 days!!

# Boeing Proposes alternative Moon Landings



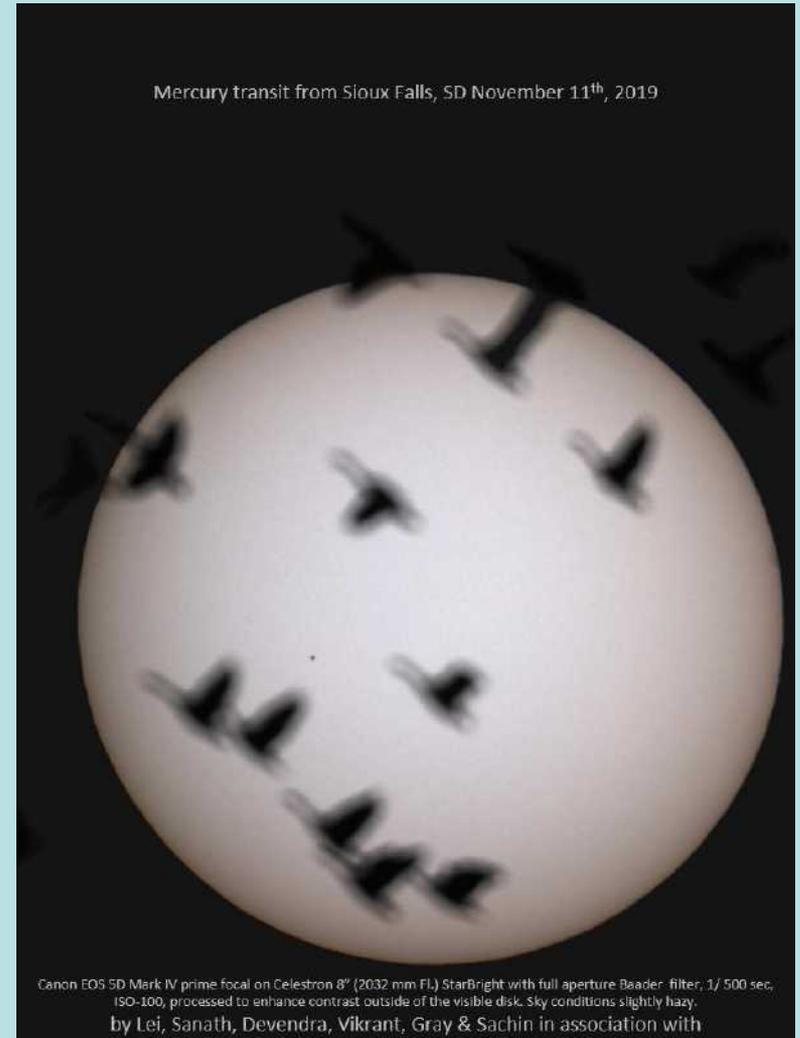
**6<sup>th</sup> Nov:** **Boeing** has unveiled its proposal for a lander that could take humans to the Moon's surface as part of the US Artemis programme in an approach named "Fewest Steps to the Moon". Its plan reduces the complexity involved in sending several different bits of hardware into space on multiple launches but would require a more powerful launch rocket (SLS Block 1B) which is not due to be ready until 2025.

