# Article information:

Coastal phytoplankton blooms expand and intensify in the 21st century | Nature  
<https://www.nature.com/articles/s41586-023-05760-y>

# Article summary:

1. Phytoplankton blooms in coastal oceans have increased in frequency and expanded in area between 2003 and 2020, with the total global bloom-affected area expanding by 13.2%.

2. The largest increases in bloom frequency were observed in six major coastal current systems, including Oyashio, Alaska, Canary, Malvinas, Gulf Stream, and Benguela.

3. Changes in climate and anthropogenic nutrient enrichment may have contributed to the trends in blooms, with significant positive correlations found between annual mean bloom frequency and coincident sea surface temperature (SST) and spatial SST gradient.

# Article rating:

May be slightly imbalanced: The article presents the information in a generally reliable way, but there are minor points of consideration that could be explored further or claims that are not fully backed by appropriate evidence. Some perspectives may also be omitted, and you are encouraged to use the research topics section to explore the topic further.

# Article analysis:

The article "Coastal phytoplankton blooms expand and intensify in the 21st century" published in Nature presents a comprehensive study on the global trends of coastal algal blooms. The authors used satellite data to map the occurrence of phytoplankton blooms in coastal oceans globally between 2003 and 2020, addressing three fundamental questions: (1) where and how frequently global coastal oceans have been affected by phytoplankton blooms; (2) whether the blooms have expanded or intensified over the past two decades, both globally and regionally; and (3) the identity of the potential drivers.

The study found that phytoplankton blooms occurred frequently in many regions, with Europe and North America contributing the largest bloom areas. The most frequent blooms were found around Africa and South America, while Australia experienced the lowest frequency of blooms. The total global bloom-affected area has expanded by 13.2% between 2003 and 2020, equivalent to 0.14 million km2 yr−1. Furthermore, the number of countries with significant bloom expansion was about 1.6 times those with a decreasing trend.

The authors suggest that increases in sea surface temperature can stimulate bloom occurrence, as well as changes in ocean circulation altering nutrient transport that drives marine phytoplankton growth and bloom formation. However, they also note that these mechanisms do not apply to regions with inconsistent trends between SST and bloom frequency.

Overall, this study provides valuable insights into global trends of coastal algal blooms using satellite data. However, there are some potential biases and limitations to consider. For example, although satellite data provide continuous monitoring of ocean surface conditions, it cannot distinguish whether a bloom produces toxins or is harmful to humans or marine environments.

Additionally, while the authors suggest that anthropogenic nutrient enrichment is expected to intensify algal bloom frequency globally, they do not provide evidence for this claim within their study. They also do not explore counterarguments or alternative explanations for observed trends.

Furthermore, while the article notes some potential risks associated with algal blooms such as closures of fisheries or illness/mortality of marine species and humans due to toxin accumulation or oxygen depletion in bottom waters forming anoxic ‘dead zones,’ it does not provide a comprehensive analysis of these risks or potential solutions.

In conclusion, while this study provides valuable insights into global trends of coastal algal blooms using satellite data, it is important to consider its potential biases and limitations when interpreting its findings. Further research is needed to fully understand the complex dynamics driving algal bloom occurrences globally and their potential impacts on human health and ecosystems.

# Topics for further research:

* Harmful algal blooms and their impacts on human health and marine ecosystems
* Anthropogenic nutrient enrichment and its role in algal bloom formation
* Alternative explanations for observed trends in algal bloom occurrence
* Strategies for mitigating the impacts of algal blooms on fisheries and marine environments
* The role of climate change in driving algal bloom expansion and intensification
* The use of remote sensing and other technologies for monitoring and predicting algal blooms.

# Report location:

<https://www.fullpicture.app/item/03884fa5f222c99897165e8dab246e0d>