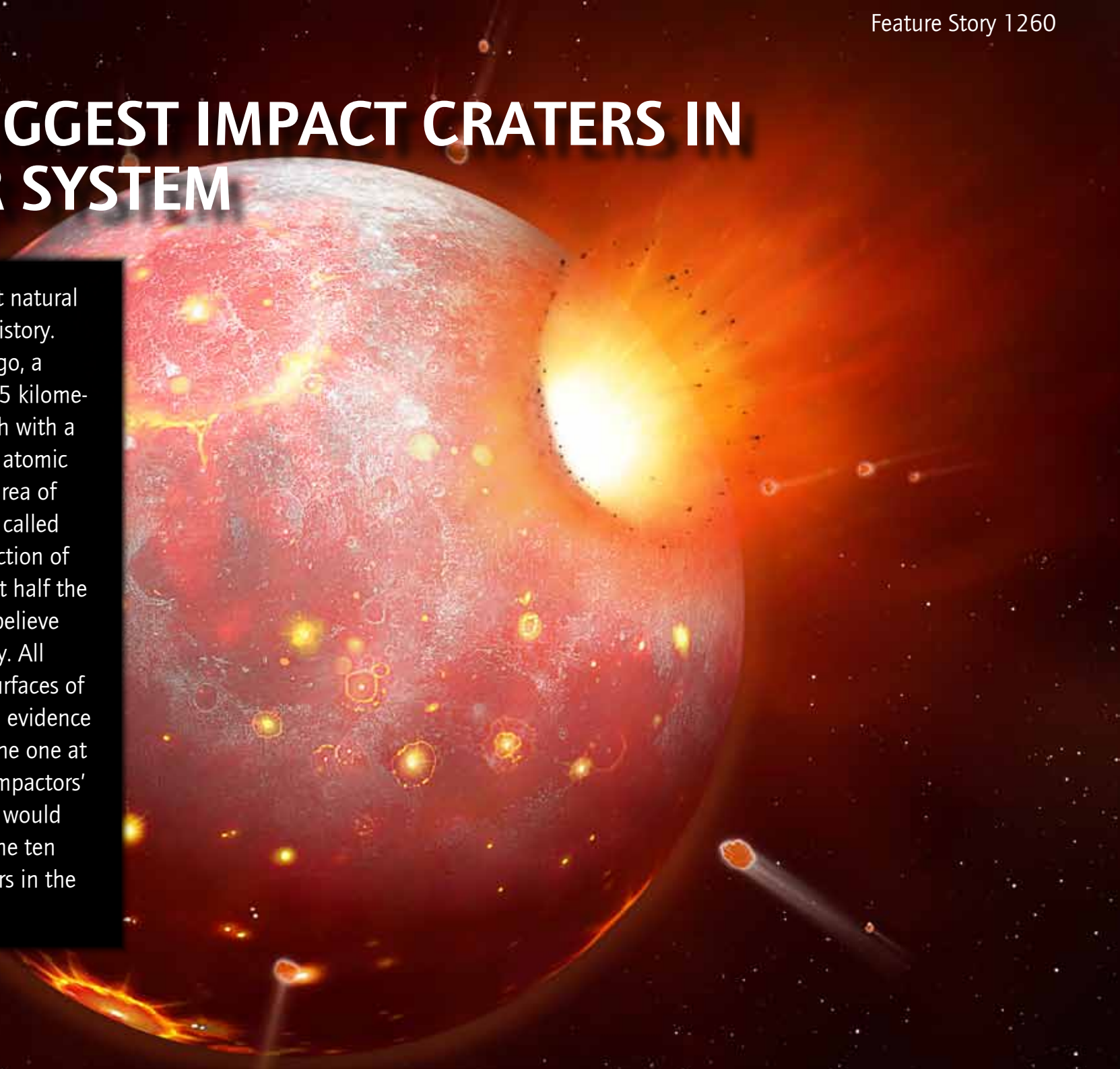
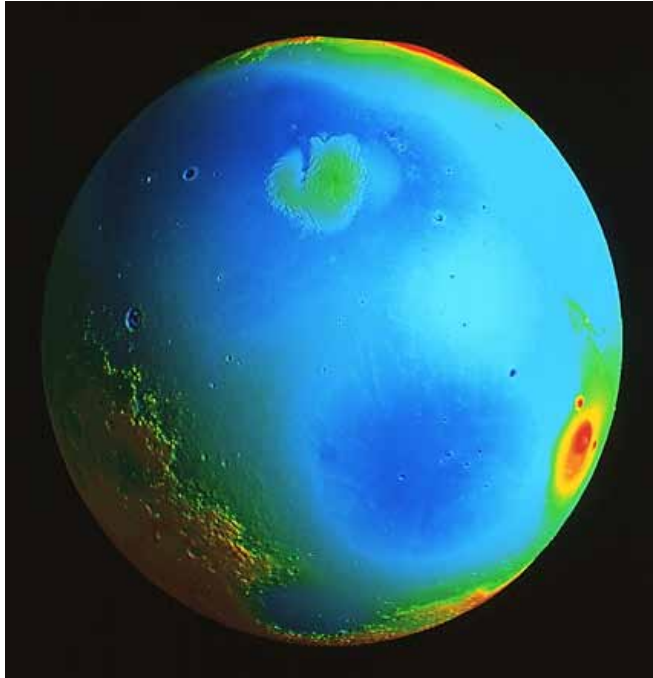


