



### About us:

The [National Oceanography Centre](http://www.noc.ac.uk)<sup>1</sup> (NOC) works in close partnership with the wider marine science community to create an integrated research capability. The National Oceanography Centre (NOC) is a focal point for UK Marine Science and many of its programmes are funded through public money, including a long history of successfully leading EC research projects in Horizon 2020 and its predecessors. The views expressed here are our own and do not necessarily reflect those of our parent body NERC.

### Response coordinator:

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### Consultation Response:

Our interests in Societal challenge 5 focuses particularly on climate change and on raw materials (deep sea mining). Generally speaking **we agree with the findings in the report of the Horizon 2020 Advisory Group**. We therefore **highlight briefly** below the areas where we feel greater emphasis would be beneficial.

#### Climate change

Whilst recognising the scale of the challenge and the need for many actors and tools it is important also to keep in mind that there are many fundamental science questions which need to be addressed. Many of these questions concern how the ocean works within the Earth system as a whole. For example:

*Where is the excess heat going ?*

*Can the ocean continue to absorb excess CO<sub>2</sub> ?*

*What are the limits of ecosystem resilience to warming, acidification, de-oxygenation ?*

*What will be the impact of a new summer sea-ice free Arctic Ocean ?*

*What is the role of viruses in the ocean ?*

*Is the ocean's heat conveyor belt circulation slowing down?*

*What is the flux of methane and other gasses/fluids from the seafloor?*

In particular the **North Atlantic and the adjacent Arctic Ocean** is a key marine region that encompasses ecologically and biologically important and fragile ecosystems (e.g. deep cold-water corals) and provides goods and services essential for our well-being such as regulating climate. Research is needed to address the **impact of Arctic warming** on the North Atlantic ecosystems.

More generally a greater understanding of **cumulative impacts and the impacts of multiple stressors** is needed to underpin policy implementation, to ensure the objective of safe, healthy and biologically diverse seas and oceans whilst enabling sustainable growth and the development of new climate and marine services.

More work is also needed to develop **models** capable of prediction of climate impacts at **local and regional scales and on seasonal, annual and decadal timescales**. The further development of underpinning technologies, such as **marine autonomous and robotic observation systems**, operating of **scales from 1-50km and hours to months** are critical to understanding, managing and sustainably exploiting the marine environment and offer potential for a wide range of novel industrial applications and services. The development of novel tools which enable the **integration of high performance computing, data analytics and visualisation facilities** should be supported that make best use of all marine data, rapidly turning it into knowledge, products and services to inform decision making and sustainable environmental management.

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<sup>1</sup> [www.noc.ac.uk](http://www.noc.ac.uk)



## Deep sea mining

As economic interest in deep-sea mining grows it will be important to ensure that the knowledge gathered from research projects is translated into the necessary policy to ensure that the deep-sea environment is sustainably managed.

Knowledge of where and what resources exist can be a major limitation on the activity of deep-sea mining. Without knowledge of deposit location and richness mining could not occur in a cost effective manner. Furthermore appropriate knowledge is needed about the entire environment that such deep-sea deposits are located in, in order to **fully assess the physical impacts on the environment, including both the pelagic and benthic communities as well as the physical impact on the deep seabed.**

Utilization of the marine environment, whether it be for scientific research or economic development requires significant cross-disciplinary collaboration. When focusing on the economic interests driving the exploitation of the deep sea there will be a need to ensure that cross sectorial collaborative working practices are adopted to ensure that both political and scientific sectors are working together to develop long term, sustainable economic growth.

## Horizon 2020 processes

The advisory group correctly highlights the need to ensure that societal challenge 5 is huge and must be linked to the other six challenges of H2020, especially: Health, Demographic Change and Wellbeing; Food, Agriculture, Marine Research and the Bio-economy; and Energy and Transport. It will be critical therefore to make sure that the design of activities across each of these challenges is not done in isolation from the others. In respect of marine and maritime science and technology the creation of the new Commission 'Blue Growth' Marine Resources Unit and the engagement of the commission service with the Joint Programing initiative on Oceans and Seas is particularly welcome.

## Selected References

European Marine Board (2013). Navigating the Future IV. Position Paper 20 of the European Marine Board, Ostend, Belgium.

<http://www.marineboard.eu/images/publications/Navigating%20the%20Future%20IV-168.pdf>

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<http://noc.ac.uk/f/content/downloads/2013/Scanning%20the%20Horizon-reduced.pdf>

National Oceanography Centre NOC Association response to the EC Seabed mining consultation submitted 16<sup>th</sup> June 2014.

<http://noc.ac.uk/>