ONE THOUSAND ELEPHANTS ORBITING THE EARTH

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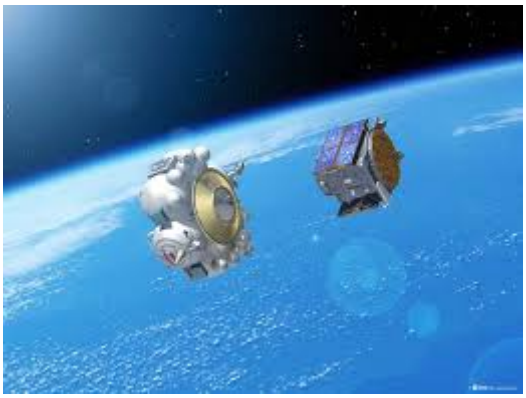
Could the Day of Archaeology have started in a more appropriate manner for a space archaeologist specialising in orbital debris?

Last night, while I was on my way home from a conference dinner at the National Wine Centre in Adelaide, observers in the eastern states of Australia were mesmerised by a flaming ball that streaked through the sky. Was it a meteor? Was it a piece of space junk? (To date, no-one has suggested it was a UFO).

This morning, it was quickly established, taking into account its slow speed, re-entry path and data from US Space Surveillance, that it was a Fregat rocket body, the upper stage of Russian launch vehicle which earlier in the week had boosted a weather satellite and six other payloads into Low Earth Orbit. Now, too low to escape the drag effects of the upper atmosphere, it had fallen back to Earth.

As I faffed around making coffee, the email and phone started binging, with requests from journalists to talk about space junk. This really was going to be an interesting day.



This is a Fregat rocket, with the cubic satellite released. Not a traditional rocket shape!

The kinds of things that people generally want to know are: what is up there? How much of it is there? Are we in any danger from it? What about satellites and human missions in orbit? Then they often ask what the hell an archaeologist is doing working in this field. Which is a good question, really, and the short answer is that human interactions with the material world are pretty much what archaeologists study.

So let's have a quick look at the other questions.

What: satellites, rocket bodies, fragments, flecks of paint, shrapnel, organic waste from human spaceflight missions, tools, fuel. It ranges from whole spacecraft that weigh thousands of kilogrammes, to

sub-millimetre particles from eroded spacecraft surfaces.

How much of it is there? One calculation is 6000 tons, or by my reckoning, the equivalent of 1000 African elephants. (I kind of like the idea of orbiting elephants). There are over 23 000 bits over 10 cm in diameter, and millions of bits smaller than that.

Are we in any danger from it? Not really. Most of the time the re-entry goes unnoticed. For example, there have been 25 other rocket bodies that re-entered the atmosphere this year already. This one is receiving attention because so many people saw it.

What about satellites and human missions in orbit? This is a more serious question. The International Space Station, not infrequently, manoeuvres to avoid space junk, and sometimes other satellites do too. Billions of dollars and human lives are at stake. So far, while collisions have damaged satellites and there have been occasional catastrophic break-ups, there have been no fatalities or injuries. The day that happens will be a wake-up call for the whole industry.

Eventually, everything in Low Earth Orbit will get dragged out of the sky. But there's a lot of stuff up there, and we keep launching new spacecraft. It's a very dynamic place, where human artefacts hurtle through a matrix of cosmic particles and dust, electromagnetic currents, plasma clouds, meteors, and atomic elements. The satellites, rocket bodies and other objects decay and fragment, and the materials of Earth migrate into the gases of space.

'Nature' and 'culture' aren't separate in Earth orbit; it's a new kind of space which we are as much a part of as the comets and meteors. You could call it a cultural landscape, or you could look at it as part of the signature of the Anthropocene. Something I spend a lot of time thinking about is how to best characterise this diverse, decaying, high-speed population. I want to go beyond just the technology and orbital configuration and think about them less as junk and more as avatars that carry our values into space.

Lately, I've been thinking spacecraft as robots, and even as computronium. I suppose that's more futurological than archaeological, but I'm OK with that. Part of the appeal of archaeology is that by imagining past worlds, we're really opening up possibilities for the future.