# THE TEN BIGGEST IMPACT CRATERS IN THE SOLAR SYSTEM

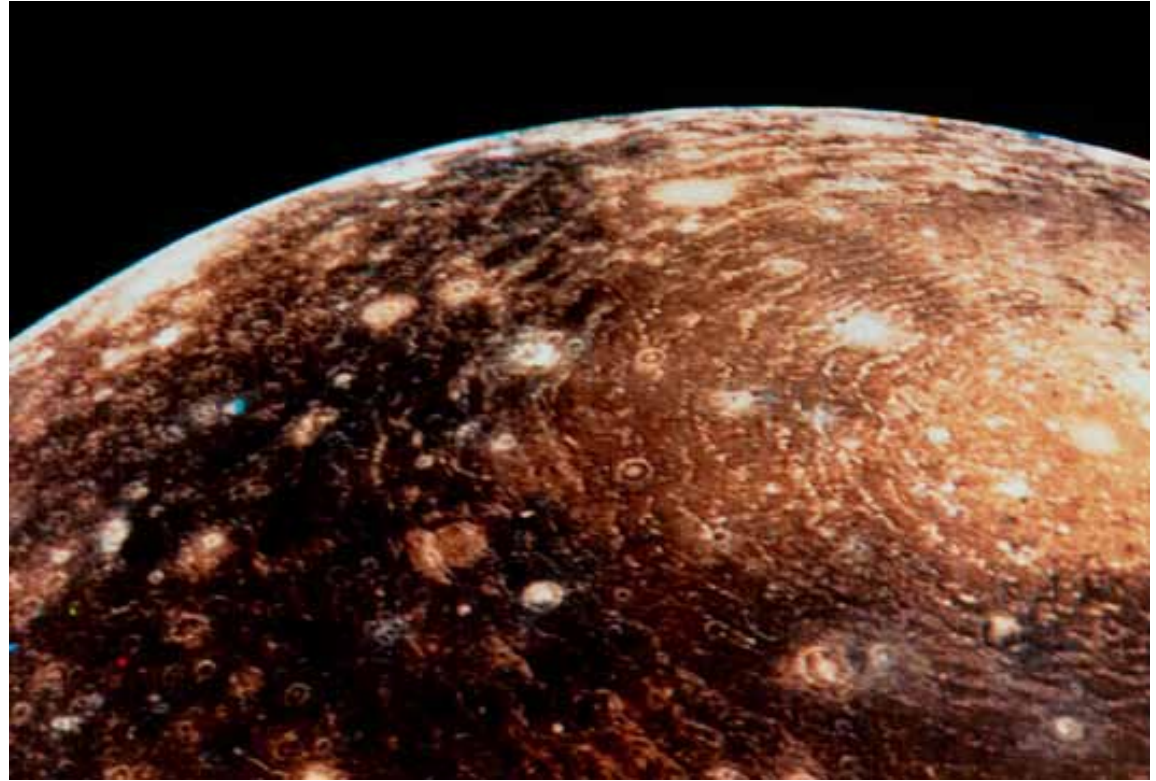
It was one of the greatest natural disasters in the Earth's history. Sixty-five million years ago, a piece of space rock nearly 15 kilometres in diameter hit the Earth with a force equivalent to a billion atomic bombs. This impact, on an area of Mexico's Yucatan Peninsula called Chicxulub, caused the extinction of the dinosaurs and wiped out half the species on the planet. But, believe it or not, the Earth was lucky. All over the solar system, the surfaces of planets and moons bear the evidence of impacts far bigger than the one at Chicxulub. If any of these 'impactors' hit Earth, the consequences would be catastrophic. These are the ten biggest known impact craters in the solar system:





