

WHAT I REALLY WANT TO KNOW IS...

Should we be concerned about space junk?



Maggie Aderin-Pocock wonders how we can tackle the increasing amount of debris clogging up low-Earth orbit

INTERVIEWED BY KEV LOCHUN

There is an awful lot of man-made debris in orbit around our planet. It's not just dead satellites: also skirting above us are spent motors, fuel tanks, flecks of paint and shrapnel from past collisions.

NASA estimates that there are more than 21,000 pieces of orbital debris larger than 10cm; there are approximately 500,000 measuring 1-10cm, and tens of millions of pieces smaller than a centimetre.

Much of this junk is concentrated in low-Earth orbit, which is where most of our satellites operate, and is travelling around Earth at amazing speeds – completing an orbit as fast as once every 90 minutes. This is what makes it so dangerous. Even something as small as a paint flake is moving fast enough that it could cut through an astronaut's spacesuit.

The ISS has been dodging debris for years. And in April 2012, the Fermi Gamma-ray Space Telescope had a near miss, firing its thrusters to avoid being hit by a defunct satellite. I've also had the opportunity to see the Hubble Space Telescope's old solar panels – they are pocked and grazed from space debris and micrometeoroid impacts. Each dent made them less efficient.

Collision chaos

The single worst space junk incident occurred in 2009, when the defunct military satellite Kosmos-2251 collided with the active communications satellite Iridium-33. The impact created 2,000 new pieces of debris large enough to be tracked from Earth, which continue to orbit our planet and could cause trouble for other satellites.

Space debris presents a problem we didn't really anticipate when we started launching satellites, but it is becoming more topical politically and so people are trying to come up with solutions. Don't forget, we're not at the point where we want to stop putting things into orbit; more and more

countries want to send their satellites into space. That's why we need to act now.

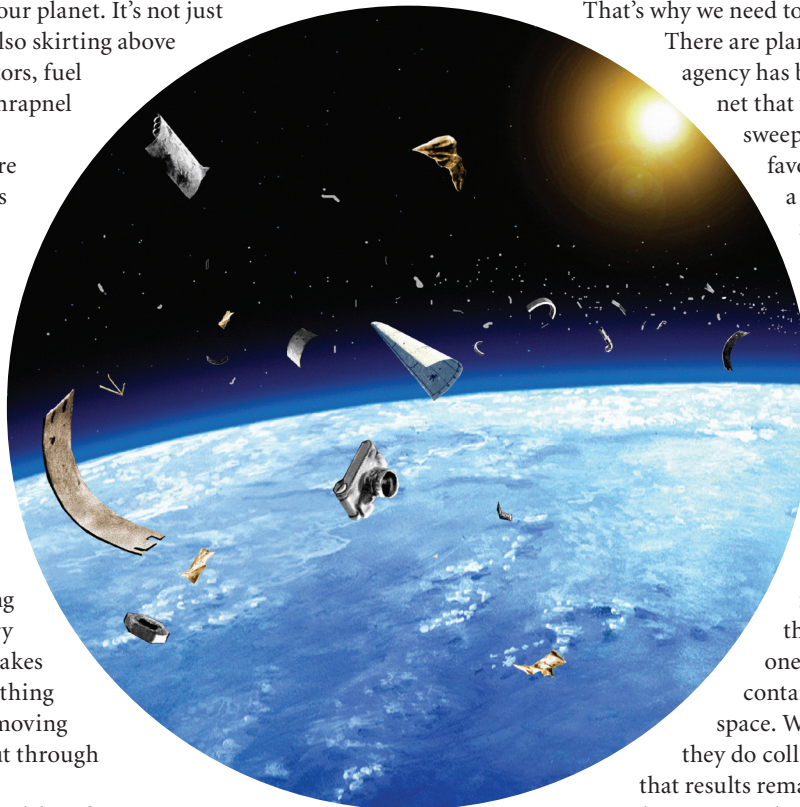
There are plans afoot. The Japanese space agency has been talking about using a net that will travel through space sweeping things up. One of my favourites is the idea of using a CubeSat (a 10x10x10cm microsatellite), fitted with a sail, to grab space junk and de-orbit it. But no one has taken any direct action yet. The trouble is finding something effective. Cost is also a limiting factor.

In the meantime, it's about damage limitation. Often we put satellites near the end of their lives into a 'graveyard' orbit where they can't interfere with active ones. The idea is to keep them contained – like a dustbin in space. We put them in there and if they do collide, the fountain of debris that results remains in that dead orbit.

In the past, people didn't give much thought to how to get rid of a satellite. You were allocated a volume of space and maybe factored in pushing the dead satellite into a graveyard orbit, but that's as far as the planning went. Now it's more common for operators to have to plan for their satellites' demise. One solution could be to perform a controlled burn-up in Earth's atmosphere.

Looking at the way we design satellites at the moment, I don't think there is much we can change. What would be nice is if, when a satellite 'died', it could fold itself up. Often they launch in compact form and only deploy their solar panels and instruments later on; you'd almost like it to do the opposite as well, making it a smaller target and less likely to collide with other space junk. This is part of the appeal of CubeSats, which are pretty small.

Does the junk pose a risk to us on the surface? It's a numbers game. Most debris would disintegrate in the atmosphere. If something large were to start tumbling down towards us and did reach the surface, it is most likely to hit the water, so the risk is slim. **S**



Space debris has many guises – there's even a camera lost during the Gemini 10 mission in orbit

ABOUT MAGGIE ADERIN-POCOCK

Dr Maggie Aderin-Pocock is a space scientist who has worked on myriad satellites, as well as the James Webb Space Telescope. She will be speaking at the British Science Festival in Newcastle this month.