

Increasing Coral Bleaching with Global Warming

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Original title

Spatial and temporal patterns of mass bleaching of corals in the Anthropocene.¹

Introduction

This may come as a surprise to you, but corals are actually animals. It is a special kind of animal that takes root on the ocean floor and they do not have a face. Their livelihood fully depends on a relationship with very small plants called algae. The algae use energy from the sun and convert it into energy for the corals, and the corals provide a home for the algae. This kind of relationship where the corals and the algae depend on each other is called symbiosis. Corals also provide shelter for other small animals such as clams, snails, and sponges. These small animals are food for the bigger fish, and the bigger fish are food for the even bigger fish. Together, all these dependencies on each other are called an ecosystem. Besides from being a very important part of this ecosystem, corals also protect the shorelines of the countries they surround, by breaking up big waves arising from storms. So corals do not only protect the sea animals, but also the land animals (including humans).

Sometimes when there is a really warm summer it has been seen that corals go from their normal very colorful appearance to completely white. This phenomenon is called coral bleaching and is basically the coral expelling the algae. Coral bleaching happens locally because of several different things, such as pollution, overexposure to the sun, low tides, and changes in the ocean temperature. One of the main concerns lately is that temperature changes caused by global warming also leads to coral bleaching on a massive scale. When

the corals have undergone bleaching, they have lost their main source of food, and they may starve. If the starvation period lasts too long, it will eventually lead to coral death. Furthermore, if the temperatures are high enough, the corals do not just slowly starve, they die very quickly as they are being cooked. Due to the dependence on each other in the coral ecosystem, it means that if the corals are not there anymore the smaller animals do not have a place to live, and the bigger animals will not have anything to eat, and hence without corals the entire ecosystem may collapse.

Findings

The authors of “Spatial and temporal patterns of mass bleaching of corals in the Anthropocene”¹ have researched how often coral bleaching has happened since 1980 in 100 different tropical ocean locations. These locations included 54 countries spread out over the Indian Ocean, Australasia, the Pacific Ocean, and the Western Atlantic Ocean. Coral bleaching is simply measured by going out into the ocean at the location of the coral reefs and having a look at them. Besides from the authors own observations they also used previously published work and input from colleagues. They put the bleaching into one of three categories: 1) no bleaching, 2) moderate bleaching (1-30% bleached), and 3) severe bleaching (more than 30% bleached). This 30% cutoff split the bleaching events into approximately 50% moderate and 50% severe out of all the observations. The authors found that before 1980 severe coral bleaching happened very rarely with 27 years in-between each event, but today it is happening every 6 years. This is often not enough time for the corals to fully recover before the next

bleaching event happens, as recovery takes minimum 10-15 years for the fastest growing corals.

Finally, the authors found differences in how often coral bleaching happens dependent on the location in the world. Since 1980, widespread bleaching (where more than 50% of locations are affected) has happened 3 times in the Indian Ocean and Australasia, only 2 times in the Pacific Ocean, but 7 times in the Western Atlantic Ocean. To try to explain this, the authors tested whether the differences between these locations could be explained by the gradual heating up of the sea surface temperatures caused by global warming. However, it was not as straightforward as expected, and they did not find any positive correlation between average sea surface temperature warming and coral bleaching.

Conclusions

Since 1980 the average global temperature has increased by approximately 1°C (1.8°F) due to global warming. Even though that does not sound like a lot, you have to consider that this is just the average increase, and it does not account for the more extreme events we are seeing. For example, strong El Niño's are now even stronger, and summer heat waves are happening more often. It is these extreme heat events that are strongly linked to the increase in coral bleaching. No matter the reason, the fact is that corals are bleaching more and more often, and if we do not do anything to stop it, there may not be any corals left in the future.

Article info

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References

1. Hughes, T. P. *et al.* Spatial and temporal patterns of mass bleaching of corals in the Anthropocene. *Science* **359**, 80–83 (2018).