## 1. Borealis Basin, Mars

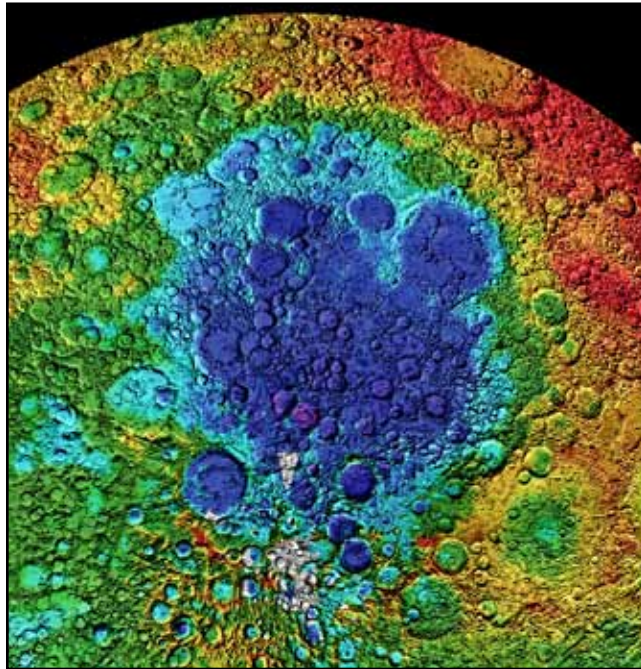
Mars holds many records in the solar system. It has the biggest volcano, the biggest canyon system and quite possibly, the biggest crater. Scientists in the 1970's studying the Viking spacecraft images of Mars were perplexed as to why the planet was divided into two halves. The upper third hemisphere of Mars appeared very smooth and low in altitude while most of the southern hemisphere was several kilometres higher, scarred with rough terrain and pitted with craters. The two-half planet remained a mystery until new data, provided by Mars Reconnaissance Orbiter and Mars Global Surveyor, indicated that the northern hemisphere's 8,500-kilometre diameter Borealis Basin could actually be a huge 4 billion-year-old impact crater. The object that created this impact was probably around 2,000 kilometres in diameter – that's the same size as the planet Pluto.



## 2. Valhalla, Callisto

The Jovian moon Callisto is a huge chunk of rock and ice that is one of the most heavily cratered satellites of any planet. Valhalla, its biggest impact basin, consists of a bright patch roughly 600 kilometres in diameter, and a series of concentric rings that spread out beyond the centre for thousands of kilometres. The rings were formed when the impact caused fracturing

on the thin surface crust of the moon. Scientists think this could mean the crust covers a soft or liquid ocean underneath. The outermost ring is 2,000 kilometres from the centre and is big enough to fit the whole of the USA within its boundaries.



### 3. South Pole-Aitken Basin, Moon.

Thank goodness for the Moon. Not only does our shiny satellite light up our night sky, shift our ocean tides and fill our folklore with moon-related tales, but also, for the many hundreds of thousands of impacts it has taken instead of the Earth.

