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## **Ocean Acidification: SCAR Future Plans**



# Ocean Acidification: SCAR Future Plans

Information Paper submitted by SCAR

## **Background**

The carbon dioxide (CO<sub>2</sub>) concentration of the Southern Ocean is rising. The dominant source of this increase is in response to partial equilibration with the increasing atmospheric CO<sub>2</sub> concentrations, following worldwide fossil fuel combustion and land use changes. Subsequent shifts in chemical equilibria result in a change to the marine carbonate system and a lowering of seawater pH. This process is termed “ocean acidification” (OA). From a limited number of studies to date, it is already clear that OA is causing rapid changes in ocean chemistry.

There is concern over the future of polar marine organisms that are uniquely adapted to their extreme and cold surroundings. In an environment where development is ten times slower than that in warmer regions of the world, the ability of these (mostly benthic) organisms to adapt to these changing conditions is questionable, especially over the next 50 to 100 years. Studies investigating the impacts of ocean acidification on polar marine calcifying organisms are extremely limited. The major challenges for understanding Southern Ocean acidification are advancing the observational network and better constraining our understanding of the underlying natural variability and the mechanisms that drive it, both of which are still poor. The socioeconomic and cultural effects of Southern Ocean OA are unknown.

## **Future Plans**

There is a growing international effort to observe and monitor the marine carbonate system with the emphasis moving to an integrated observing system approach based on ecosystem-carbon-climate coupling. Additionally, modeling efforts are becoming much more unified and assimilated through a multi-model approach, with regional models becoming much more utilised – often informed at the boundaries through coupling to global earth system models.

SCAR has appointed an international ocean acidification Action Group, lead by Dr. Richard Bellerby (Norway), to document the scientific understanding of ocean acidification. The Action Group consists of an international cross-disciplinary team of ocean acidification experts representing the fields of marine carbonate chemistry, global and regional modelling, marine ecology, ecotoxicology/physiology and paleoceanography. Dr Bellerby is also leading an equivalent effort in the Arctic.

The OA Action Group will:

- define our present understanding of the contemporary rates and future scenarios of Southern Ocean acidification;
- document ecosystem and organism responses from experimental perturbations and geological records;
- identify present and planned observational and experimental strategies;
- identify gaps in our understanding of the rates and regionality of ocean acidification and;
- define strategies for future Southern ocean acidification research.

The above workplan will be performed in consultation with existing global ocean acidification efforts (e.g. SOLAS/IMBER Sub Group 3, US Ocean Carbon Biogeochemistry, the SCAR co-sponsored ICED programme and the SCAR/SCOR Southern Ocean Observing System).

The final report will be launched at the SCAR Open Science Conference in August 2014 ([www.scar2014.com](http://www.scar2014.com)).