
Where noise and signal collide: observational challenges for monitoring global change at the limits of detectability

John Kennedy*¹ and Nick Rayner¹

¹Met Office – FitzRoy Road, Exeter, UK, United Kingdom

Abstract

The early 21st century slowdown in global temperature rise provoked challenges across climate science. Variations in the rate of short-term global warming of hundredths of a degree became of vital interest. In this context, we explore the challenges associated with the creation of the observation-based data sets used to measure and monitor global climate change and issues with the effective integration of these with other activities. We draw on our experience with global temperature data sets that exemplify these issues.

- lack of observations at high latitudes and other areas of rapid, high-impact climate change;
- difficulties of consistently and comprehensively quantifying uncertainty in observational data sets across space and time scales, particularly changes over time and in persistent data voids.
- ambiguity in the correct metric to use; the difference between sea-surface temperature and air temperature over the oceans; and the vast disparities between them in network adequacy;
- placing multi-annual to decadal changes in a long-term context
- how to present uncertainty information to users so observational data can be used effectively in all parts of the infrastructure and services ecosystem.

All these play a role in understanding multi-annual changes in the climate system where signals and noise can be of similar magnitude and robust answers are needed in real time.

Keywords: climate monitoring, observations, uncertainty quantification

*Speaker