From lagged forensics to real-time diagnosis: A new paradigm of integrated biological observation for marine health assessment

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A healthy marine ecosystem is essential for economic and social development

- Marine ecosystem services
- Production functions of marine ecosystems
- Support for economic and social development





The ocean is changing



Kelp culture in Sanggou Bay









The kelp harvest in Sanggou Baywas almost a total failure in 2022

Kelp Disaster Situation

In Rongcheng,





烟墩角，2022.01.12



楮岛北，2022.01.14



楮岛南，2022.01.12

Problems Caused by Large-scale Bivalve Aquaculture





- 筏式养殖/底播养殖
- 底栖生态系统的破坏
- 生产方式-避难所
- 环境适应与每年种苗的变化
- 生物多样性与单一种类
- 在生态系统受到冲击但是又无法进行控制
- 片面追求产量和效益带来的后果





Ecological Security of Mariculture: Monitoring and Early Warning







Ecosystem health is a big problem













Human Health check-up



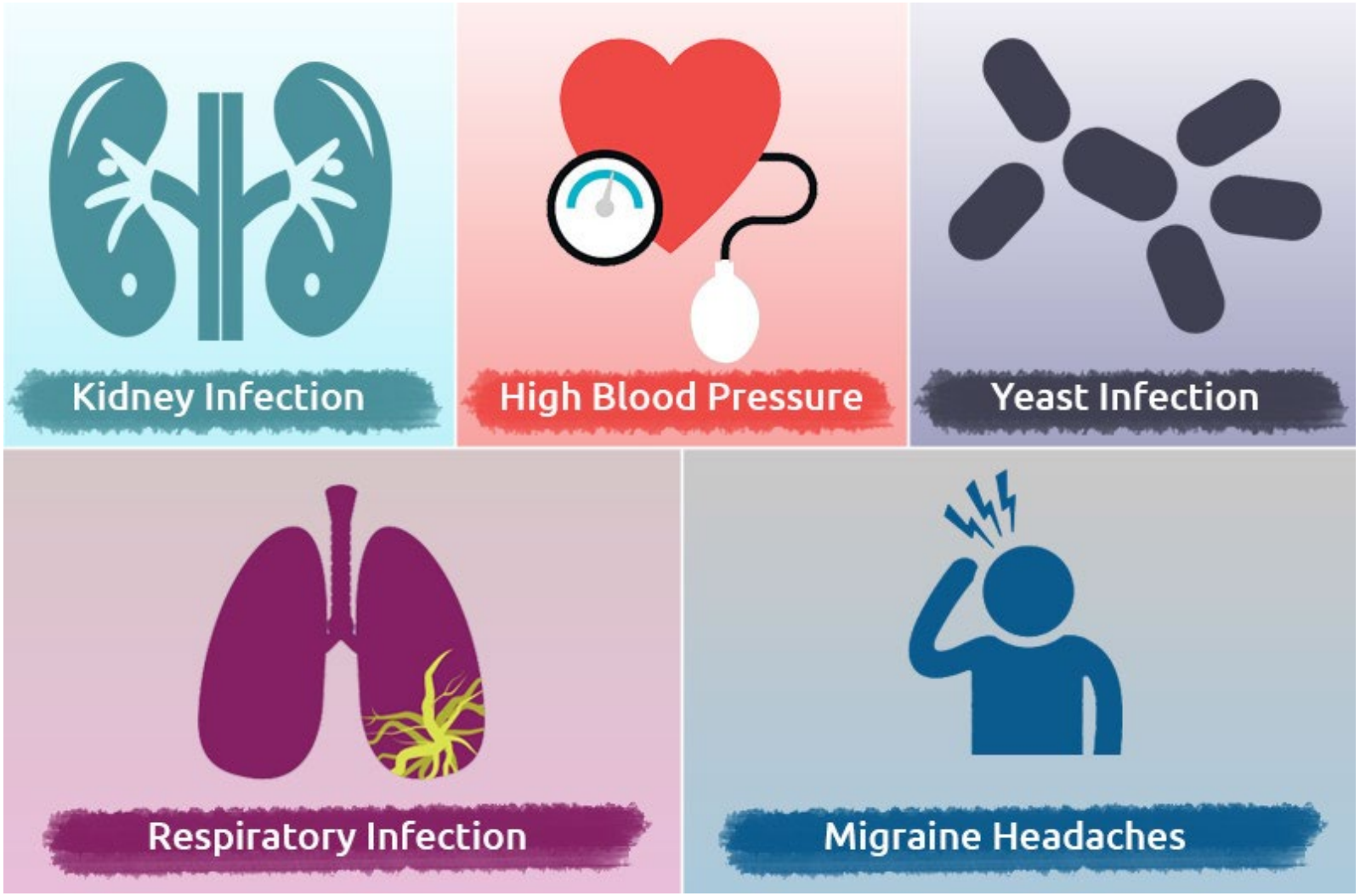




Provide a clear evaluation of health status







Ocean health and human health is similar



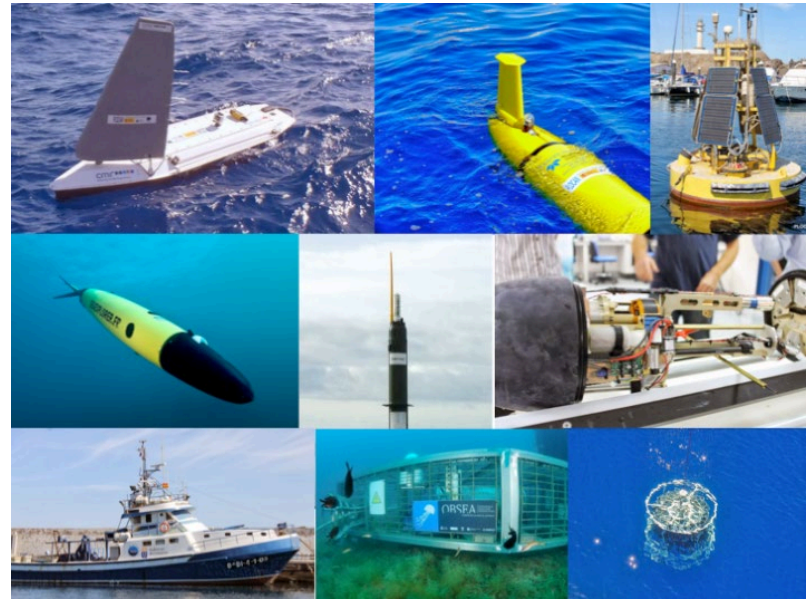





Image Attribution:
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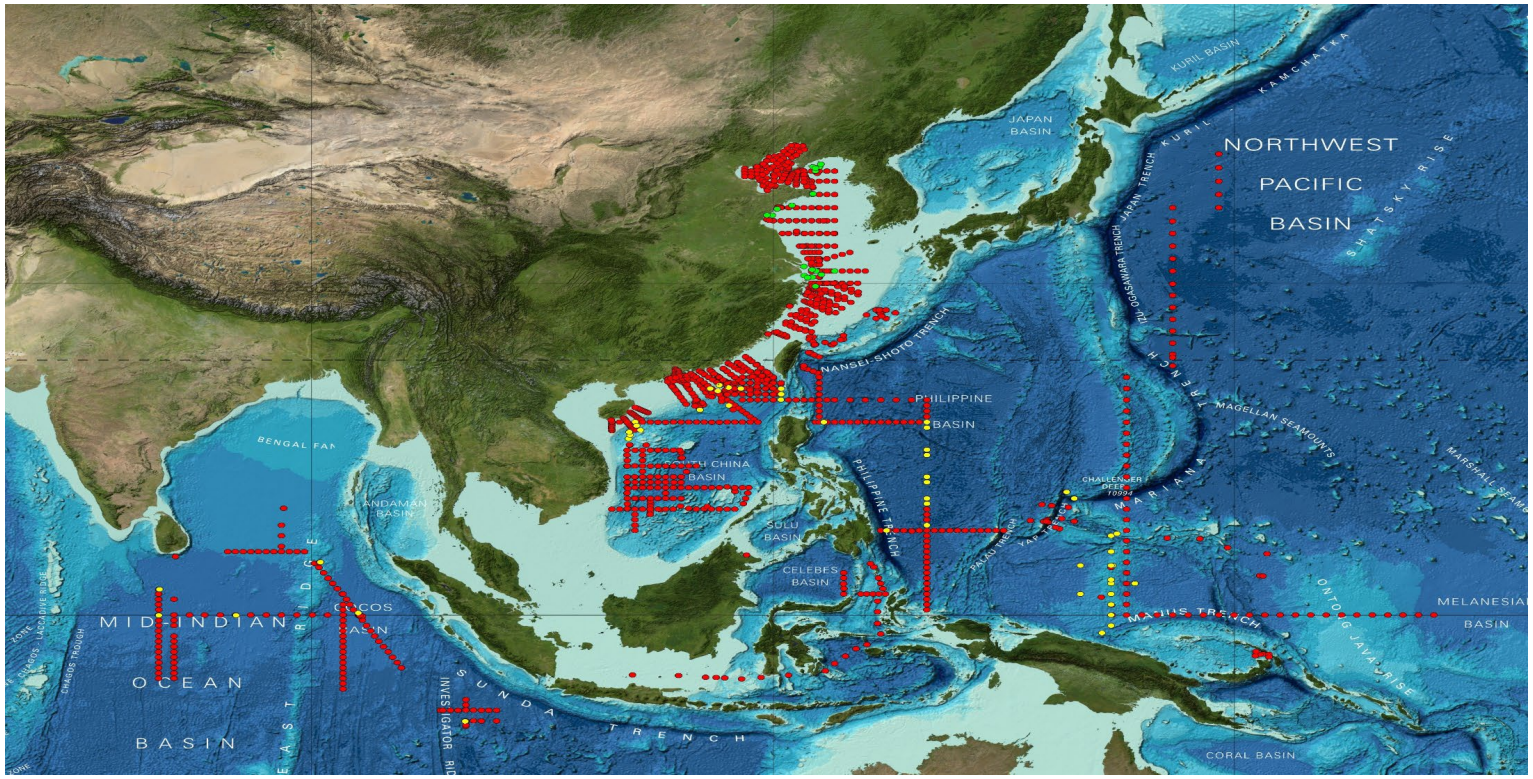
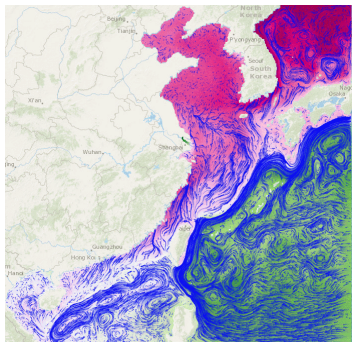
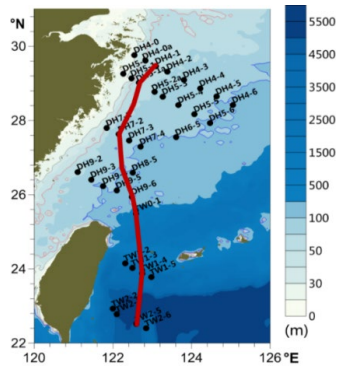
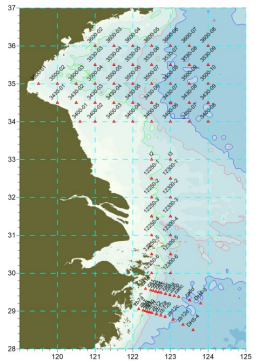
Massive Ocean Observations