# NASA Instrument to Probe Clouds on ESA Mission



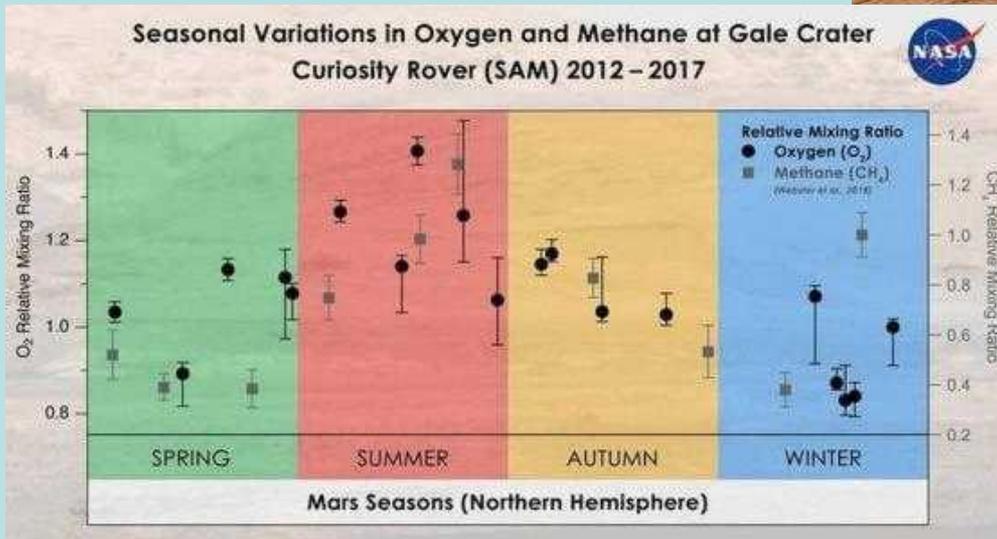
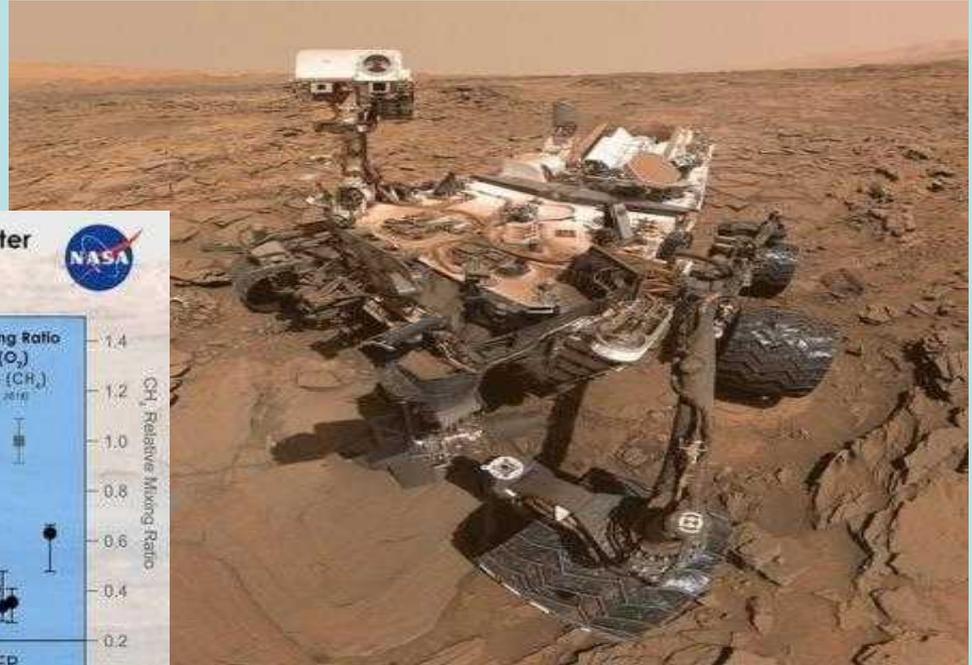
**8<sup>th</sup> Nov:** NASA will contribute an instrument to a European mission that will explore the atmospheres of hundreds of exoplanets, for the first time. The instrument, called CASE, adds scientific capabilities to ESA's Atmospheric Remote-sensing Infrared Exoplanet Large-survey (ARIEL) mission. The ARIEL spacecraft with CASE on board is expected to launch in 2028 and will be positioned at Lagrange point 2, opposite the Sun.

