

# WMO OMM

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World Meteorological Organization  
Organisation météorologique mondiale  
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Всемирная метеорологическая организация  
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Annex: 1 (available in English only)

Subject: Marine geoengineering

- Actions required:
- (1) Provide reflections on the report "High level review of a wide range of proposed marine geoengineering techniques" by Working Group 41 – Marine Geoengineering of the Joint Group of Experts on Scientific Aspects of Marine Environmental Protection (GESAMP)
  - (2) Provide recommendations related to the future work of Working Group 41 of GESAMP

Dear Sir/Madam,

The WMO Executive Council, at its sixty-sixth session in 2014, requested the Commission for Atmospheric Sciences (CAS) to keep the Council and Congress updated on any significant developments in climate engineering of relevance to WMO, in order to enable decisions on the appropriate level and the nature of involvement of WMO in climate engineering.

The World Meteorological Congress, at its seventeenth session in 2015, noted the interest of Members in developing a science-based assessment on climate engineering, specifying the gaps in scientific understanding and promoting specific research activities to fill such gaps. In this regard, the Congress requested CAS to coordinate its contribution to such an assessment in close cooperation with the International Maritime Organization (IMO), the Intergovernmental Oceanographic Commission (IOC) of UNESCO, the Intergovernmental Panel on Climate Change (IPCC), the World Climate Research Programme (WCRP) and other relevant international, academic and science bodies.

The recent development on the climate change arena including the Paris Agreement in 2015 and the publications of the IPCC Special Report on Global Warming of 1.5°C in 2018, have implicit acceptance of negative emission requirements. In particular, the Summary for Policymakers of the IPCC Special Report states in the following paragraph:

*"All pathways that limit global warming to 1.5 °C with limited or no overshoot project the use of carbon dioxide removal (CDR) on the order of 100–1000 GtCO<sub>2</sub> over the 21st century. CDR would be used to compensate for residual emissions and, in most cases, achieve net negative emissions to return global warming to 1.5°C following a peak (high confidence). CDR deployment of several hundreds of Gt CO<sub>2</sub> is subject to multiple feasibility and sustainability constraints (high confidence). Significant near-term emissions reductions and measures to lower energy and land demand can limit CDR deployment to a few hundred Gt CO<sub>2</sub> without reliance on bioenergy with carbon capture and storage (BECCS) (high confidence)."*

To: Permanent Representatives (or Directors of Meteorological or Hydrometeorological Services) of Members of WMO

cc: Hydrological Advisers to Permanent Representatives

It has been recognized that the ocean plays an important role in the climate system. It covers three quarters of Earth's surface area, and hence this areal coverage offers some potential for Albedo Modification (AM) for example using foams. The ocean is also characterized by diverse biogeochemical cycles such as for carbon and trace elements, and ocean circulation has much longer timescales than the atmosphere, meaning that additional anthropogenic carbon could be potentially stored, in the deep ocean or on the sea floor. The productivity of the ocean is limited in large areas by iron or phosphorus. Therefore, there is some potential in attempting to boost productivity through intentional nutrient enrichment, as a means to enhance the oceans biological pump.

Recognizing the potential of the ocean as outlined above and the need for the scientific assessment of the geoengineering techniques, the Joint Group of Experts on Scientific Aspects of Marine Environmental Protection (GESAMP) with support of the Sponsoring Organizations (IMO, IOC and WMO) organized a working group (WG 41) to assess the marine geoengineering techniques. The working group accomplished its work and the full report is available here:

<http://www.gesamp.org/site/assets/files/1723/rs98e.pdf>.

To evaluate the future of WG 41 and the directions of the work presented in the report, Members of WMO as one of the organizations co-sponsoring WG 41 are invited to provide their reflections on the presented report as well as recommendations related to the future work of WG 41.

It would be most appreciated if your feedback could be received by the WMO Secretariat ([sbelfiore@wmo.int](mailto:sbelfiore@wmo.int)) at your earliest convenience, but not later than **20 March 2019**.

Yours faithfully,



(P. Taalas)  
Secretary-General