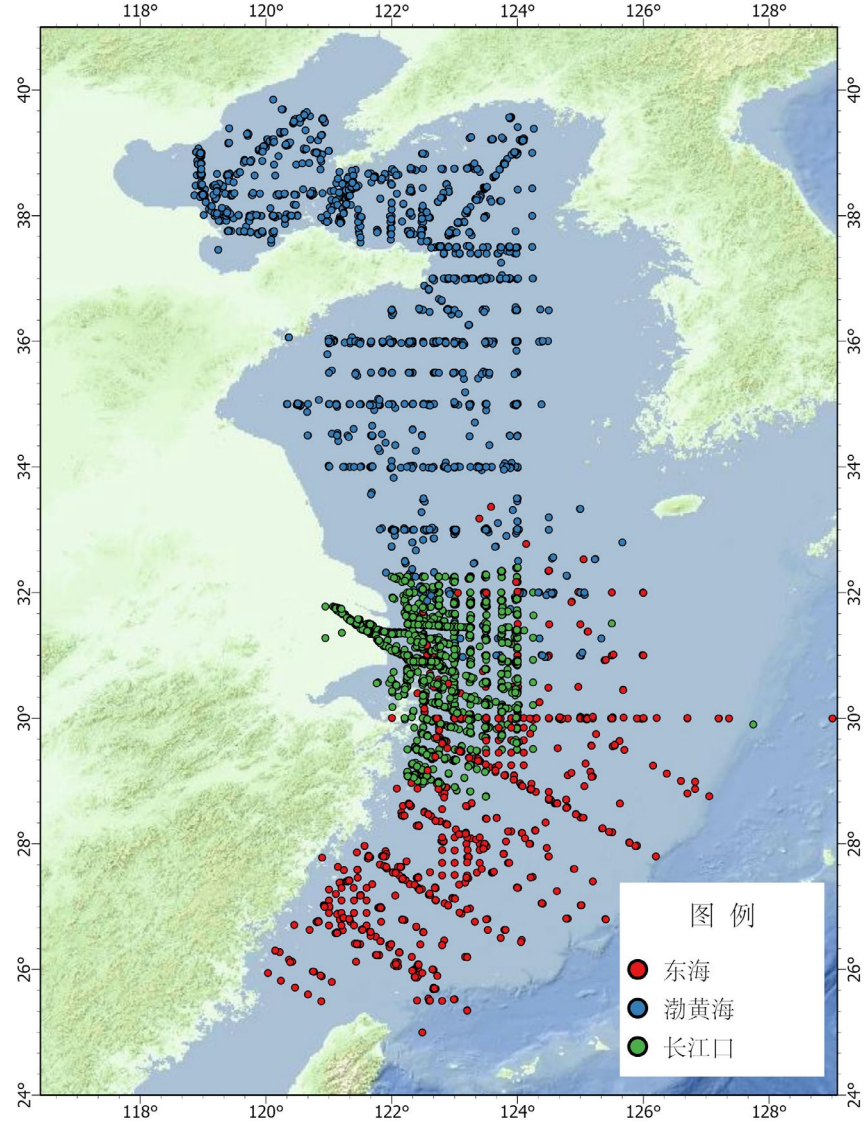






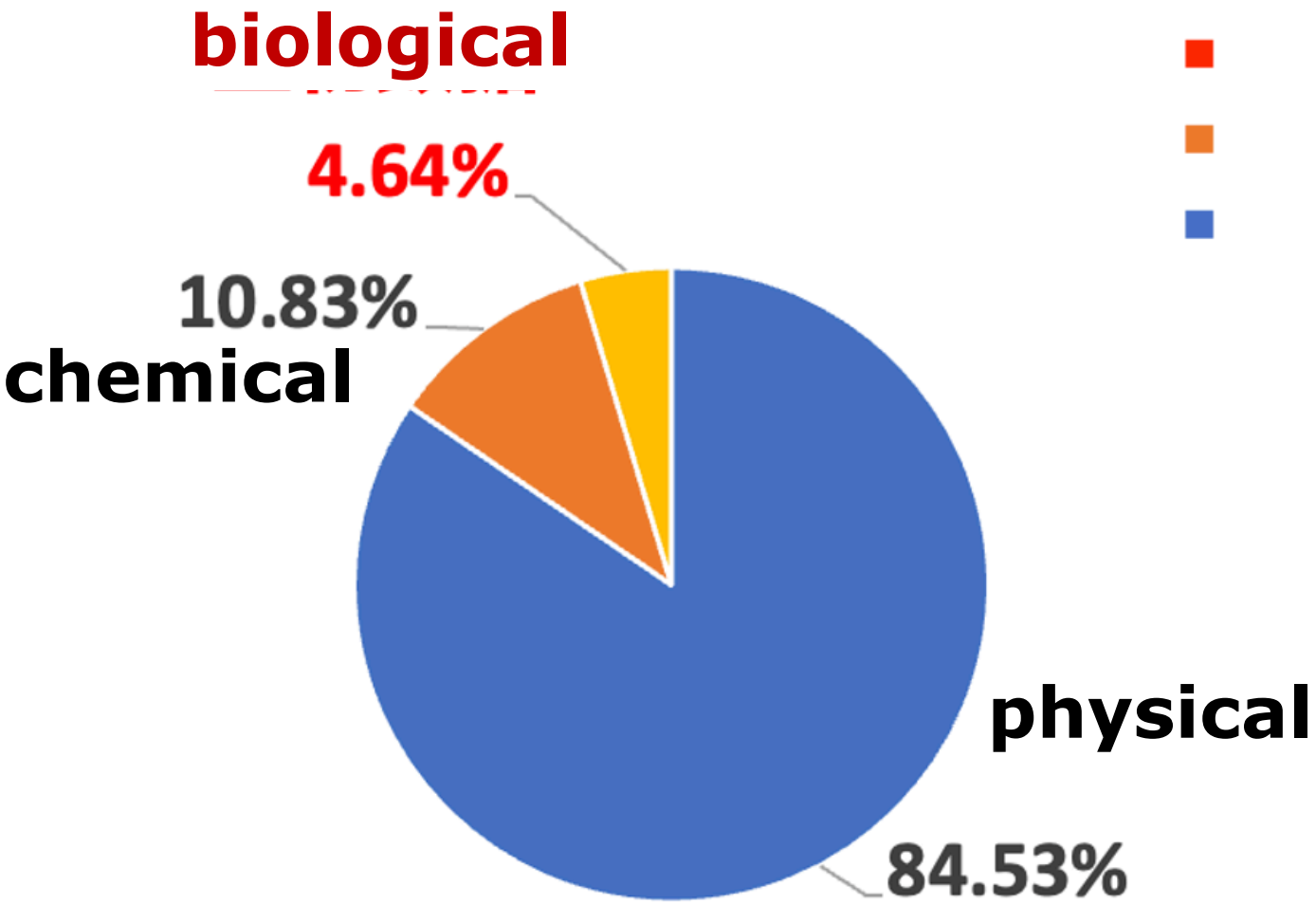






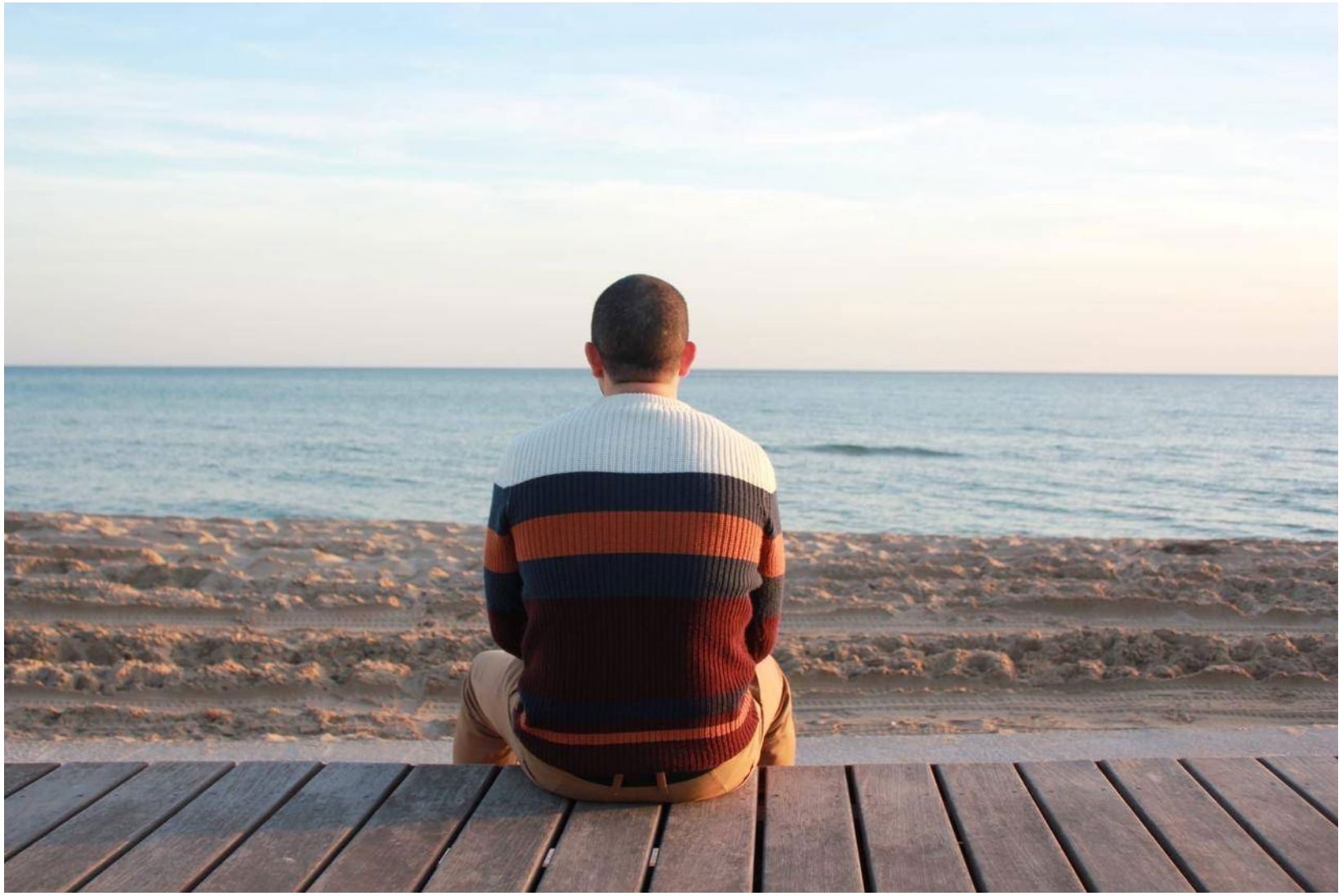
But we cannot provide a clear evaluation of health status of the Ocean.
Because we cannot get Sufficient valid data, with some key data missing, e.g., biological data

World Ocean Database (WOD)



- 生物数据：叶绿素、浮游生物等
- 化学数据：溶氧、营养盐、pH等
- 物理数据：温度、盐度、压力等

How to perceive, understand, and assess the state of the ocean?







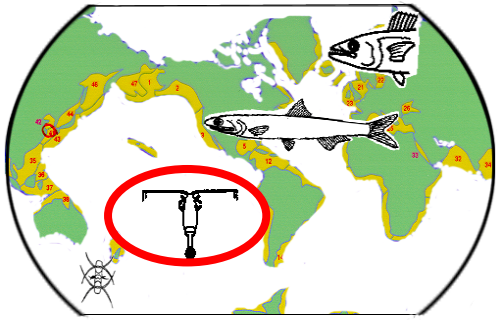
How to face reality?