# Mercury crossed the Sun



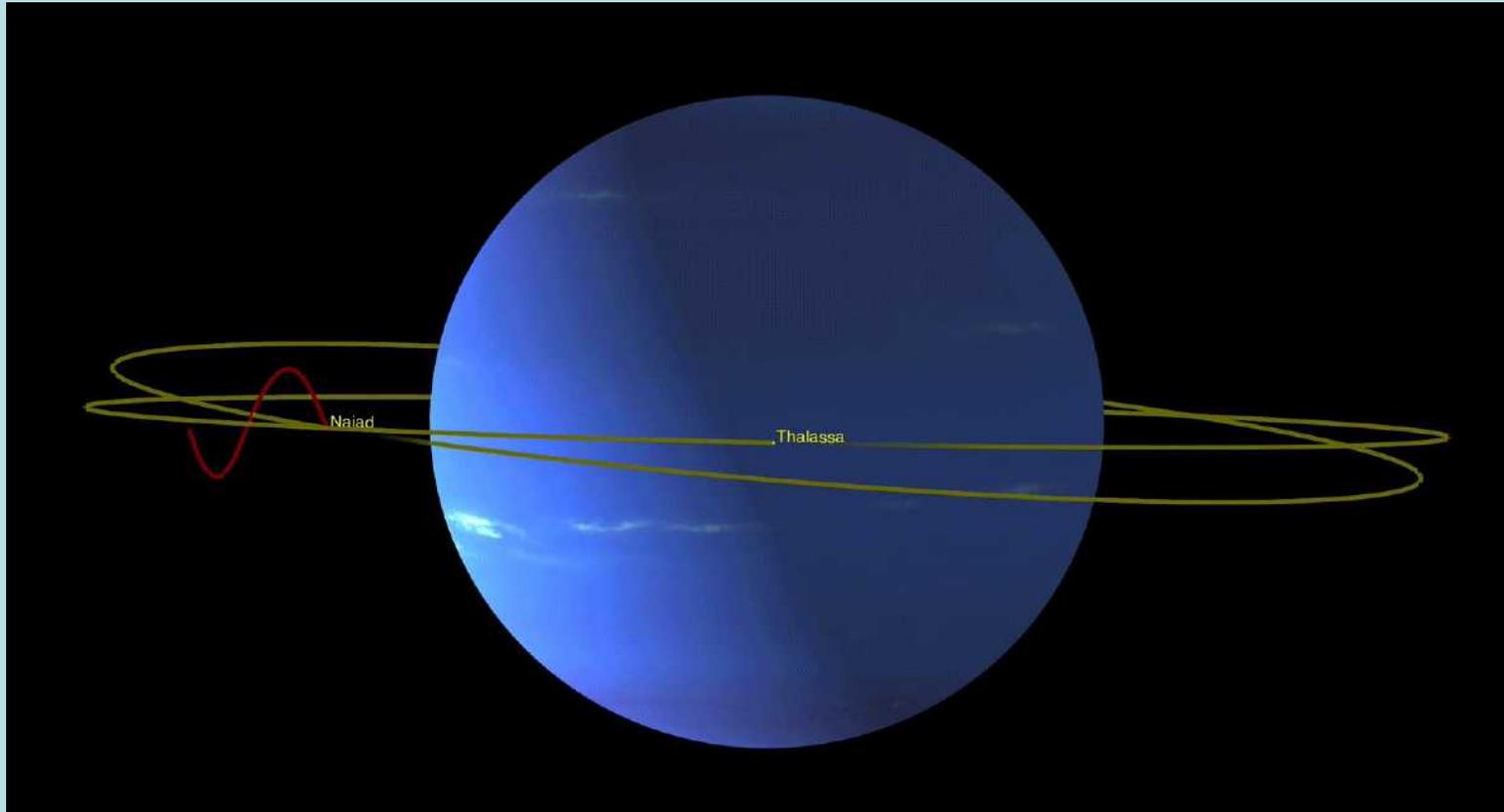
**11<sup>th</sup> Nov:** Transit photos from Raunds, UK (Dave Eagle) and South Dakota (with Geese passing)

# Where did the Martian O<sub>2</sub> come from?



**14<sup>th</sup> Nov:** The oxygen in Martian air is changing in a way that can't currently be explained by known chemical processes, according to scientists working on the Curiosity rover mission, who have been measuring the gas. They discovered that the amount of oxygen in Martian "air" rose by 30% in spring and summer. The pattern remains a mystery – probably geological in nature, but planetary scientists can't completely rule out an explanation involving microbial life...

