

Interstellar achievement

NASA launched two robotic explorers called the Voyagers in 1977, with the hope that they would explore space beyond the reach of any other mission — and they have. In June, Voyager 1, nearly 18 billion kilometres from the Sun, sent back measurements that convinced scientists that the probe is just about to become the first human-made object to ever leave our solar system.

There are three key signs that scientists have been expecting to detect when Voyager 1 finally crosses into the great beyond — specifically, when it leaves the corner of the universe dominated by the particles from the sun, the heliosphere, and enters interstellar space. First, the solar wind, a constant flow of protons and electrons from the Sun, should tail off. Then, galactic cosmic rays — largely

blocked by the solar wind within the heliosphere — are expected to become more intense. And, finally, as the craft makes its way out of the Sun's magnetic field and into other fields, the magnetic lines it detects should shift direction.

Last year, the first of those key signs was reported (*Nature* 474, 359–361; 2011). Data travel to Earth from Voyager 1 through a radio signal that, by now, takes nearly 17 hours to reach us. In 2010, programme scientists at NASA's Jet Propulsion Laboratory in California noticed a change in that data stream: the flow of the solar wind, which had been steady up to that point, had slacked off to near stagnation.

Now, the data stream has exposed another key event. Voyager 1's particle detector logged a substantial increase in the level of galactic cosmic rays,

suggesting that the craft is at the edge of the heliosphere. Over the past three years, the number of galactic cosmic rays Voyager passed through increased by about 25 per cent. But from early May, the numbers started ramping up rapidly, with a 10 per cent jump in the span of just 30 days.

Researchers are now waiting for the third sign before they can declare that Voyager 1 has truly left the solar system. So far, the magnetic field lines Voyager 1 has measured have maintained the directionality expected from the Sun's magnetic field. When that direction changes as the probe enters interstellar space, the big moment will have finally arrived. □

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The journalist's take

People love space. Few, if any, science topics garner as much press and public attention as something happening in the Universe outside our own planet. To feed this widespread interest and build support for its work, NASA has created what is probably one of the most proactive and effective public relations machines in the world. It sometimes feels as if NASA could get attention for someone flushing a toilet; in fact, they can — if it's in space. But this story had more than just the NASA push to propel it.

Feats of exploration usually come with caveats. With so many news stories hyped as breakthroughs and milestones, news editors and readers alike can grow weary of such claims.

Even though Voyager 1 hasn't made it all the way yet, the story here is about both pure exploration and a true milestone by almost any standard. Voyager 1 is going where no man, woman or steak knife (or anything else from this planet) has ever gone. So, it is no surprise that various points along its long path have garnered attention.

In fact, although a conference talk given by the programme manager was a key motivator for NASA to put its media machine in gear, the latest data were already fodder for the blogosphere. The agency then wanted to make sure the details were clear. The buzz before

NASA publishing a feature story on the topic (<http://go.nature.com/mMqWpo>) was possible because Voyager data are publicly available. That inherent interest in space science means some people will comb this information just for fun. However, because the latest news was just a step towards the big moment, NASA did not go so far as to set up a press conference.

Even setting aside the popularity of a good space angle, any story that involves a legitimate superlative — first, biggest, longest, etc. — is sure to get attention. For example, most people don't have the slightest idea how large a bacterial cell is — but tell them that someone has discovered the biggest bacterial cell ever, and it will be a media headline hit. Voyager 1 can claim a number of superlatives, with its longest

ever trip en route to the first interstellar penetration.

To round out its general appeal, Voyager 1 has a fascinating backstory.

The craft were launched an astonishing 35 years ago — a time so far back that a gold-plated phonograph record seemed the best medium for carrying human music and messages to any intelligent being that may be encountered. The very fact that these spacecraft are still operational is itself worthy of attention. There was more than enough of a story even for a relatively unknown organization to receive media coverage. The NASA backing took the story even further.

When the big moment does finally come, and it is confirmed that Voyager 1 has left our solar system, this latest round of attention will surely pale in comparison to the media furore that will be generated by the NASA press machine running at full steam.