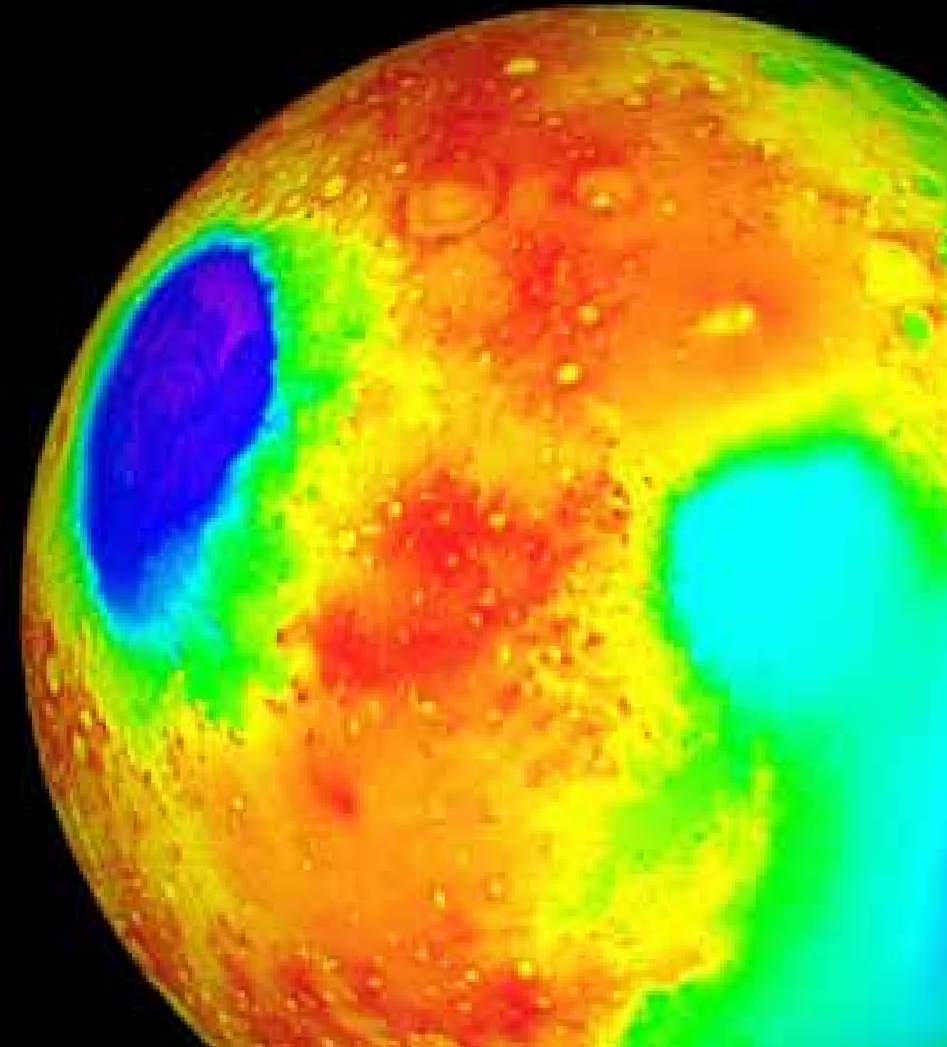
Many lunar craters are visible to the naked eye but no one knew about the monster that existed on the far side of the moon until a small Russian probe, called Luna 3, visited during the early 1960's and sent some intriguing images.

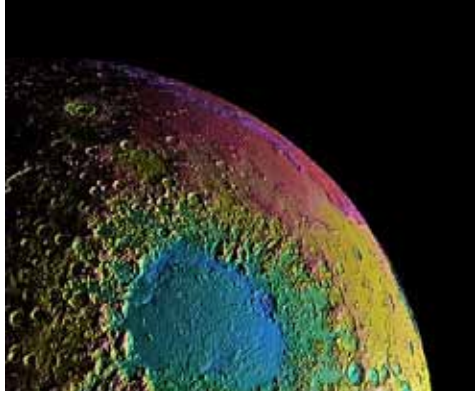
Subsequent spacecraft have confirmed that a huge impact basin, 2,500 kilometres in diameter and 13 kilometres deep, exists between the south pole and the large Aitken crater.

The impact occurred very early in the existence of the moon, some 3.8 billion years ago and the object that made it was so big that it would easily have smashed the Moon apart were it not for the fact that it hit at quite a low angle – the equivalent to a heavyweight boxer's glancing blow to the head!

### 4. Hellas Basin, Mars

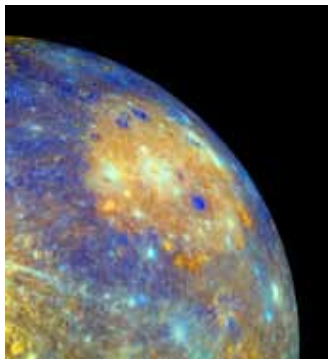
At over 2,100 kilometres in diameter and nine kilometres deep, the Hellas Basin on the southern hemisphere of Mars is very big, and very deep. You could fit all the countries of western Europe inside its basin. The crater walls are very steep and the huge amount of material ejected by the impact stretches out for 4,000 kilometres from the basin centre and is up to 2 kilometres thick in places.





### 5. Argyre Basin, Mars

Coming a close second to Hellas in terms of size, is the massive Argyre Basin, also on the southern hemisphere of Mars. At 1,800 kilometres wide and 5 kilometres deep it closely rivals its giant crater but the two are on different sides of the red globe. Argyre does have one novel feature of interest – a smiley crater!



