

Space heritage: artefacts and archaeology

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One of my favourite topics in the world is archaeology and how it intersects with space industry and space exploration. I'm going to start with the basics on this topic: what is space archaeology?¹

People tend to think archaeology is the study of the past, usually the deep past, far beyond living memory and they associate it with the cultures of ancient Greece, Rome, Egypt, et cetera. And the Australian public has come, finally I think, to understand that we have a very deep archaeological record in this country as well. It's very different to the northern hemisphere, but changing paradigms about how human societies work in its own way.

Sure, there's a lot of archaeology which is actually about old stuff, but the actual definition of archaeology is the study of how humans relate to material things. Whether that's objects or artefacts or the environment or architecture. So it's actually a set of theories and methods which examine how humans operate in the material world through those very physical objects.

For this reason, it is not confined to the past: it can be applied to the present and even into the future. When we talk about space archaeology, we're looking at a very particular where, what, why, who, when. And the what is all of those objects and places that are associated with the human

movement into space, generally after the Second World War.

When? If we wanted to put a beginning point on the space age, it really begins around 1936 when the first rocket truly capable of reaching orbit was developed: the V2 rocket, which was actually a weapon of war. Our time period is 1936 up to the present. Where? In terms of geographic range, if you like, we're looking at stuff on the surface of the Earth, right throughout the Solar System, and beyond the Solar System where the Voyager 1 and 2 spacecraft are currently fleeing through interstellar space. Incidentally, there are only 17 V2 rockets left in the world; two of those are here in Australia at the War Memorial in Canberra.

So this is what space archaeology is and I often also get asked, why does this have to be archaeology? Why isn't it just history? Don't we have an extensive documentary record of everything that went on in the space age? Usually archaeology is the techniques you go to when you don't have any written record. Well, it's true, we have this incredible record of documents and letters and plans and images, but like all documentary records, there are huge gaps and sometimes the only way you can find out about something is to go to that place or to find that physical object.

So there is a reason to make this archaeology and not just history, but there are new and different things we can learn from an archaeological approach, and given how

¹ This is an edited version of the transcript of Dr Gorman's talk.

much the contemporary world relies on space, I think it's important that we use any means available to try and understand what is this world we're currently living in, in which technology and all of the social and political changes which come with that are moving incredibly fast. To contextualise these changes within a deeper context of human history and human technology and material culture is important and I think we can learn things about the way forward by looking at the archæology. So that's the archæology, but there's another aspect to this which is heritage, which is basically stuff from the past that people in the present think is important and want to keep for future generations.

These are the same physical objects. A large part of my research has been focused on space debris in Earth orbit: in effect a cloud clustering around the Earth in lower-earth orbit and a broad ring around the Earth, which is the geostationary orbit where most of the telecommunication satellites are. Space junk is a problem. What we have at the moment is more than 35,000 objects larger than 10 centimetres, and millions and millions and millions of objects below that size, down to really tiny micron, submicron dust particles. All orbiting at incredibly high speeds providing a threat to functioning spacecraft. It's a problem that needs to be solved and many people are tackling this problem from a number of different angles.

My angle on this is informed by my previous career as an archæologist working in heritage management with Aboriginal communities in Australia. For me, environmental management very much included consideration of the social significance of objects and places that were important to

people. I was working in a context where heritage was an accepted part of general environmental management. And this is the approach I've been taking to space debris in Earth orbit as well. Just to give you a very quick flavour of this, among the stuff in orbit classified as debris is Australis-OSCAR 5, a satellite created by a group of students at Melbourne University, launched in 1970 and still in orbit.² This is a piece of Australia's space heritage: one of only two satellites, not counting a bunch of CubeSats that were launched in the last couple of years. It's classed as junk but, I would argue, we don't want someone to zap it out of the sky with a laser or collect it in a debris-collecting space tugboat whenever we have that technology, which isn't happening anytime soon. We want to keep it in orbit. It's evidence of Australian engagement with space. It's evidence of successful space technology driven by the precursors of our current CubeSat revolution. People who made a little satellite on a low budget and had tremendous scientific success for it. I think this is a tremendously important object.

Finally, I'm going to leave you with a thought: we have seen the first launches of Space X's styling satellite constellation. This is going to number in its thousands over the next few years, and there are other companies proposing to launch similar numbers of satellites as well. It's going to radically change the debris environment. It's also going to radically change human perceptions of the night sky. Satellites and space debris are going to be more visible to us than they have ever been in the past, and within a few decades there is going to be no

² See a photo of the satellite, Figure 5 in Dougherty, above.

one left alive on Earth who has had a view
of the night sky before there were human
objects in it. This will be the only night sky

humans will ever have known. And that is
the end.

