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Century scale CO_2 pulses could substantially alter marine primary production, $CaCO_3$ export, oxygen concentrations and DMS emissions

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The world's oceans have historically made a significant contribution in mitigating global warming by storing both large amounts of anthropogenic CO_2 emissions and a significant portion of the heat generated by the enhanced greenhouse effect. However, precisely because of this buffering function, they are themselves subject to massive chemical and physical regime shifts that are suspected to continue long after anthropogenic CO_2 emissions have ceased. For this reason, within the HORIZON2020-COMFORT project, we are studying the long-term effects that different scenarios of temporarily increasing atmospheric CO_2 concentrations could have on marine biogeochemistry. To this end, we use CLIMBER3alpha+C, an Earth system model of intermediate complexity, to study the response of the ocean carbon cycle and associated nutrients during and after the period of elevated atmospheric pCO_2 levels. Preliminary results show sustained changes in marine primary production, export of $CaCO_3$, extent of hypoxic zones and production of dimethyl sulfide (DMS), with DMS acting as a condensation nucleus in cloud formation. This raises the possibility that the effects of elevated CO_2 on the oceans will cause a change in both the Earth's radiative balance and the marine carbon pump long after atmospheric CO_2 concentrations have returned to preindustrial levels.

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information the work contains.”