### 6. Caloris, Mercury

It was the space probe Mariner 10, in 1974, that first discovered something huge lurking on the surface of

our smallest planetary neighbour Mercury. In 2008, the Messenger spacecraft went back and examined Mercury. It confirmed a

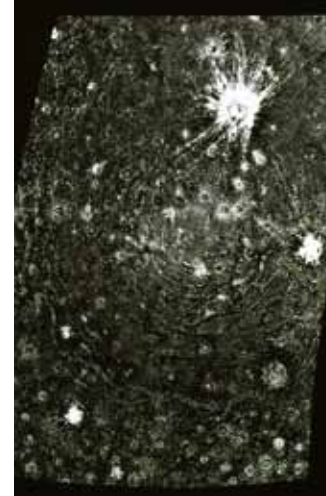
monstrous crater, 1,550 kilometres in diameter, which, due to its small size, affected the entire planet. The impact that created the Caloris Basin caused massive amounts of lava to flow across the impact basin. The force of the impact itself pushed the crust upwards, creating a ring of mountains two kilometres high that surround the crater. Shock waves from the impact caused a second set of outer mountains to rise up from the crust and even affect geological processes on the other side of the planet.

### 7. Isidis Planitia, Mars

Isidis is Mars' third, officially recognised, biggest crater. With a diameter of around 1,500 kilometres, the vast sand-covered basin was chosen as the landing site of the ill-fated Beagle 2 spacecraft. The British-built Beagle 2 was released from ESA's Mars Express spacecraft in December 2003. After separation, Beagle 2 was never heard from again. The huge basins of Mars may once have contained liquid oceans of water and Beagle 2 was meant to find evidence of water, and possibly life.

### 8. Asgard, Callisto

Valhalla is not the only big impact on Callisto. The rings of Asgard span over 1,400 kilometres in diameter. It too has a bright central zone, which measures 300 kilometres wide. Like Valhalla, the Asgard impact happened a long time in the past, possibly several billion years ago when impacts were



much more common.

### 9. Mare Imbrium, Moon

Ancient sky gazers once thought that the dark patches on the surface of the moon

were vast oceans. Mare Imbrium is the largest of these patches and is easily visible to the naked eye. If the Moon were a clock face, Mare Imbrium could be described as a roughly circular patch sitting around 11 O'clock on the moon's face. The basin measures 1,100 kilometres in diameter and its dark appearance is due, not to a liquid ocean, but was formed when lava fluid flooded the hole that was made by the impact.

And what a colossal impact it must have been. Surrounding the Mare crater are three rings of mountains, some rise as high as seven kilometres above the Mare surface. The impact gouged a hole five kilometres deep and



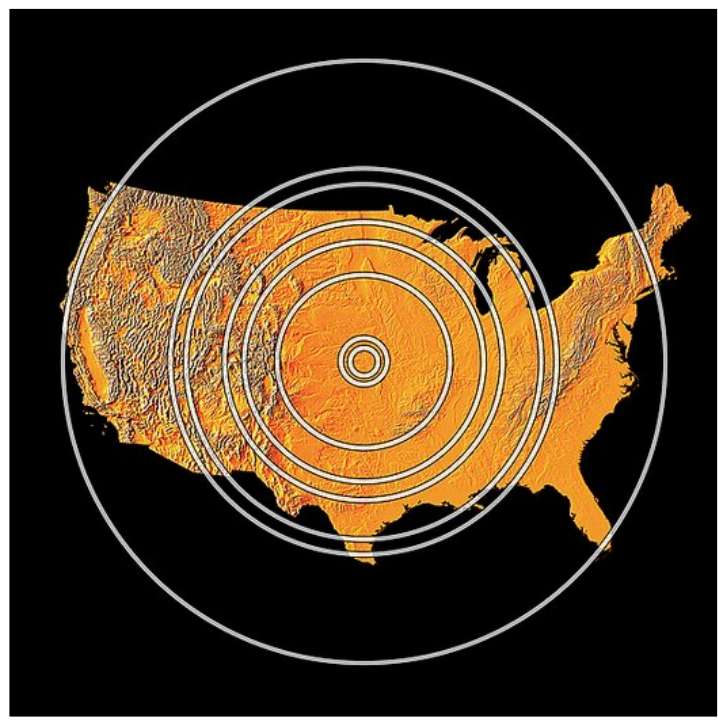
blanketed the surrounding area with ejecta for over 800 kilometres.

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### 10. Turgis, Iapetus

The Saturnian moon Iapetus measures just 1,500 kilometres in diameter. One half of the moon is covered with dark ejecta giving it a two-tone appearance. Dominating the 'light' side of the moon is the Turgis impact crater. Although the crater measures only 580 kilometres wide, it comprises 40 percent of the diameter of the whole of Iapetus. This is easily one of the biggest craters as a proportion of the diameter and hence makes our top ten – and it looks very pretty too.





