



# Progress in the study of climate change impacts on cephalopod population dynamics based on citespace analysis

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## Background

- Cephalopods are not only important economic species in the world's ocean fishing, but also play important roles as predator and prey in marine ecosystems. [1]
- Cephalopods are fast-growing, have a short life cycle, and are sensitive to changes in the environment, and their feeding ecology [3], migratory routes [4], and biological characteristics [5] all change with the environment.
- In this article, the literature related to the impact of climate change on cephalopod population dynamics in the Web of Science Core Collection database from 1990 to 2020 was used as the research and analysis object.

## Material and methods

### • Research Methodology

Citespace is a software developed by Dr. Chaomei Chen for analyzing the literature in the field of study to visualize it as a scientific knowledge graph [6], and this article uses the WOS data analysis board of version 5.7.R4.

### • Data source

The data were selected from Web of Science Core Collection database, with "Cephalopod" as the theme, and related to "climate change", "population" and "environment", and then exported the files in txt format for visualization and analysis in citespace software.

## Result and Discussion

• From Figure 1, we can see the trend of related literature publication, and the analysis of the literature on climate change on cephalopod population dynamics during the three decades from 1990 to 2020 shows that the related research started late before 1996, but after 1997 the related literature increased year by year, and especially reached a peak in 2020. This shows that the study of climate change on cephalopod population dynamics has gradually attracted widespread attention. Taking the El Niño event as an example, the distribution of seals in California waters was affected by water temperature, which in turn affected the distribution of cephalopods, which are the prey of seals, in this region [7].

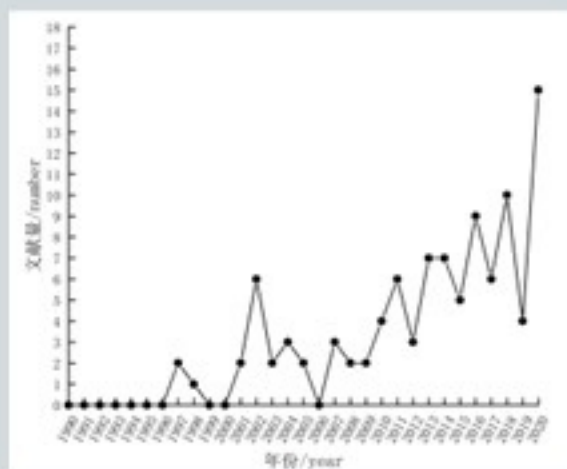


Figure 1. Number of published papers on The impact of climate change on Cephalopod population dynamics

• As can be seen from Figure 2, the overall trend of published papers is rising, followed by a total of 326 papers published in 2020, which may be due to the national attention to attract more scholars to invest in research on cephalopods, in particular, after 2003, China has

become a major producer of cephalopods, with the world's largest catch, and reached the highest ever catch in 2015 [1], which lays a solid foundation for research on cephalopods.



Figure.2 The number of papers on Cephalopod research in Web of Science

• The citespace analysis yielded a mapping as shown in Figure 3 of the countries where research on cephalopods in the Web of Science core collection is mainly concentrated. According to the search results, it was found that the earliest literature on cephalopod research was published by American scholars in 1995 [29], while China's research in this field started in 2002 [30], although relatively late, China ranked 10th in terms of the number of publications on cephalopod research in the world. By analyzing the research institutions, it was found that the Spanish National Research Council (CNRS) had the highest number of publications, followed by the other institutions as shown in Figure 3.

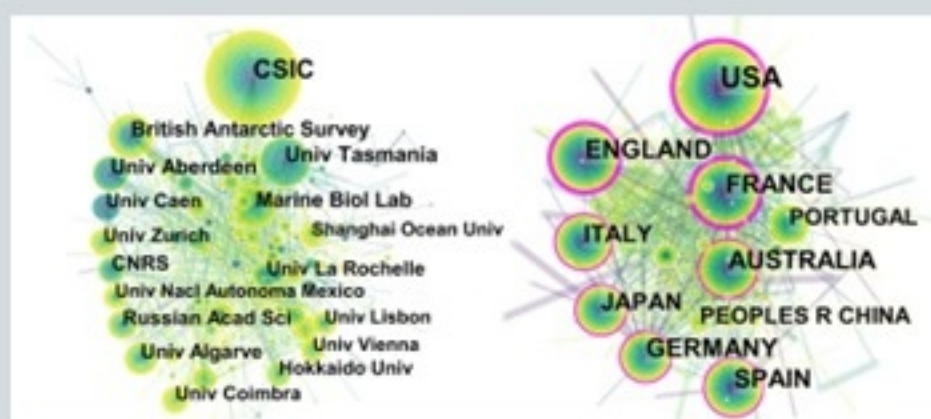


Figure.3 Graph of cooperation institutions and countries for Cephalopod research in Web of Science

• The mapping obtained through citespace keyword analysis is shown in Figure 4, and it can be found that a total of 12 research frontiers in the impact of climate change on cephalopod population dynamics have been formed, namely, cephalopod life history, stem flexuosus, temperature, cephalopod growth patterns, cephalopod fisheries, cephalopods, Mediterranean seas, cephalopod tissue lactate dehydrogenase studies, cephalopod acoustics, thermocline cephalopod studies, and wild cephalopods.

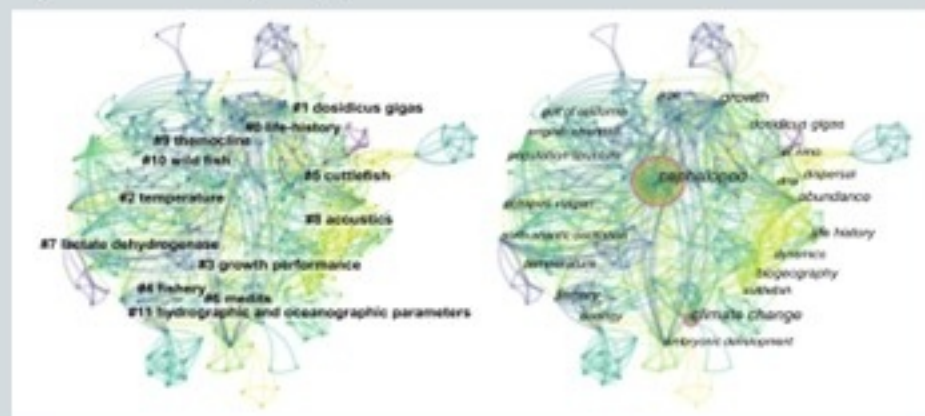


Figure.4 Graph of keywords co-occurrence network for Cephalopod research in Web of Science

## Conclusion

The research on cephalopods related to climate change started in 1997, and the number of papers published has been increasing, and this research direction has gradually become a research hotspot. Researchers have mainly studied cephalopods in regional waters under the influence of climate change, focusing on growth and development, life history, feeding strategies, and migratory movements. In the analyzed literature, climate change, fisheries, temperature, growth, and population structure are the most frequently occurring keywords; stemmed softshell fish and gun squid are the most frequently occurring research objects; the Parisian Islands, the North Atlantic Ocean, the Gulf of California, and the English Channel are the popular research areas; otoliths are the most frequently occurring cephalopod research sites; population structure, life history, abundance, age, biodiversity, feeding, and embryonic development were the most frequently occurring study components; and El Niño was the most frequently occurring environmental factor.

## Reference

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