# Neptune Moons Locked in 'Dance of Avoidance'



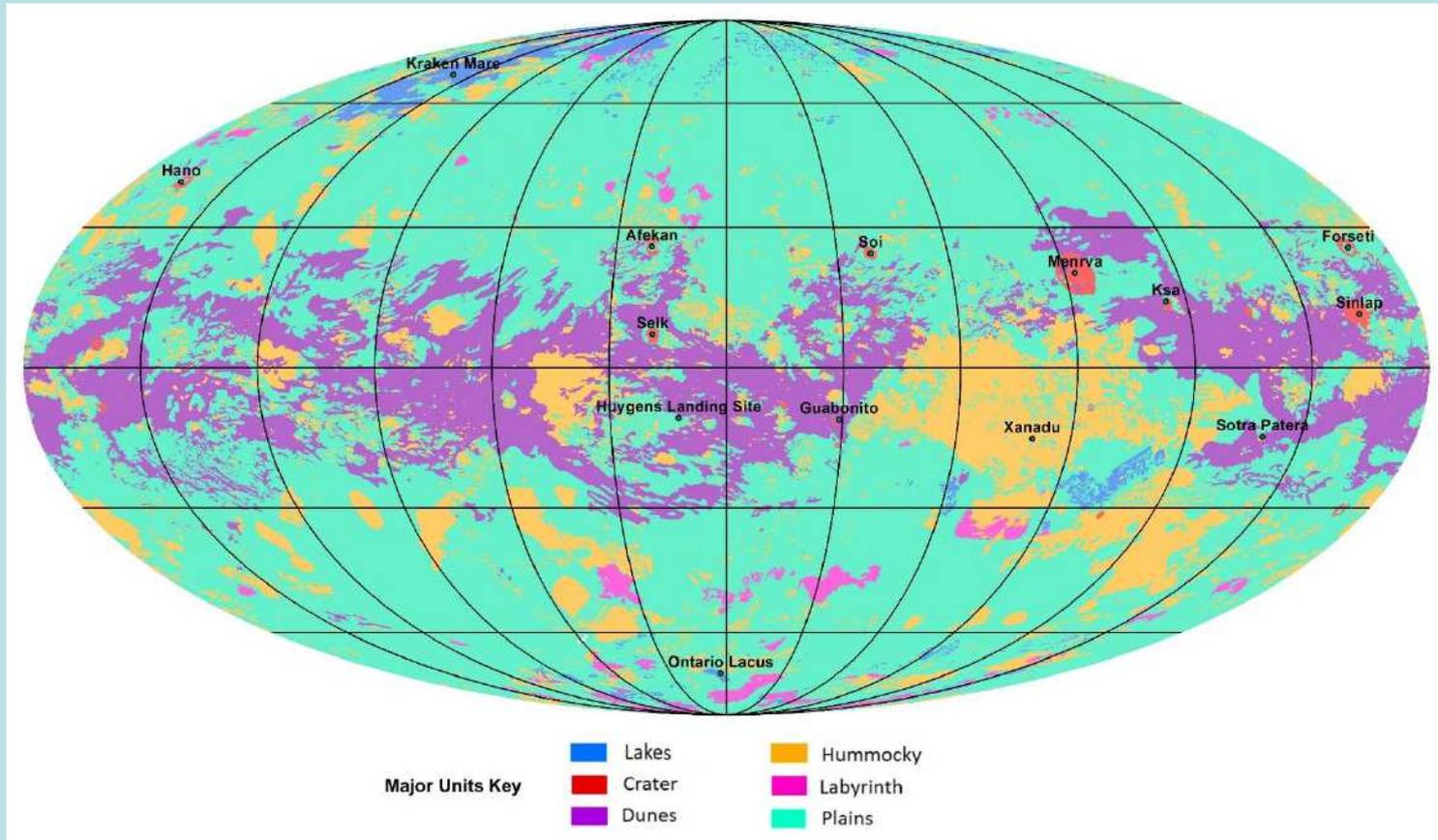
**14<sup>th</sup> Nov:** The strange orbits of Neptune's two innermost moons (of 14) are quite unusual. Orbital dynamics experts call it a "dance of avoidance" performed by the tiny moons **Naiad** and **Thalassa**. They are true partners, orbiting only about 1,150 miles apart. But they never get that close to each other; Naiad's orbit is tilted and perfectly timed. Every time it passes the slower-moving Thalassa, the two are about 2,200 miles apart.

# Jason Replacement ready for Testing



**15<sup>th</sup> Nov:** **Sentinel-6a** will follow the long-running **Jason** series of spacecraft when it launches next November. These missions track the height and shape of Earth's oceans using microwave altimeters. Since 1992, the sea levels have gone up by an average of 3.2mm every year. This trend is accelerating. The most recent five-year period, from 2014 to 2019, has witnessed a 4.8mm/year increase.

# First Global Geologic Map of Titan



**18<sup>th</sup> Nov:** This first global geologic map of Saturn's largest moon is based on radar and visible and infrared images from NASA's Cassini mission, 2004 to 2017. At  $-180^{\circ}\text{C}$  the only liquids are hydrocarbons (methane, ethane) which perform a version of Earth's 'Water-Cycle'. They rain down on the surface, flow in streams and rivers, accumulate in lakes and seas, and evaporate into the atmosphere.

