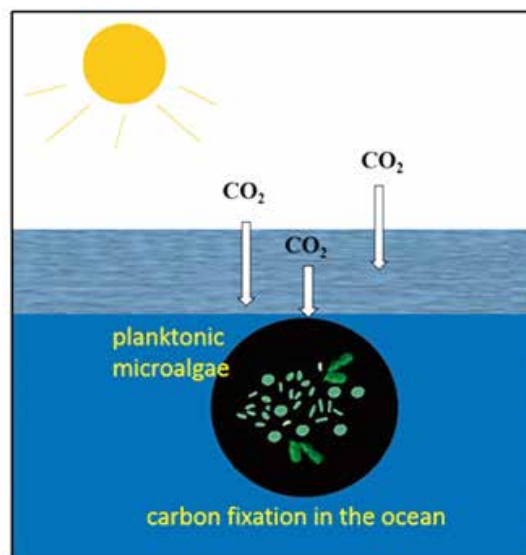# Using Planktonic Microalgae to Evaluate Marine Carbon Fixation

Increasing emissions of CO_2 and other greenhouse gases have been facilitating global warming, which seriously threatens human life and social sustainable development. To curb the dangerous effects of climate change, we need to not only make deep cuts in emissions, but also enhance carbon sequestration. The ocean plays an important role in climate change mitigation thanks to its high potential in absorbing CO_2 from the atmosphere. For example, about 1/3 of the annual CO_2 emissions can be absorbed by the ocean. In fact, the ocean's amazing capability of carbon sequestration is mainly driven by microbes including bacteria, viruses, protozoan and picophytoplankton, etc.

Picophytoplankton is a kind of microscopic plants that live under water, which usually comprise planktonic and tiny algae. It is the most abundant photoautotrophic organism in the ocean. In some regions, over 80% of the total oceanic carbon fixation is contributed by picophytoplankton. However, it is still a challenge to accurately estimate the carbon fixation of picophytoplankton in a wide survey on large spatiotemporal scales.

Recently, a research group led by ZHANG Yongyu from the CAS Institute of Bioenergy and Bioprocess Technology in Qingdao developed a modified carbon-based ocean productivity model (CbPM) to achieve this goal. They applied the CbPM method to a big picophytoplankton abundance database covering nearly all China Sea, and successfully calculated that the annual carbon fixation by picophytoplankton in Bohai Sea is about 1.5 million tons of carbon. That is to say, picophytoplankton in the Bohai Sea can absorb up to 5.5

Marine carbon fixation. (Image: LIANG Yantao and ZHANG Yongyu, Qingdao Institute of Bioenergy and Bioprocess Technology)

million tons of CO_2 each year from the atmosphere.

Based on this finding, ZHANG and his coworkers are now leading the development of a National Ocean Occupation Standard on "Blue Carbon Investigation, Monitoring and Measurement: Picophytoplankton".

Their study is also a major contribution to the international IMBER project. The research was supported by the National Key Research and Development Program of China, the National Natural Science Foundation of China, Shandong provincial government, and the Chinese Academy of Sciences. Their paper has been published in *Frontiers in Microbiology* and *FEMS Microbiology Ecology*.