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Focusing on the long-term memory of our climate system **Helmholtz Centres made important contributions to the IPCC Special Report on the Ocean and the Cryosphere**

25 September 2019 / Kiel / Potsdam. Today, the Intergovernmental Panel on Climate Change (IPCC) published the Special Report on Climate Change and the Cryosphere. For this Special Report, more than 100 scientists from more than 30 countries assessed the latest scientific knowledge about the physical science basis and impacts of climate change on ocean, coastal, polar and mountain ecosystems, and the human communities that depend on them. Their vulnerabilities as well as adaptation capacities were also evaluated. Options for achieving climate-resilient development pathways were presented as well.

The report also includes important findings from scientists from several Helmholtz centres, including the GEOMAR Helmholtz Centre for Ocean Research Kiel (GEOMAR) and the Helmholtz Centre Potsdam German Research Center for Geosciences (GFZ).

Particularly noteworthy here are studies on the development of future sea-level rise. These are on the one hand simulations with realistic ocean, climate and Earth system models and on the other hand precise measurements of the changes in the ocean and in polar regions. Important issues related to this topic are the natural variability and the regional effects of the sea level rise. The results indicate that the regional deviations from the global mean sea level rise can be of the same order of magnitude as the mean increase.

In addition, scientists have made outstanding contributions to understand changes of ocean currents and the dynamics of ice sheets. Long-term measurements in deep layers of the Labrador Sea and other subpolar regions provide important insights into the natural fluctuations and stability of the Gulf Stream circulation. The development of complex models of ice sheet dynamics, in particular their interaction with the ocean and the continents, is essential for the quantification of future sea-level rise. Substantial ice loss on Greenland and the Antarctic would also lead to land elevation and changes in geopotential, which has been considered when calculating future sea level. On longer timescales, feedbacks on plate tectonic processes are also possible.

In the field of marine ecology and biogeochemistry, scientists have made important contributions to the IPCC Special Report as well. Here the focus is on the CO₂ uptake of the oceans and their consequences, such as the acidification of the ocean and the global oxygen decrease resulting from warming, circulation changes and overfertilization. These processes associated with ocean warming affect marine ecosystems with direct consequences for their productivity and the resulting fishing efforts. They also have feedbacks on the amount of carbon dioxide the oceans absorb in the future, as well as on the production and release of other greenhouse gases such as nitrous oxide and methane. Should the efficiency of the marine CO₂ sink decrease and the release of other greenhouse gases increase, global carbon dioxide emissions would need to decrease even more quickly in order to achieve the Paris Agreement's goal of limiting global warming to well below two degrees.

Links:

<https://www.ipcc.ch/srocc/home/> IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC)

<https://www.gfz-potsdam.de> Helmholtz Centre Potsdam German Research Center for Geosciences (GFZ)

<https://www.geomar.de> GEOMAR Helmholtz Centre for Ocean Research Kiel

Images:

At www.geomar.de/n6694 images are available for download.

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