# What's behind the "Space Blob"?

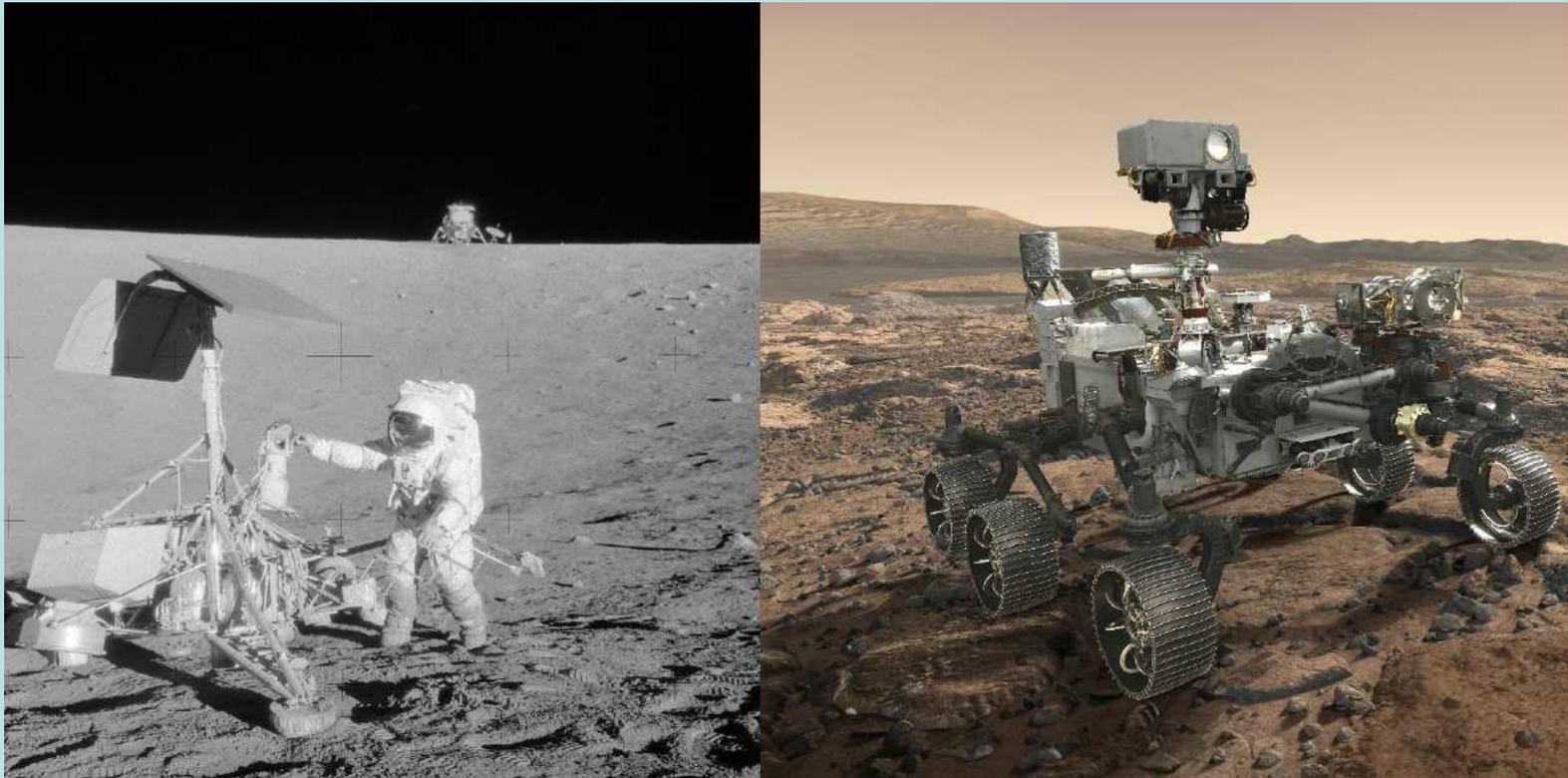


**19<sup>th</sup> Nov:** In 1987 a supernova was observed in the LMC - the nearest, brightest supernova seen in the night sky in 400 years.

Astronomers routinely observe Supernova 1987A and its developing form; a series of bright rings that represent bands of gas and dust thrown out by the star. Scientists reckon they've now located the star remnant. It should be a hot dense neutron star measuring just a few tens of km across, but surrounded in dust glowing with its heat and detectable with our radio telescopes.



# Apollo 12 and Mars 2020 – Connected??



**20<sup>th</sup> Nov:** **Apollo 12** first demonstrated that precision targeted landings were possible – putting the lunar lander down within 160m of ‘Surveyor 3’ (left). Following Apollo missions were then confidently sent to their own special sites. Next year the **Mars 2020** mission will launch, with the expectation of a similarly accurate touchdown in Jezero Crater on Feb 18<sup>th</sup>, 2021. Its terrain relative navigation, a computerized autopilot that utilizes optical imagers and computers will help Mars 2020 avoid landing hazards.

