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Could the 2019-20 Australia bushfires or 2020-22 floods be predicted using CMIP decadal prediction?

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Over the past six years, Australia has experienced significant fluctuations in rainfall, including prolonged dry conditions and extensive bushfires, followed by two consecutive years of heavy rainfall in the east. Could such anomalies be predicted many years in advance is the question this study hopes to answer. A prediction framework that combines empirical and physically-based approaches using CMIP decadal prediction, and a novel spectral transformation approach is presented. When tested in a hindcast experiment, this framework shows significant prediction skill for rainfall up to five years in the future across all regions and climate zones in Australia. This framework was used to project from 2018 to 2022, covering the years of bushfires and extreme floods in Australia, as an added blindfolded validation of the prediction approach used. Following this, a blind projection of the precipitation anomalies over the continent for the coming five years is presented, to assess whether the anomalies for the past five years were, indeed, anomalies, or part of a pattern of what can be expected into the future. It is shown that this decadal framework has great potential for predicting whether the next few years will be wetter or drier, extending the predictive accuracy beyond a few months into the future. This can be valuable for managing water resources, prioritizing demands, protecting vulnerable systems, and reducing uncertainty in hydrological decision-making.