EMS Annual Meeting Abstracts
Vol. 16, EMS2019-637-1, 2019
© Author(s) 2019. CC Attribution 4.0 License.

Considering Climate Projection Uncertainties in the Science and Decision Realms

Keith Dixon (1) and Ellen Mecray (2)

(1) NOAA Geophysical Fluid Dynamics Laboratory, Princeton, United States (keith.dixon@noaa.gov), (2) NOAA/NESDIS/National Centers for Environmental Information, Norton, Massachusetts, United States (ellen.l.mecray@noaa.gov)

Much has been written on the topic of how to improve the multi-step process by which state-of-the-art climate predictions and projections can be reliably translated and transferred so as to enable better informed planning decisions. Terms such as “actionable science”, “co-production of knowledge”, “climate services”, and “transdisciplinary knowledge-action systems” are examples of concepts that seek to address challenges encountered as demand for climate information increases. Concerns arise when these mechanisms cannot offer sufficiently comprehensive, timely, scientifically credible, cost-effective, localized, and customized solutions to support particular decision-making activities. Notable challenges can arise when stakeholders desire information with less uncertainty, whereas climate scientists endeavor to reveal, quantify, and document existing uncertainties. At the same time, as a climate modeler and a climate service provider, we will illustrate some research results and some decision support approaches that have sought to strengthen certain weak links in the multi-disciplinary chain. Separate consideration is given to links between those with expertise in the foundational climate research community, those specializing in applied science applications, and those engaging directly with decision makers, planners, and other stakeholders. More specifically, examples drawn from sets of perfect model and sensitivity test experimental designs involving statistical downscaling of multi-decadal climate projections will be presented in the context of the question, “Does bias correction and downscaling reduce uncertainty or does it introduce additional uncertainties?” Results point to how the determination of whether a downscaled projection is suitable for use in an application can be highly dependent on the application’s sensitivity to different climate variables, central tendencies vs. tails of the distribution, and the forms of statistical processing applied to climate data. Also, examples of the uptake of climate model information and its application to transportation and energy sectors will be offered to demonstrate the need for climate decision support services to maintain the credibility of the upstream climate science products while meeting downstream user needs. Institutional investment in decision support services includes the long-term partnership between the scientific data producers and the end users. This involves the careful consideration of time scales, spatial scales and locations of interest, the state of knowledge, and known sensitivities and tolerances for uncertainty.