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# EOS

SCIENCE NEWS BY AGU

Whither the Anthropocene?

The Source of Swift Quakes

Tatooine, Trisolaris,  
and Thessia, Oh My!

## ALL ROADS LEAD TO...

*Seatbelt Rock*

*the Order of the Red Nose*

*luna firma*

*\$13,000 worth of missing acid*

*Teletubby training*

*beanbag sampling*

*cruise hands*

*stickers and geotags*

*penguins*

## SCIENCE



Antarctica. Identifying the periodicity surprised the researchers and led to questions about what creates these recurring holes. Coauthor Ariaan Purich, a climate scientist at Monash University in Australia, said there is another data set with a similar cycle length.

“Examining the longer 68-year record for meteorological stations, a 16-year periodicity has been observed in winter air temperature on the Antarctic Peninsula,” she said.

Purich also thinks the Amundsen Sea Low, a low-pressure system off the coast of Antarctica in the Pacific sector, could affect both temperature and polynya area.

“We can physically understand how it might influence both the temperature at stations on the peninsula, as well as the polynya area in the Ross Sea,” she said. “That, I guess, is a bit of a hint that it could be the atmosphere forcing this rather than the ocean.”

Purich is looking at ways the Southern Annular Mode, a circumpolar wind pattern, interacts with the Amundsen Sea Low.

But, of course, the atmosphere and the ocean constantly interact, and Purich said the ability to gather relevant ocean information at the resolution needed to study a 16-year cycle remains elusive.

“They’re on the right track by looking for an atmospheric component,” Moore said. “The challenge is that 16 years is an odd cycle in the atmosphere.” The El Niño–Southern Oscillation, for example, has a periodicity of 3–5 years.

Both Moore and Purich said further study of the deep-ocean formation and water mass circulation could enhance understanding of the findings. Moore said he would start by investigating the extent of the polynyas.

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With a limited data set and a 16-year cycle, finding answers could be slow going.

“We’re not 100% sure that it’s a long, long-term pattern,” Fraser said. “And so looking at that into the future will be really interesting. But that’s going to be something that happens over decades, not years.”

By **Amy Mayer** (@amyhmayer), Science Writer

## Tatooine, Trisolaris, Thessia: Sci-Fi Exoplanets Reflect Real-Life Discoveries



*Tatooine familiarized people with the idea of circumbinary planets long before the first one was discovered in 2005. Credit: Journal of Science Communication – JCOM*

**A**stronomers have identified more than 5,000 extrasolar planets since the first—51 Pegasi b—was found in 1995. As the discoveries started pouring in, they quickly realized that few exoplanets resembled anything in the solar system. Instead, they found chunks of rocks orbiting dead stars, balls of evaporating gas, planets raining rubies, and super-puffs no denser than cotton candy.

But worlds beyond our solar system captured public imagination long before 1995. They have been the settings for science fiction (sci-fi) for more than a century.

“Sci-fi already introduces the general public to lots of scientific concepts—many people probably first encounter exoplanets through science fiction,” said Emma Puranen, a doctoral student at St Andrews Centre for Exoplanet Science in Scotland.

A new study led by Puranen examined how the discovery of real exoplanets has influenced portrayals of fictional ones. The researchers showed that as scientists discovered that real-life exoplanets rarely resembled Earth, sci-fi exoplanets became less Earth-like, too.

“Science fiction and popular culture are key to engaging the general public and non-scientists in current scientific discoveries,”

said Erin Macdonald, an astrophysicist and science consultant for the *Star Trek* franchise who was not involved with the new research. “Seeing an interesting planet in science fiction can pique curiosity and allow scientists to share the similarities and differences with actual discoveries using common ground.”

### Strange New Worlds

Science and science fiction have long had a circular relationship, Macdonald said. “Many science fiction writers may have a science

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background or a deep interest in science which then influences their work as new discoveries are made.” Likewise, “scientists are often inspired to become scientists because

of what they see in media and science fiction.”

