

## Executive summary

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The Joint OSPAR/ICES Study Group on Ocean Acidification (SGOA) held its second meeting in Copenhagen, Denmark from 07–10 October 2013. The meeting was hosted by the ICES Secretariat. The meeting was co-chaired by Evin McGovern (Ireland) and Mark Benfield (USA) and was attended by 17 scientists representing ten nations and AMAP. Two additional guest scientists and ICES DataCentre representatives joined for discussions on data management. A number of participants joined via WebEx conference. NOAA scientists were, unfortunately, unable to participate due to the US federal government shutdown. The objective of the meeting was to address the Study Group's eight terms of reference (ToRs). A final consolidated SGOA report will be prepared at the 2014 meeting.

The group members provided new information on national OA monitoring and research developments. Updates were also provided on international activities, in particular the recently published AMAP Arctic OA assessment and EU FP7 MedSeA project.

The meeting noted the exponential increase in the number of publications on biological effects of OA with many investigations considering the combined impacts of multiple stressors. Experimental research confirms that survival, calcification, growth, development and abundance can all be negatively affected by acidification, but the scale of response varies between taxonomic groups. Volcanic CO<sub>2</sub> vents can provide useful proxies of future OA conditions allowing studies of species responses and ecosystem interactions across CO<sub>2</sub> gradients. Studies at suitable vents in Italy, Greece, Mexico and Papua New Guinea show that marine systems respond in predictable ways to increased CO<sub>2</sub>. SGOA 2013 also considered the threat of the projected shoaling of the Aragonite Saturation Horizon to reef forming scleractinian cold-water corals, in particular *Lophelia pertusa*, in the Northeast Atlantic. These reefs are rich in biodiversity but we have a poor understanding of the functional ecology of these ecosystems. Cold-water corals appear sensitive to even small changes in seawater temperature, and the fossil record shows how each major extinction event of previous coral fauna was strongly related to perturbations in the ocean's carbon cycle. SGOA 2013 made arrangements to undertake an assessment of the OA status of cold water coral habitats in the OSPAR area.

To support OSPAR assessments of OA, a first draft of an OA monitoring and assessment framework was developed with a view to finalisation at SGOA 2014. It was recognised that, as an emerging field of research, any OSPAR framework would need to be flexible and responsive to rapidly expanding scientific knowledge and technological developments. The carbonate system parameters are currently included in OSPAR monitoring on a voluntary basis. SGOA concurred with MCWG that an analytical workshop is required to develop best practice and develop quality assurance required to support coordinated monitoring.

The selection of appropriate species for monitoring and description of appropriate morphological or biochemical metrics that can be used to document OA impacts is premature. SGOA updated a table of potential indicator taxa for OA responses. Shell erosion in thecosomate pteropods may provide a useful indicator but given the morphological diversity, identification of suitable species for the OSPAR area and metrics are required. SGOA recommends that a broad suite of organisms likely sensitive to OA, be collected

and archived. This archive will serve as a repository of specimens that can be retrospectively examined for evidence of OA responses once appropriate indicator metrics are developed.

The parameters and checks required for reporting OSPAR OA chemistry data to the ICES environmental database have been defined and tested. Reporting to this database is limited to discrete sample data. Protocols are needed to facilitate OA data exchange with other international data centres and initial discussions involving ICES-DC and the CDIAC data centre, a well-established data repository for marine carbon system data, took place at SGOA 2013. Data synthesis products such as GLODAPV2 and SOCAT (surface ocean CO<sub>2</sub> atlas), also available via CDIAC, have an additional level of quality checks.

The next meeting of the SGOA will be held in Copenhagen from October 6–10, 2014 at ICES.