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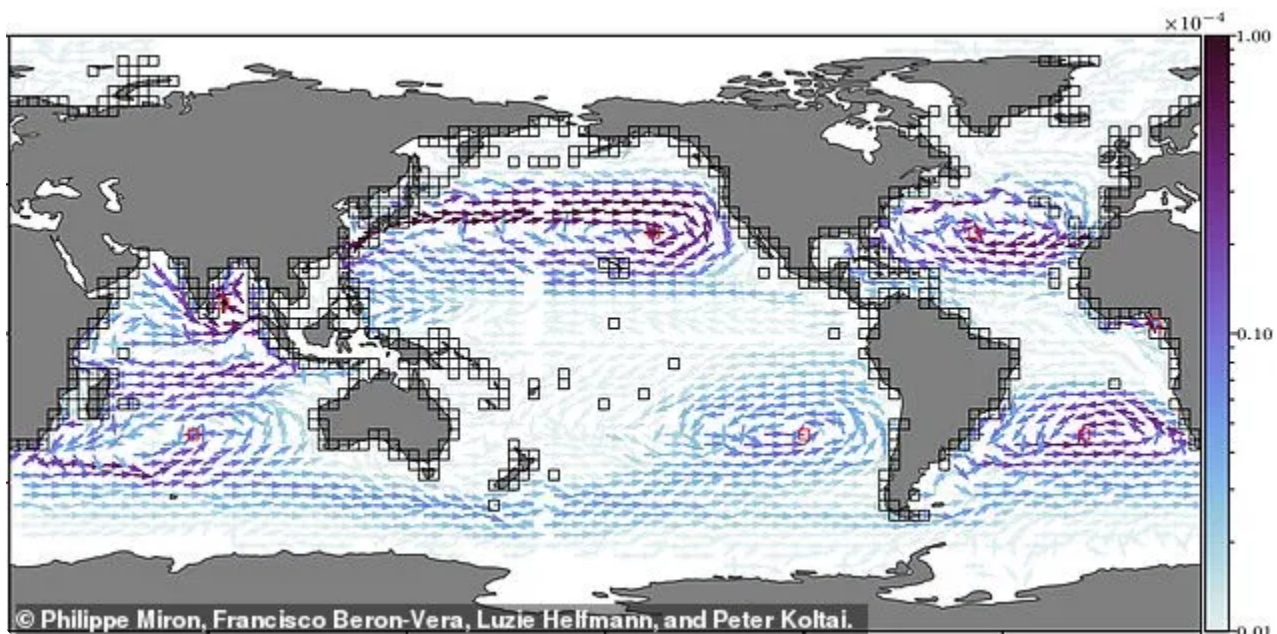
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> Great Pacific Garbage Patch has 'connecting pathway with East Asia' that may feed it debris

Great Pacific Garbage Patch has 'connecting pathway with East Asia' that may feed it debris

🕒 March 3, 2021 📄 Newsco (<https://australiannewsreview.com/author/zippy8/>)

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The North Pacific is home to an enormous swirl of plastic waste twice the size of Texas known as the Great Pacific Garbage Patch, but how the trash made its way to the region has been a mystery among scientists – until now.

Researchers from the US and Germany set out to uncover pathways that transport debris to the massive floating landfill, along with relative strengths of different subtropical gyres, or large systems of circulating ocean currents, in the oceans and how they influence long-term accumulation of debris.

Using the Markov model, the team described the probability of plastic debris being transported from one region of ocean surface to another.

The model identified a high-probability transition channel connecting the Great Pacific Garbage Patch with the coast of eastern Asia, which suggests the area is a large source of plastic pollution.

The model also revealed that the weakness of the circulating system in the Indian Ocean is also a trap for plastics and the North Pacific subtropical gyre attracts the most debris.

Scroll down for video

Using the Markov model, which looks at the probabilities of different states and the rates of transitions among them, the team described the probability of plastic debris being transported from one region of ocean surface to another

Tons of plastic debris makes its way into the oceans every day and as of 2020 there were some 5.25 trillion pieces of waste with 269,000 ton of it floating on the surface.

