German Centre
for Integrative
Biodiversity Research

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sDiv Workshop Summary

Global Changes in Marine Plankton Diversity and Productivity (sMarD)

30. Nov. – 4. Dec. 2015

Workshop summary

Human activities have greatly affected marine biodiversity and productivity. Although oceans cover more than 70% of the Earth, changes in biodiversity of marine plankton and their consequences for global ocean productivity are still poorly understood. Here, we propose a large-scale analysis of changes in diversity of marine plankton to understand recent trends in global ocean primary production and their consequences for ecosystem structure and the services they provide to humanity.

Contact: Aleksandra M. Lewandowska (aleksandra.lewandowska@uni-oldenburg.de) & Boris Worm (boris.worm@dal.ca)

Participants

Andrew D. Barton (Duke University, USA), Daniel G. Boyce (Bedford Institute of Oceanography & Queens University, Canada), Pedro Carmeno (CSIC Institute of Marine Sciences, Spain), Zoe V. Finkel (Mount Allison University, Canada), Stephanie Henson (National Oceanography Centre Southampton, UK), Matthias Hofmann (Potsdam Institute for Climate Impact Research, Germany), Helmut Hillebrand (Carl von Ossietzky University of Oldenburg, Germany), Andrew J. Irwin (Mount Allison University, Canada), Aleksandra M. Lewandowska (Carl von Ossietzky University of Oldenburg, Germany), Heike Lotze (Dalhousie University, Canada), Birte Matthiessen (GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany), Friederike Prowe (GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany), Ulrich Sommer (GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany), Derek Tittensor (Dalhousie University, Canada & UNEP World Conservation Monitoring Centre, UK), Sergio Vallina (CSIC Institute of Marine Sciences, Spain), Claire E. Widdicombe (Plymouth Marine Laboratory, UK), Boris Worm (Dalhousie University, Canada)

Feedback of applicants

The goal of the workshop was to analyse observed changes in plankton diversity and project consequences of these changes for ecosystem structure and ocean productivity.
The workshop started with defining objectives and presenting available data sets collected prior to the meeting. Preliminary results and examples of trends in plankton diversity were presented. We discussed how to deal with inconsistencies in the data.

On the second day, we continued with presentation of modelling approaches and a new method to address turnover in species composition. We discussed methods of time series analyses, meta-analyses of experimental data and global model needs. To standardize the analyses we generated mathematical formulas and worksheet templates.
On the 3th and 4th day, we focused on group work. Preliminary R-scripts for time-series analyses and data quality control were created and the first results were discussed. We concluded that: (i) marine plankton diversity and compositional turnover are highly dynamic and greatly affected by environmental change, and (ii) plankton diversity and species composition are rarely quantified in oceanographic studies and this ought to change, because variation in plankton diversity plays a significant role in driving resource use efficiency and hence productivity in the oceans.
On the last day, we discussed a manuscript outline, defined the next steps and deadlines. We decided to focus on time-series analyses of phytoplankton diversity and community composition adding experimental and sediment core data for verification. The group, which is centered in Halifax, Canada, and Kiel, Germany, agreed to meet in these locations to continue working on the project.

Presentations

- Introduction: workshop objectives & data overview (Mo 30. Nov) – B. Worm & A.M. Lewandowska
- Presentation of long-term data sets (Mo 30. Nov) – A.D. Barton & C.E. Widdicombe, D.G. Boyce, P. Carmeno & S. Vallina, Z.V. Finkel & A.J. Irwin, F. Prowe, D. Tittensor
- Presentation of experimental data (Mo 30. Nov) – B. Matthiessen
- Presentation of historical data (Mo 30. Nov) – H. Lotze
- Modelling approaches (Tue 01. Dec) – S. Henson, M. Hofmann
- Calculating turnover in species composition (Tue 01. Dec) – H. Hillebrand
- Public talk at iDiv Conference (Wed 02. Dec): *Contrasting diversity patterns on land and in the sea: two different kettles of fish* – B. Worm

Working balance

General discussion: 40%
Presentations: 20%
Working in groups: 40%

sDiv support

The service provided by sDiv promoted efficient work and excellent working atmosphere.