# Starship blows its Top



**21<sup>st</sup> Nov:** SpaceX's Starship prototype experienced a **major failure** during pressurisation testing. This photo of the scene in Texas shows the vehicle rupture. Cryogenic ( $\text{CH}_4$ ,  $\text{O}_2$ ) propellants that were being loaded at the time dispersed across the Boca Chica facility in a huge cloud.

Starship will be used to ferry people and cargo off Earth, and around the globe. The Mk-1 prototype was due to begin practice flights to 20km soon.

# ESA Plans its own Lunar Lander



**21<sup>st</sup> Nov:** ESA is working on a concept for a robotic lunar lander. It would fly in the mid-to-late-2020s and use the proposed Moon space station, Gateway, as a halfway point. The lander could go down to the surface to deliver cargo to astronauts but also return samples to the Gateway for onward return to Earth.

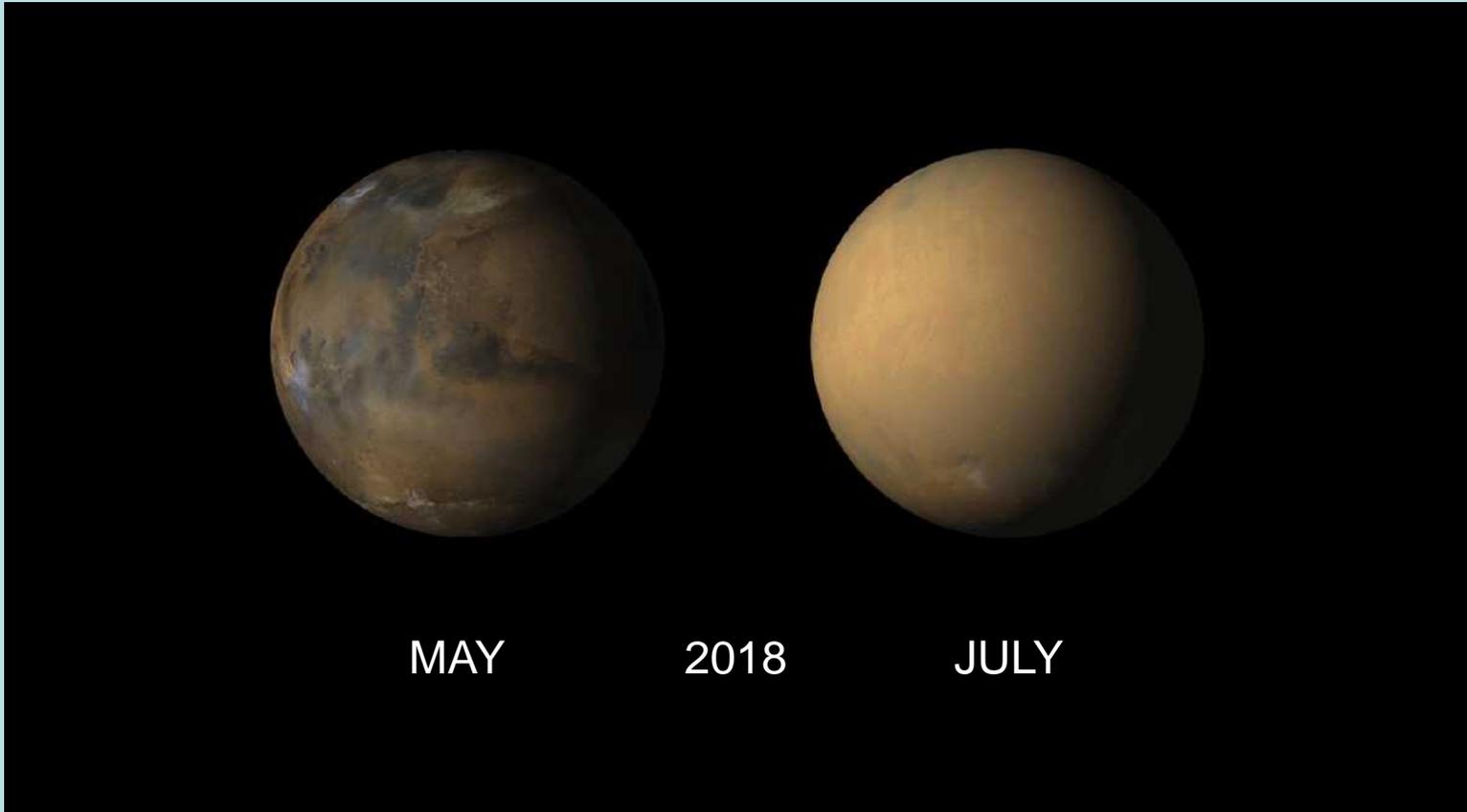
# Russian 'Nuclear Rocket' Failed but goes on...