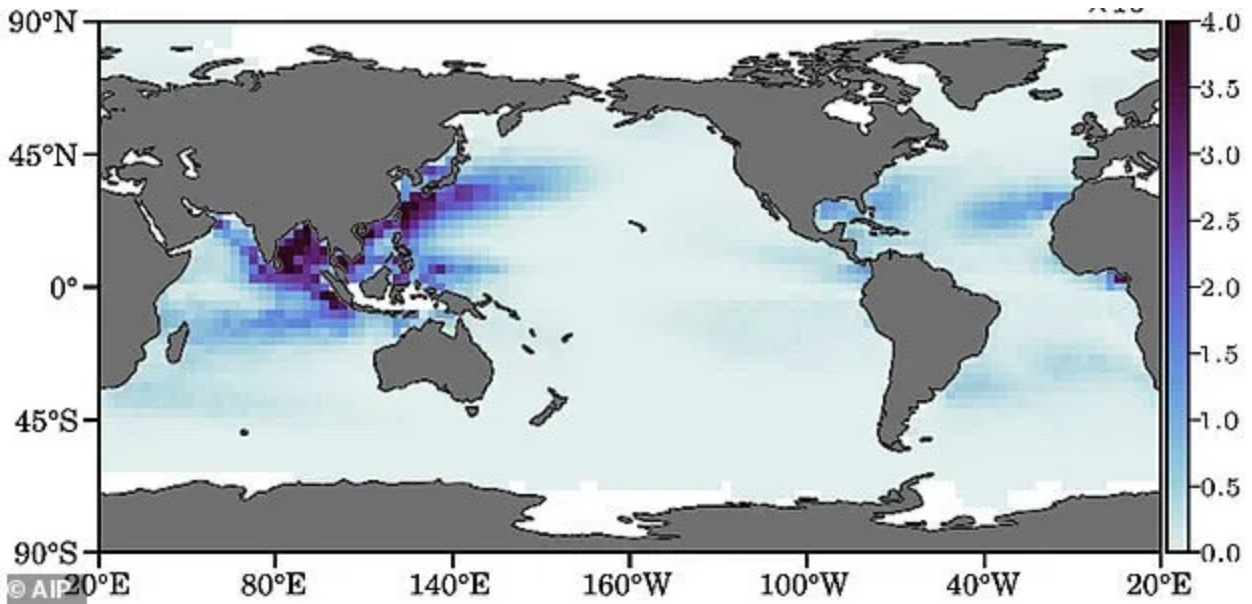
However, a majority of the trash accumulates in garbage patches, specifically the most famous – the Great Pacific Garbage Patch.

This marine landfill, also known as the Pacific trash vortex, is estimated to hold 1.8 trillion plastic pieces.

The study was conducted by Philippe Miron, Francisco Beron-Vera, Luzie Helfmann, and Peter Koltai who created a Markov chain model of the oceans' surface dynamics from historical trajectories of surface buoys.

'Surface debris is released from the coast and distributed according to their location's share of the global land-based plastic waste entering the ocean,' said Miron, an assistant scientist at the University of Miami.





The model identified a high-probability transition channel connecting the Great Pacific Garbage Patch with the coast of eastern Asia



The findings suggest eastern coasts along Asia (pictured) may be a large source of plastic pollution

^
'To observe the long-term distribution of floating debris, beached debris is reinjected into the system

following the same distribution.'

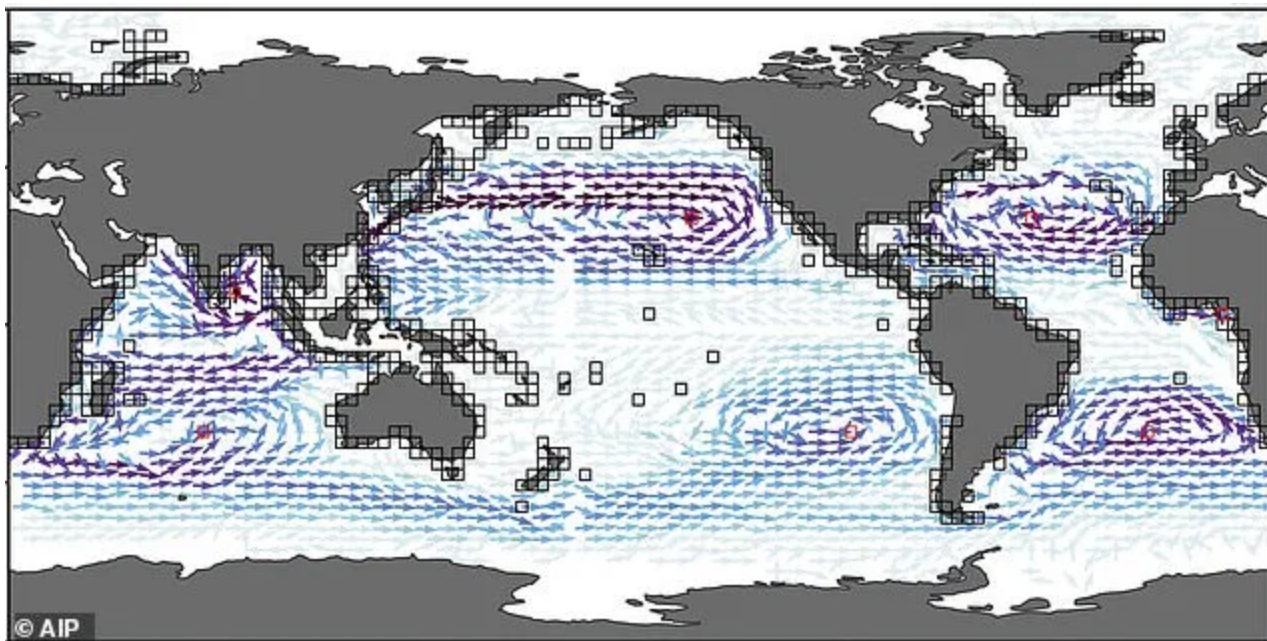
'We call this model 'pollution aware,' because it models the injection, dispersion, and recirculation of debris within the system.'