国际地圈与生物圈计划（IGBP)海洋领域核心计划
全球海洋生态系统动力学（GLOBEC）研究

GLOBEC

ICES/GLOBEC

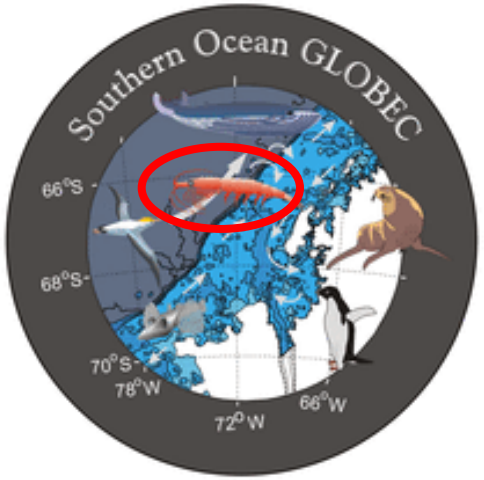


GLOBEC-CHINA

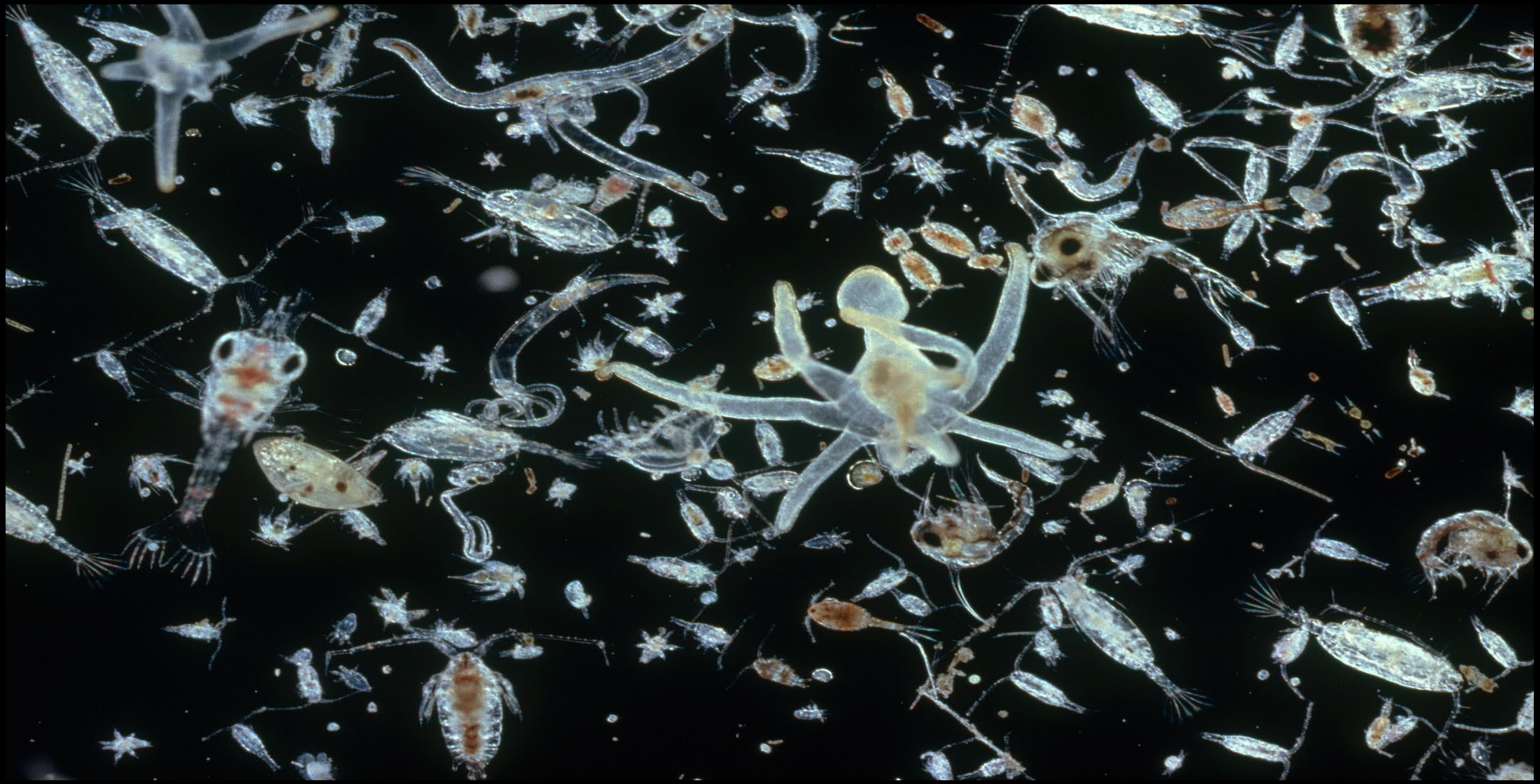


GLOBEC
Germany

U.S.GLOBEC
GLOBAL OCEAN ECOSYSTEMS DYNAMICS



