

Corals show rising sea levels likely due to climate change: Study

Coral microatolls can provide clues about S'pore's sea level history over past century

Cheryl Tan

Corals can provide a good gauge of Singapore's sea-level history over the past century, with the rising levels recorded over the 20th and 21st century very likely a result of climate change.

While this can be attributed to multiple factors such as sinking land, findings from a Nanyang Technological University (NTU)

study show that climate change contributed to rising sea levels in the country.

Data from the Meteorological Service Singapore in 2020 had shown that sea levels in Singapore had gone up by 14cm since pre-1970 levels.

Dr Jędrzej Majewski from the Earth Observatory of Singapore (EOS) at NTU, who is the lead author of the study, said that as the rate of sea-level rise over the last 100 years was lower compared

with the global average, taking away human factors would mean that the sea level in the country could have been stable or even "slightly falling", likely due to Singapore's geological history.

In addition, taking into account the recent report by the United Nations' Intergovernmental Panel on Climate Change (IPCC), some 70 per cent of the combined change in glaciers, ice sheet surface mass balance and thermal expansion since 1970 can be attributed to human activity – with this percentage increasing over the course of the 20th and 21st century, he noted.

The latest report by IPCC has found that Singapore will face a sea-

level rise of about 0.2m by 2050, and 1m by 2100, relative to a baseline from the period of 1995 to 2014.

This discovery was made possible only through the use of coral microatolls – circular colonies of coral which usually grow sideways – from Mapur, an Indonesian island about 100km south-east of Singapore.

Dr Majewski added that the corals there can provide a good gauge of Singapore's sea level history over the past century.

Assistant Professor Aron Meltzner from EOS, who co-led the study, noted that tide gauge records on Singapore's sea levels in Tanjung Pagar went back only to 1989, whereas the first data point recorded on the coral microatoll dated back to 1915.

"Between 1915 and 1990, sea-level rise in Singapore was slower than the global average, and the sea level was essentially stable.

"However, before this study, we could only extrapolate the probable sea level in Singapore from a global average and the more recent tide gauge records. This left quite a bit of uncertainty about how high the sea level was and how it changed over the period," said Prof Meltzner.

Dr Majewski said the microatolls

allowed researchers to narrow down the uncertainty of probable sea levels in Singapore by over 40 per cent for earlier periods, and about 30 per cent for the more recent period of time.

"This background will be incorporated into future models, allowing experts to be more precise with

SOURCE OF INFORMATION

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DR JĘDRZEJ MAJEWSKI, from the Earth Observatory of Singapore at Nanyang Technological University.

their predictions of future sea levels, and for those in Singapore to have a better understanding of how the regional sea-level change may differ from the global average," he said.

Dr Majewski pointed out that the youngest coral microatoll records were cross-referenced with tide gauges in Tanjung Pagar from 1989, thereby validating their potential use in reconstructing sea-level change in South-east Asia.

"There are a lot of places which didn't have any tide gauges installed until maybe the 1980s or the 1990s, or still don't have any tide gauges presently. So if they had any corals growing, and if we found the right ones, we can actually reconstruct the sea-level change over the past 100 or 200 years," said Dr Majewski.

Prof Meltzner said the team is currently studying microatolls in the Southern Islands, with plans to conduct similar studies in other sites in Indonesia and Malaysia.

This can give more robust data on how sea-level rise may have a varied impact on different parts of Singapore, given how different areas may have had varying sea-level histories.

tansuwen@sph.com.sg

What coral microatolls tell us about sea-level rise

Understanding the historic changes to the sea level over the years can help Singapore better predict the extent of sea-level rise in the future and better prepare for it. **The Straits Times** speaks to researchers from Nanyang Technological University to find out what coral microatolls are and how they work.



WHAT IS A CORAL MICROATOLL AND WHAT DOES IT TELL US ABOUT SEA-LEVEL CHANGE?

- A coral microatoll is a single colony of coral, with its top surface made up of dead tissue due to exposure to air, while living tissue is found growing along its perimeter, forming growth rings similar to the ones found on tree trunks.
- These corals tend to grow sideways, as upward growth is usually limited by exposure to air.

- The coral microatoll can grow to several metres in diameter.
- These rings therefore make these coral microatolls natural recorders of sea-level change, and scientists can trace these changes by counting backwards from the outer age where the living tissue is, to determine the age of any part of the coral.



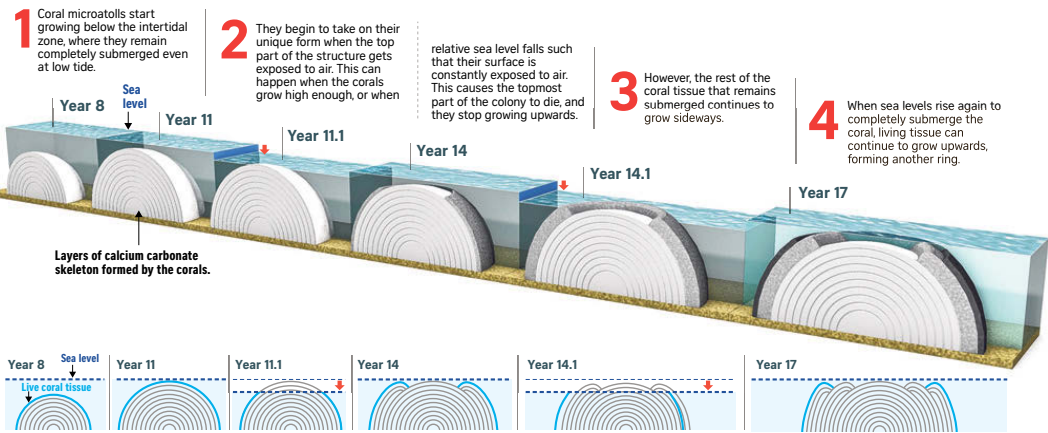
Corals microatolls at Mapur island in Indonesia. The first data point was recorded on the microatoll in 1915. Since tide gauge data for Singapore's sea levels began only from 1989, having earlier data helps in reconstructing sea-level changes for a large part of the 20th century. This can help to improve predictions for future sea-level rise here.



A coral microatoll in Belitung, Indonesia.



HOW CORAL MICROATOLLS FORM



A close-up of a coral microatoll in Mapur, Indonesia.