**22<sup>nd</sup> Nov:** Russian President Vladimir Putin has promised to press on with the development of a nuclear-powered rocket believed to have been at the centre of a deadly accident, when five engineers and two others died when its engine exploded at a test range on the White Sea on 8<sup>th</sup> August.

Defence experts think it was part of a nuclear-powered cruise missile. "We will certainly be perfecting this weapon regardless of anything," Mr Putin told widows of the victims as he presented posthumous medals.

## Martian Dust Storm Towers Analysed...



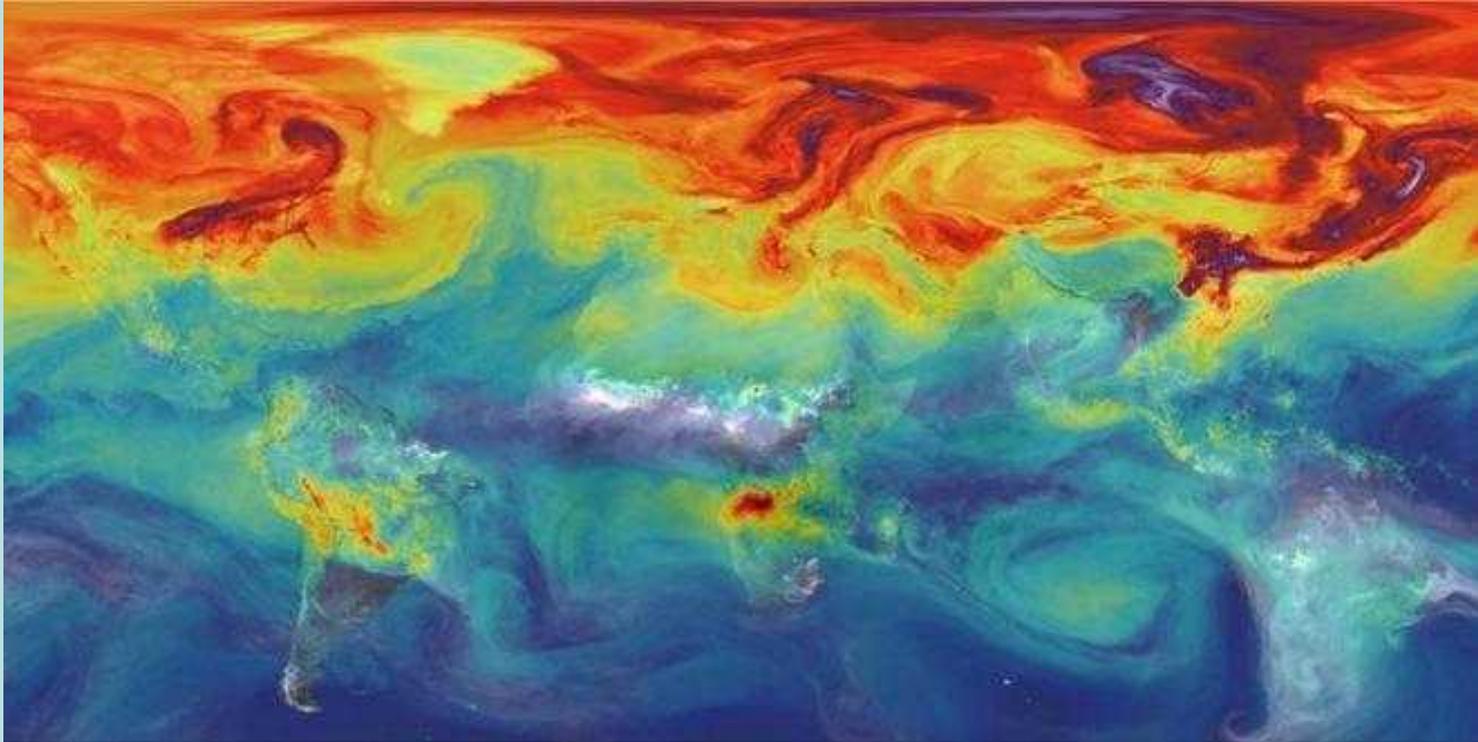
**26<sup>th</sup> Nov:** Last year's planet-wide dust storm resulted in the loss of the NASA Opportunity rover. Analysis of images and other data from MRO indicates that enormous dust towers were created that lift the dust 50 miles high into the atmosphere, where solar radiation breaks apart their molecules. This might help explain how Mars' water disappeared over billions of years.