### Impacts on Earth

The Chicxulub impact that killed off the dinosaurs 65 million years ago seems like a small dent compared to the monstrous impacts found on other solar system bodies. Chicxulub is actually one of over 170 terrestrial impact craters that are officially recognised by the Earth Impact Database – an online catalogue of impact craters with strict criteria.

Some impacts, such as the Barringer crater in Arizona, or Wolf Creek crater in Australia are easily visible, having formed within the past few hundred thousand years. Most other craters however are hidden under deep layers of sediment, rock, water, or vegetation. Satellites that measure anomalies in the surface gravity are able to spot many hidden craters, such as those lying in Chicxulub and Chesapeake Bay. The largest crater on Earth that is officially recognised by the Earth Impact Database, is the 300 kilometre Vredefort

impact crater in South Africa. There are also suggestions that the East Antarctic ice sheet hides a 482-kilometre impact crater. Some researchers believe this impact may have been the cause of the great Permian-Triassic extinction 250-million years ago.

Most impacts that occurred further back in time have long since become eroded away or eaten up as part of the Earth's continual geological processes. But it was highly likely that in the earliest history of the Earth, our planet was bombarded with objects as big as those that have fallen on Mars, the Moon, Callisto etc.. The truly frightening aspect, is that a monster impact may yet hit us in the very near future. And there is nothing we can do to stop it.

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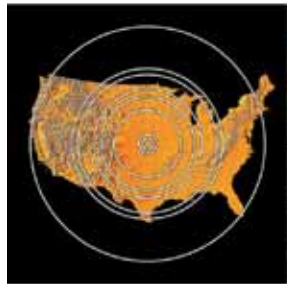
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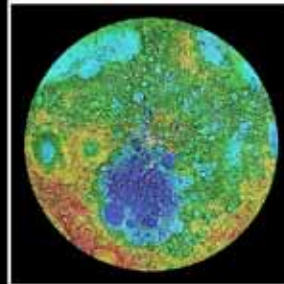
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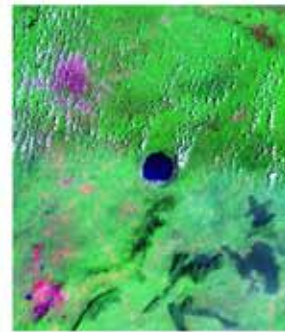
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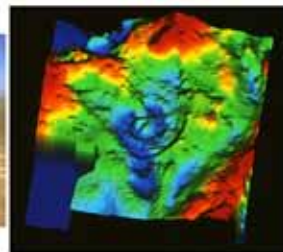
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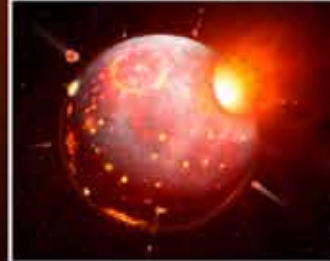
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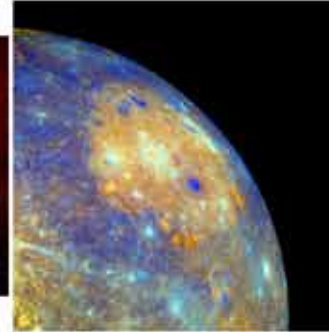
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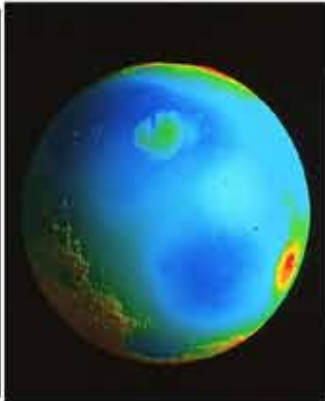
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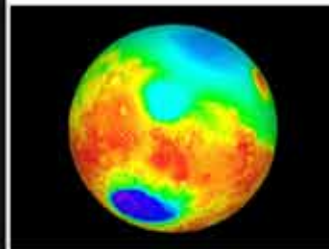
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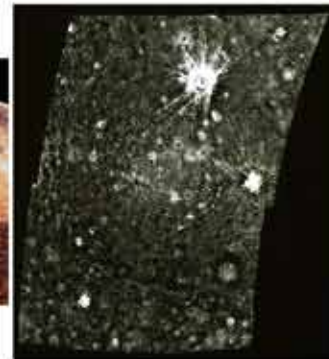
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