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Elon Musk's line in the sky

Astronomers are concerned about SpaceX's bright satellites

Donna Lu

SKYGAZERS had an unusual view last week: a string of bright objects moving across the night sky, as seen in this image captured by Marco Langbroek in Leiden, the Netherlands.

The orbiting objects are Starlink satellites, produced by Elon Musk's SpaceX and launched two days earlier. The 60 satellites are the first of an intended 12,000-strong fleet designed to provide broadband internet worldwide.

The satellites are in low orbits: initially launched to an altitude of 440 kilometres, their thrusters will carry them to 550 km above Earth and they should dim as they disperse. Their brightness has been met with concern by astronomers, who say the planned number of satellites could interfere with views of the night sky.

Musk claimed on Twitter that Starlink would have "no material effect on discoveries in astronomy", but also said he is looking at reducing the reflectivity of future satellites. ▮

MARCO LANGBROEK

Geology

The oceans are draining below Earth's crust

SEAWATER has been steadily draining into the interior of our planet over the past 230 million years. The loss is equivalent to a fall in sea level of at least 50 metres and possibly as much as 130 metres.

This drainage won't counter the current rise in sea levels, however, which is driven by climate change and ultimately our greenhouse gas emissions. That's because the seas are rising 10,000 times faster than the rate at which water is draining away.

Many processes have affected sea levels over Earth's history, from warmer climates that melt ice sheets, causing levels to rise, to sea-floor rocks becoming denser with age and sinking, causing levels to fall. Another is subduction: as one continental plate moves under another it is dragged down into the mantle below, taking water trapped inside the rock with it.

To find out how much water is lost to the mantle in this way, Krister Karlsen at the University of Oslo in Norway and his colleagues modelled the flow of water into and out of Earth's interior over the past 230 million years. They found that it varied depending on the speed of subduction: if the rate is slow, water in the sinking rocks can escape back into the sea.

The team found the rate of subduction increased around 150 million years ago. Before then, all the land masses were linked together in a supercontinent called Pangaea. But by 150 million years ago Pangaea was breaking apart. "You have much more rapid subduction when you break up a supercontinent," says Karlsen.

"If the oceans carry on draining at a similar rate, they would empty in about 12 billion years"

If no other processes were taking place, sea levels would have fallen by between 50 and 130 metres in the past 230 million years, with the fastest drops around 150 million years ago (*Geochemistry, Geophysics, Geosystems*, doi.org/c58r). In reality, more dominant processes like sea floors sinking were also happening, so the effect of this drainage was masked.

If the oceans carry on draining at a similar rate, they would empty in about 12 billion years. However, the sun is expected to destroy Earth in about 5 billion years. ▮

Michael Marshall