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Assessing the quality of climate information for adaptation.

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There are now a plethora of data, models and approaches available to produce climate information intended to inform adaptation to a changing climate. There is, however, no analytical framework to assess the epistemic issues concerning the quality of these data, models and approaches. An evaluation of the quality of climate information is a fundamental requirement for its appropriate application in societal decision-making. By integrating insights from the philosophy of science, environmental social science and physical climate science, we construct an analytical framework for "science-based statements about future climate" that allows for an assessment of their quality for adaptation planning. We target statements about local and regional climate with a lead time of one to one hundred years. Our framework clarifies how standard quality descriptors in the literature, such as "robustness", "adequacy", "completeness" and "transparency", rely on both the type of evidence and the relationship between the evidence and the statement. This clarification not only provides a more precise framework for quality, but also allows us to show how certain evidential standards may change as a function of the purpose of a statement. We argue that the most essential metrics to assess quality are: Robustness, Theory, Completeness, Adequacy for purpose, Transparency. Our framework goes further by providing guidelines on when quantitative statements about future climate are warranted and potentially decision-relevant, when these statements would be more valuable taking other forms (e.g. qualitative statements), and when statements about future climate are not warranted at all.