

universities are promised relocation packages of up to one million yuan, as well as top salaries and millions in research grants. To learn more about the impact of working abroad, Tang and her colleague Li Feng at Hohai University in Nanjing, China, decided to review the career trajectories of 1,447 Changjiang scholars. About one-third held PhDs from overseas universities, and about half had short-term overseas experience.

The average time between graduating with a PhD and becoming a Changjiang scholar is 10.3 years, Tang and Feng report. But it took researchers with any type of overseas experience longer to receive the honour than it took those with no international experience. Even Chinese scholars who left the country temporarily to be visiting scholars at international institutions waited 12% longer (about a year extra) for the title than did peers who remained in China.

The researchers controlled for factors that could influence the timing of the award, such as gender, research field, where academics trained overseas and the status of the academic's university when they received the award.

In the second part of the study, the researchers examined the Changjiang scholars' networks. They found that academics with strong local connections – measured as having obtained a bachelor's degree and PhD at the same institution in which they work – were faster to obtain the title. Scholars working at their alma mater received the honour, on average, about 2 to 8 months faster than did those working at a different university.

Tang suggests that because award recipients are nominated by their university, researchers who have spent their academic career in China might be more likely to be nominated – and more familiar to the reviewers – than are academics who have been out of China for years.

Dong Jielin, a guest researcher in science policy at Tsinghua University in Beijing, says that the results support the belief among some that China has an unhealthy academic environment that rewards personal connections over skills and experience. Efforts to reform this culture are needed, she says.

But Cao Cong, a science-policy researcher at the University of Nottingham Ningbo China, has another theory. He suggests that in the past, researchers with overseas training might have been slower to obtain the award because they were not as academically competitive as the best locally trained scientists. Before programmes such as Thousand Talents, many overseas-trained PhD graduates preferred to apply for foreign faculty positions, and so academics who returned to China might have done so because they couldn't secure an overseas position, he says.

Cao suggests that a future study should examine overseas-trained scientists who have returned more recently, to see whether the study's conclusion still holds.

SPACEX TESTS BLACK SATELLITE TO REDUCE REFLECTIVITY

'DarkSat' prototype could help to address 'megaconstellation' threat to astronomy.

By Alexandra Witze in Honolulu, Hawaii

The SpaceX company launched 60 of its Starlink broadband Internet satellites into orbit on 6 January – including one, called DarkSat, that is partially painted black. The probe is testing one strategy to reduce the brightness of satellite 'megaconstellations', which scientists fear could interfere with astronomical observations.

Various companies plan to launch thousands of Internet satellites in the coming years; SpaceX, of Hawthorne, California, aims to launch 24 batches of Starlinks this year. By the mid-2020s, thousands to tens of thousands of new satellites could be soaring overhead. Bright streaks caused by light reflecting off them could degrade astronomical images.

"I was complaining to my wife that I can't sleep very well these days because of this," says Tony Tyson, a physicist at the University of California, Davis, and chief scientist of the Vera C. Rubin Observatory, a major US telescope under construction in Chile.

Astronomers discussed the potential impact of the satellites on various telescopes, and what could be done about the problem, on 8 January at a meeting of the American Astronomical Society in Honolulu, Hawaii. "2020 is the window to figure out what makes a difference in reducing the impact," says Jeffrey Hall, director of Lowell Observatory in Flagstaff,

Arizona, and chair of the society's committee on light pollution.

"SpaceX is absolutely committed to finding a way forward so our Starlink project doesn't impede the value of the research you all are undertaking," Patricia Cooper, SpaceX's vice-president for satellite government affairs, told a session at the astronomy meeting.

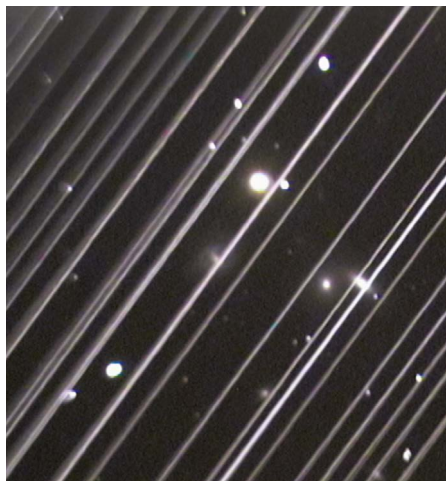
Three batches of Starlinks have been launched, totalling about 180 satellites so far. They are most obvious in the night sky immediately after launch, before they boost their orbits to higher altitudes where they are farther away and look dimmer. It's not yet clear how significant a problem Starlinks will be for astronomy, although scientists have complained about trails in their images.

Many astronomers panicked in June, soon after SpaceX launched the first batch of 60 Starlinks and telescopes began photographing their trails. Their brightness came as a surprise, says Patrick Seitzer, an astronomer at the University of Michigan in Ann Arbor. "The new megaconstellations coming online have the potential to be brighter than 99% of everything else in Earth orbit, and that's where the concern comes from," he says.

Several factors contribute to the puzzling brightness, astronomers reported at the meeting. SpaceX says the position of the solar panels might have something to do with it: at lower elevations, before the orbit boost, the satellites' panels are positioned like an open book to reduce drag. That temporary orientation could make them reflect more sunlight. The speed at which a satellite moves across a telescope's field of view is also important – the more slowly it moves, the more brightness accumulates per pixel of imagery.

There are no regulations that control how bright or dim a satellite needs to be, notes Ralph Gaume, director of the astronomical-sciences division of the US National Science Foundation in Alexandria, Virginia.

Calculations suggest that the Starlink trails will interfere with astronomy most significantly during the hours surrounding twilight and dawn. That's a particular problem for observations that need to be made during twilight, such as searches for some near-Earth asteroids. And on short summer nights, the satellite trails could be visible all night long.



The diagonal lines in this image show light reflected from SpaceX's Starlink satellites.