浮游动物生物多样性



Sample tool for plankton

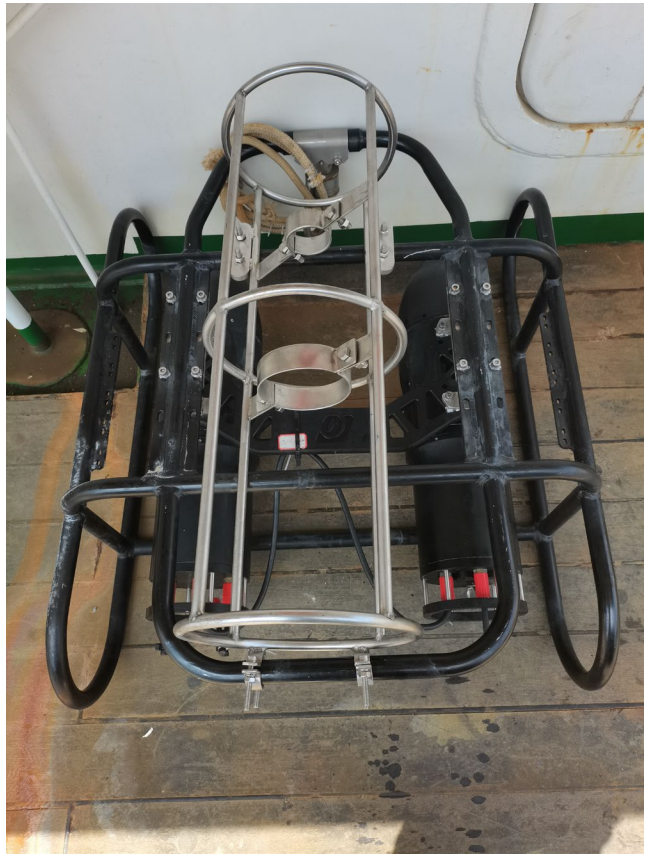


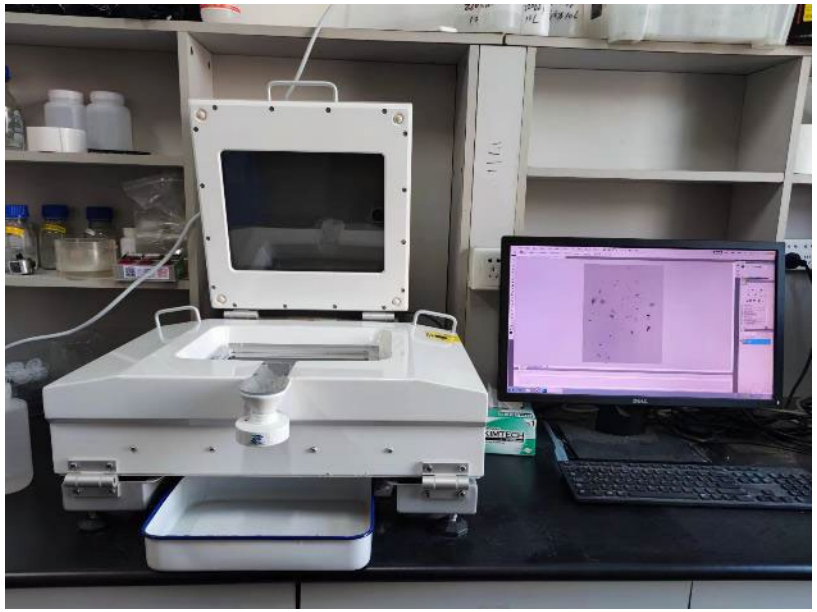
Collect and analysess for plankton

Underwater Video Profiler (UVP)



planktonscope





浮游动物图像扫描分析系统(ZooSCAN)

