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TITLE: The Concept of Essential Climate Variables in Support of Climate Research, Applications, and Policy

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ABSTRACT:

Climate research, monitoring, prediction, and related services rely on accurate observations of the atmosphere, land, and ocean, adequately sampled globally and over sufficiently long time periods. The Global Climate Observing System, set up under the auspices of United Nations organizations and the International Council for Science to help ensure the availability of systematic observations of climate, developed the concept of essential climate variables (ECVs). ECV data records are intended to provide reliable, traceable, observation-based evidence for a range of applications, including monitoring, mitigating, adapting to, and attributing climate changes, as well as the empirical basis required to understand past, current, and possible future climate variability. The ECV concept has been broadly adopted worldwide as the guiding basis for observing climate, including by the United Nations Framework Convention on Climate Change (UNFCCC), WMO, and space agencies operating Earth observation satellites. This paper describes the rationale for these ECVs and their current selection, based on the principles of feasibility, relevance, and cost effectiveness. It also provides a view of how the ECV concept could evolve as a guide for rational and evidence-based monitoring of climate and environment. Selected examples are discussed to highlight the benefits, limitations, and future evolution of this approach. The article is intended to assist program managers to set priorities for climate observation, dataset generation and related research: for instance, within the emerging Global Framework for Climate Services (GFCS). It also helps the observation community and individual researchers to contribute to systematic climate observation, by promoting understanding of ECV choices and the opportunities to influence their evolution.

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