Transition path theory allows the researchers to identify pathways or transition paths connecting a source directly to a target.

'In this work, we focus on pathways from the coast to the subtropical gyres, from one gyre to another, and from the gyres to the coast,' Miron said.

Using the model, the team followed debris pathways and analyzed the stability of the garbage patch to understand the connection between them and their ability to retain trash.

'We identified a high-probability transition channel connecting the Great Pacific Garbage Patch with the coasts of eastern Asia, which suggests an important source of plastic pollution there,' said Miron.



The model also revealed that the weakness of the circulating system in the Indian Ocean is also a trap for plastics and the North Pacific subtropical gyre attracts the most debris

'And the weakness of the Indian Ocean gyre as a plastic debris trap is consistent with transition paths not converging within the gyre.'

The team determined that gyres, in general, are weakly connected or disconnected from each other.

'Indeed, in the event of anomalously intense winds, a subtropical gyre is more likely to export garbage toward the coastlines than into another gyre,' Miron said.

One of the biggest discoveries the group made is while the North Pacific subtropical gyre attracts the most debris, consistent with earlier assessments, the South Pacific gyre stands out as the most enduring, because debris has fewer pathways out and into other gyres.

'Our results, including prospects for garbage patches yet to be directly or robustly observed, namely in the Gulf of Guinea and in the Bay of Bengal, have implications for ocean cleanup activities,' said Miron.

'The reactive pollution routes we found provide targets – aside from the great garbage patches themselves – for those cleanup efforts.'

WHAT DOES DEEP-SEA DEBRIS DATABASE REVEAL ABOUT OCEAN PLASTIC POLLUTION?

Plastic pollution is a scourge that is ravaging the surface of our planet. Now, the polluting polymer is sinking down to the bottom of the ocean.

The deepest part of the ocean is found in the Mariana Trench, located in the western Pacific Ocean, to the east of the Mariana Islands. It stretches down nearly 36,100 feet (11,000 metres) below the surface.

One plastic bag was found 35,754 feet (10,898 metres) below the surface in this region, the deepest known piece of human-made pollution in the world. This single-use piece of plastic was found deeper than 33 Eiffel towers, laid tip to base, would reach.

Whilst the plastic pollution is rapidly sinking, it is also spreading further into the middle of the oceans. A piece of plastic was found over 620 miles (1,000 km) from the nearest coast – that's further than the length of France.



The Global Oceanographic Data Center (Godac) of the Japan Agency for Marine-Earth Science and Technology (Jamstec) launched for public use in March 2017.

In this database, there is the data from 5,010 different dives. From all of these different dives, 3,425 man-made debris items were counted.

More than 33 per cent of the debris was macro-plastic followed by metal (26 per cent), rubber (1.8 per cent), fishing gear (1.7 per cent), glass (1.4 per cent), cloth/paper/lumber (1.3 per cent), and 'other' anthropogenic items (35 per cent).

It was also discovered that of all the waste found, 89 per cent of it was designed for single-use purposes. This is defined as plastic bags, bottles and packages. The deeper the study looked, the greater the amount of plastic they found.

Of all man-made items found deeper than 20,000 feet (6,000 metres), the ratios increased to 52 per cent for macro-plastic and 92 per cent for single-use plastic.

The direct damage this caused to the ecosystem and environment is clear to see as deep-sea organisms were observed in the 17 per cent of plastic debris images taken by the study.


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