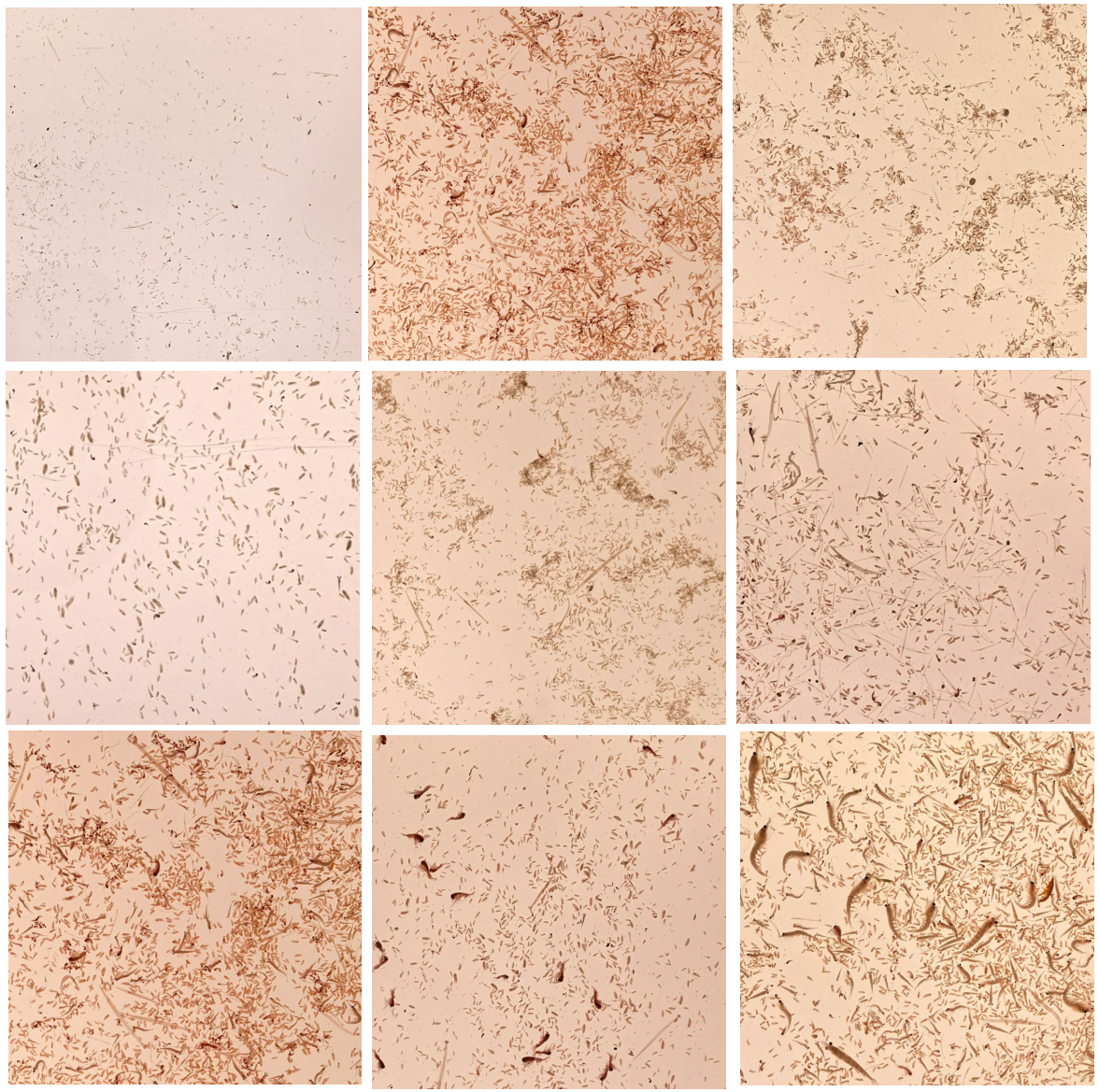
ZooScan







Rapid Detection of Zooplankton: Biomass of Dominant Functional Groups



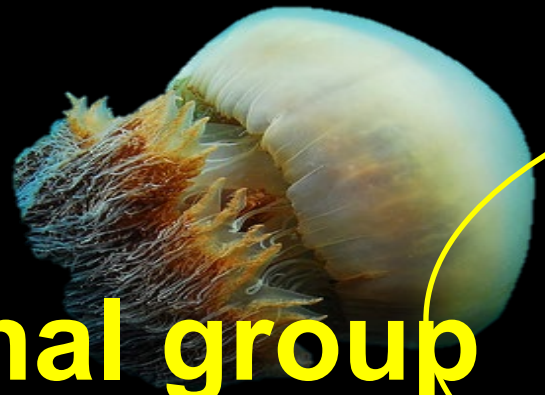


- 黄海春季浮游动物优势功能群：桡足类、端足类、磷虾和箭虫
- 桡足类在所有站位均有分布，端足在北黄海生物量较高，磷虾主要分布南部区域

Rapid Detection of Zooplankton: Biomass

Functional group





胶质类



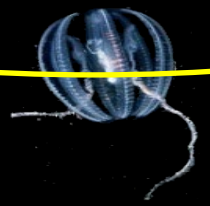


甲壳类





















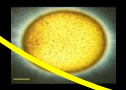


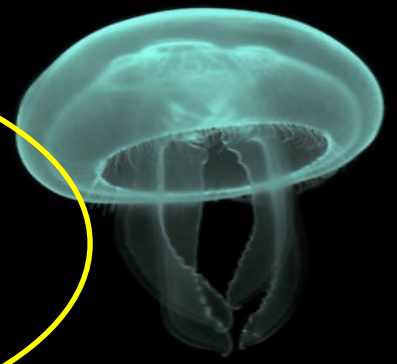
微型浮游生物











We anticipate the establishment of a new observation system

获取图像

影像传输

影像识别

实时数据

地理位置

温度？

盐度？

营养盐？






Thank you!