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Global climate indicators provided by the EU Copernicus Climate Change and Marine Monitoring Services in support of GCOS

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All domains of the Earth system are affected by a changing climate and other anthropogenic influences. In turn, these domains have their specific roles to play within the system. As an example, the oceans play a key role through their regulating effect linked to their capacity to store and redistribute large amounts of excess heat and carbon, which in turn impacts weather and climate from regional to global scales. To best manage and minimise threats and damages to these domains and the ecosystems that are part of them, there is an emerging need of enhancing our understanding and to regularly monitor Earth system changes. This raises the need to assess the environmental state, variability and change based on science and high quality data, to combine them with state-of-the-art scientific knowledge, and to enhance the sharing of scientific data, best practices and know-how.

In this context, the United Nations-ratified programme the Global Climate Observing System (GCOS) recommends a list of global climate indicators to be used for communicating climate change in a comprehensive, but still easy-to-understand way for non-experts including decision makers. These indicators – such as surface temperature, ocean heat, atmospheric CO_2, sea level, Arctic and Antarctic sea ice extent and glaciers provide information about variables that are key in the main Earth system budgets and cycles. As such they also provide a good first baseline for monitoring of and reporting on changes at global and regional level.

In this contribution, we highlight how the European Commissions's flagship Earth observation Copernicus programme, via its two services the Copernicus Climate Change (C3S) and Copernicus Marine Environment Monitoring Services (CMEMS), replies to this need as identified at international level by the regular provision of high-quality global climate indicators and their uncertainty levels. This includes the development of the indicators and their routine provision to an operational schedule, as well as the scientific evaluation and interpretation of these indicators and the communication thereof in regular publications such as the C3S European State of the Climate, the CMEMS Ocean State Reports and the CMEMS Ocean Monitoring Indicator framework.