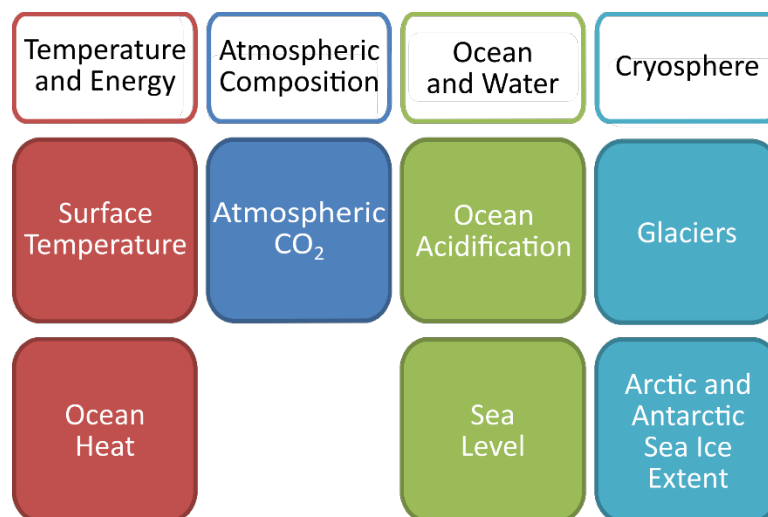


## Cross-panel Group on Climate Indicators

### RATIONALE

The Global Climate Indicators (Figure 1) describe the changing climate and comprise key information for the most relevant domains of climate change: temperature and energy, atmospheric composition, ocean and water as well as the cryosphere.

**Figure 1.** GCOS Climate Indicators



These Global Climate Indicators have been identified by scientists and communication specialists in a discursive process led by GCOS during workshops and scientific panel meetings and have been finally endorsed by WMO. They form the basis of the annual [WMO Statement of the State of the Global Climate](#), which is submitted to the Conference of Parties of the [United Nations Framework Convention on Climate Change \(UNFCCC\)](#). In addition, the Copernicus Climate Change Service (C3S) and the Copernicus Marine Service of the European Commission uses the GCOS indicators for their annual ["European State of the Climate"](#) and for the Copernicus Ocean State Report, and the Copernicus Ocean Monitoring Indicators<sup>1</sup>.

- 1) These seven headline indicators are complemented by a set of subsidiary indicators that provide additional information and allow a more detailed picture of the changes in the respective domain. It is important to note, that the Global Climate Indicators are not limited to specific datasets or certain storylines.
- 2) GCOS held a meeting at WMO in February 2017 to discuss Global Climate Indicators with participants from UNFCCC, ECMWF, C3S<sup>2</sup>, ESA Climate Office, IOC, ISC, UNEP, GEO, IPCC, WCRP as well as various WMO branches GAW, CLPA, OBS. This meeting agreed that:

*the need is to identify a small set of essential climate indicators for the purpose of communication of climate change to date. Surface temperature is not the best indicator of climate change as it is a poor overall thermodynamic descriptor of the Earth's energy balance. A broader set of indicators would better describe and communicate the full range of physical climate change over the last 150 years...*

<sup>1</sup> See also [link to compilation](#)

<sup>2</sup> Copernicus Climate Change Service

When the Climate Indicators<sup>3</sup> were defined, it was agreed that they should meet the following criteria:

- **Relevance:** each should be a clear, understandable indicator of global climate change, which has broad impact for a range of audiences. Some indicators will also have national and regional values;
- **Representativeness:** indicators as a package should provide a representative picture of changes to the Earth system related to climate change;
- **Traceability:** should be calculated using an internationally agreed (and published) method;
- **Timeliness:** should be calculated regularly (at least annually) with a short lag between the end of the period and publishing the data;
- **Limited number:** to allow clear, concise, communication the number of indicators should be limited to less than 10.

The original list was agreed in 2017<sup>4</sup> (Williams and Eggleston).

3) The Subsidiary Body for Scientific and Technological Advice (SBSTA) of the UNFCCC stated in its 47<sup>th</sup> session in 2017:

*Paragraph 5) The SBSTA noted the efforts undertaken by GCOS and the wider science community on the development of climate indicators, including global surface temperature, global atmospheric carbon dioxide and glacier change, and by WMO on the categorization of extreme events. The SBSTA invited GCOS and WMO to report to it on progress, as appropriate, and noted the relevance of their work in the context of decision 4/CP.22, paragraph 4(c)...*

*Paragraph 6) The SBSTA noted the importance of ocean-related climate indicators, including ocean heat content, ocean acidification, sea level rise, and Arctic and Antarctic sea ice extent, for informing on the state of the global climate. It encouraged Parties to sustain observations underpinning these indicators...*

The question now is **whether the current list represents the shortest and most appropriate list of climate indicators or changes are needed.** In particular:

1. Do we need any new Indicator reflecting other changes in the Earth system cycles?
2. Do we need any new Indicator reflecting climate extremes?
3. Which indicators could be included to describe biosphere change that reflect the impact of climate change

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<sup>3</sup> It is difficult to find a clear definition for Climate Indicator. In the paper from Williams and Eggleston they talk of "indicators – numbers and scales that track the state or level of some aspect of the climate". Other papers say that Climate Indicators are a subset of the ECVs (?) or parameters (GCOS webpage, but clearly some of them aren't, like the cryosphere ones)

<sup>4</sup> Williams, M., and S. Eggleston, 2017: Using indicators to explain our changing climate to policymakers and the public. *WMO Bull.*, **66**, 33–39.