Puranen is a sci-fi fan herself. (“Huge fan of Mr. Spock!” she said, as well as of Becky Chambers’s *Wayfarers* series and Andy Weir’s *Project Hail Mary*.) She said that case studies and anecdotal evidence have suggested that science and sci-fi influence each other, but few studies quantify how the two are linked.

“The portrayal of exoplanet science in science fiction is the perfect area in which to investigate this [link] because exoplanets have long featured in sci-fi stories, but our scientific knowledge of them has completely changed since they were first discovered,” Puranen said.

To quantify how science may have influenced sci-fi, the researchers crowdsourced examples of fictional exoplanets from social media groups, sci-fi conventions, and team members. These sci-fi planets originated in books, films, TV shows, video games, and podcasts and included stories told before and after 1995.

The researchers categorized planets by whether they orbited a real star, orbited in the habitable zone, were gaseous, had human-breathable air, had a biosphere, had intelligent native life, or had an established colony of non-native humans. They used a Bayesian network analysis to explore connections between these characteristics and identify trends that shifted with the discovery of 51 Pegasi b.

The analysis showed that “fictional exoplanets from after the real-life discovery of exoplanets were less likely to have intelligent native life and less likely to have established populations of non-native humans,” Puranen said. Sci-fi exoplanets became less Earth-like and more likely to feature nonintelligent native life. These results were published in the *Journal of Science Communication* ([bit.ly/scifi-exoplanets](http://bit.ly/scifi-exoplanets)).

“We’ve known for a long time that there’s a two-way influence between science and sci-fi, but it’s really interesting to see it quantified and represented in this way,” said Moiya McTier, an astrophysicist, folklorist, and author who was not involved with the research. “These [categorizations] are exactly the exoplanet questions people are interested in exploring.”

However, McTier didn’t necessarily agree that creatives were evolving with the science. “The discovery of non-Earth-like planets opened the door to new possibilities,” she said, “but a lot of sci-fi creators ended up making less realistic worlds because they tend to know even less about the science of gas



As real exoplanets were revealed to be unlike Earth, fictional exoplanets also became less Earth-like. Credit: britaseifert/AdobeStock

giants than they do about physics here on Earth.” In other words, sci-fi may have started to depict more gas giants than it did before 1995, but those planets do not approximate how exoplanets actually work.

“That’s fine, though,” McTier added, “because I think sci-fi should be inspired by science and not beholden to it.”

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### Teaching Tatooine

This research included a few long-running franchises, including *Star Trek* and *Star Wars*. Macdonald said that she would like to have seen more discussion on how exoplanet trends within individual franchises have evolved, too. “The exoplanets we see in *Star Trek* in 1966 versus the ones we see in current shows [like] *Star Trek: Prodigy* and *Strange New Worlds*, particularly, have definitely expanded based on our knowledge of what is possible out there and the desire to tell unique stories,” she said.

Stories of fictional worlds can inspire scientists as they interpret obscure signals from new worlds and communicate their discov-

eries to broader audiences. *Star Wars* familiarized folks with Tatooine decades before the 2005 discovery of HD 202206 c, the first known exoplanet orbiting two Sun-like stars. Now, Tatooine is a ubiquitous reference in the science communicator’s toolbox.

Macdonald recounted teaching an introductory astronomy class not long after the discovery of the circumbinary world Kepler-16b. Her class, which had been relatively disinterested, perked up at the comparison to Tatooine.

“They began asking questions like, Well, could Luke live there? Would it be a desert planet? Would the sunsets look like the movie?” Macdonald recalled. “The students were now thinking critically and asking the types of questions and thinking in the way we want introductory science classes to learn.”

Puranen said that some scientists, teachers, and science communicators still hesitate to use sci-fi to make new discoveries more accessible to nonscientists because not all sci-fi makes clear distinctions between science and fiction.

“My hope is this study can help science communicators craft lesson plans to take advantage of the huge enthusiasm people already have for sci-fi to help people become more scientifically literate and engaged,” she said.

By **Kimberly M. S. Cartier** (@AstroKimCartier), Staff Writer