# ESA Budget rises to cover BIG Projects



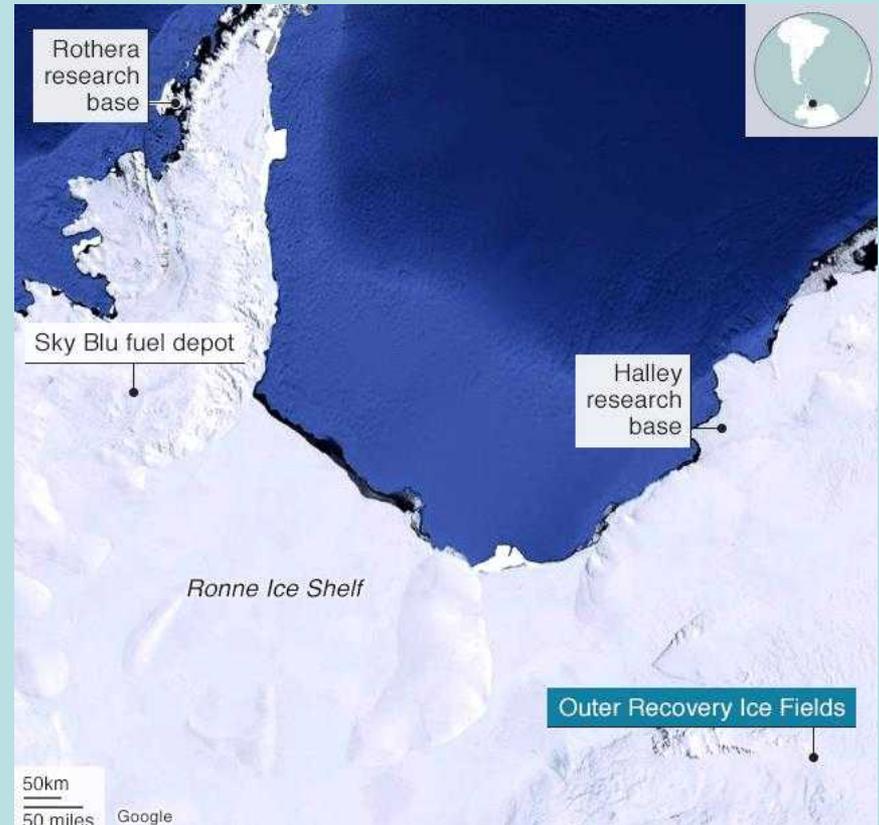
**28<sup>th</sup> Nov:** ESA's member countries are planning to increase its budget by 10% so that some projects can be aligned. In particular the **Athena** X-Ray telescope could be launched in association with the orbiting **LISA** mission to put 3 spacecraft in orbit to detect Gravitational Waves. Usually these big projects can only be undertaken every 5 years, but the increased science budget to €3bn is due to be approved at the Council Meeting in Valencia.

# Earth Observation takes the biggest share



**28<sup>th</sup> Nov:** Europe can press ahead with a network of Sentinels to track **carbon dioxide** emissions across the globe, now that new ESA budget has been agreed at the triennial ministerial council in Seville, Spain. Research ministers have approved a package of proposals worth some €14.4bn over the next five years. As well as the new CO2 monitoring system, the funds will also pave the way for missions to the Moon and Mars. *The UK's contribution will go up from £304m to £377m per year (£5.70pp).*

# Metal meteorite quest set to get under way



**29<sup>th</sup> Nov:** A team of British scientists has arrived in the Antarctic to try to find the continent's "missing meteorites". The Univ of Manchester group will spend 6 weeks scouring a remote region for lumps of iron that have fallen from the sky. These pieces of metal represent the shattered remains of small planet-like objects that were destroyed in the early life of the Solar System. These Iron meteorites are rare - especially in Antarctica.

Send anything interesting you  
spot during  
December to:  
[michael@held.org.uk](mailto:michael@held.org.uk)

Alan Bean  
&  
Pete Conrad  
Apollo 12  
Nov 1969

