

## Project information

### Keywords

Ocean acidification; copepods; Arctic Ocean

### Project title

ECOAN WP3-Population-level effects of Arctic ocean acidification on copepods PI

### Year

2015

### Project leader

Pedro Duarte

### Participants

Pedro Duarte, Norwegian Polar Institute

### Flagship

Ocean Acidification

### Funding Source

Project Ecosystem effects of Ocean Acidification in Northern waters (ECOAN), financed by the Fram Centre

## Summary of Results

The modelling approach implemented during 2014-2015 is based on structured population dynamic models (SPDM), where experimental populations are represented by different life cycle stages using a transition matrix model (Leslie 1945, 1948), or a McKendrick-von Foster type model (Otto and Day, 2007). Each stage is assumed to be composed of a homogeneous set of individuals. The transition matrix model was implemented in MatLab and it may be used for a fast evaluation of the effects of changes on population level vital rates, such as mortality and growth, on population dynamics. The McHendrick-von Foster model was implemented with EcoDynamo (Pereira et al., 2006) and it couples physiological with population dynamics processes by calculating growth rates as a function of energy budgets. Therefore, it may integrate ocean acidification effects both at the physiological and the population level. Both models are prepared to use. The vital rates and their random variability will be used to generate thousands of population growth trajectories to estimate the probability of severe population changes in the future pH/salinity ranges determined from ECOAN-WP1 and WP3.

## References

Leslie, P.H., 1945. On the use of matrices in certain population mathematics. *Biometrika* 33: 183-212.

Leslie, P.H., 1948. Some further notes on the use of matrices in population mathematics. *Biometrika* 35: 213-245.

Otto, S.P., Day, T., 2007. A biologist's guide to mathematical modelling .Princeton University press.

Pereira, A., Duarte, A., Norro, A., 2006. Different modelling tools of aquatic ecosystems: A proposal for a unified approach. *Ecol. Informatics* 1: 407-421.

## For the Management

This report corresponds to one of the sub-projects within the "large" ECOAN FRAM Centre funded project. The work reported had no budget attributed for 2015.

## Published Results/Planned Publications

Models were implemented but results were not published yet. Publication depends on data input from other Workpackages.

## Communicated Results

Results were presented to the project partners in a workshop that took place in the Fram Centre in the 29th of September 2015.

## Interdisciplinary Cooperation

This sub-project depends of cooperation with the remaining WPs of ECOAN, especially "Work package I: Understanding the biogeochemical mechanisms controlling ocean acidification in Arctic waters – past, present and future" where experimental data necessary to parameterize the models described above is gathered.

Could results from the project be subject for any commercial utilization

No  
Conclusions

The tasks planned 2015 for this sub-project were fulfilled. Models were implemented and meetings with colleagues from WP1 were organized to define data needs to start using the implemented population models.