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Title: Subseasonal prediction of extreme heat over Australia
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Abstract:
There has been an increasing demand in Australia for subseasonal forecasts of extreme events, particularly from the agricultural community. Here we assess the capability of POAMA, the Bureau of Meteorology's subseasonal-seasonal coupled model prediction system, to predict extreme heat over Australia. We explore the relationship between subseasonal heat extremes and key climate drivers, namely the El Niño Southern Oscillation (ENSO), Indian Ocean Dipole (IOD), Southern Annular Mode (SAM), Madden Julian Oscillation (MJO) and atmospheric blocking, in both the model and observations, and investigate the forecast skill of extreme heat events during different phases of these drivers using a large set of retrospective forecasts spanning 1981-2010. We will show that there are windows of forecast opportunity related to the state of these drivers, where the skill in predicting extremes over certain regions is increased. This skill is related to how well the model can both predict the driver and simulate the teleconnection between the driver and extreme heat. For example, when forecasts are initialised during ENSO periods in austral winter, there is more skill over much of Australia compared to forecasts initialised in neutral periods. The increased skill over northern Australia comes mainly from La Niña periods and over eastern and south-eastern Australia from El Niño periods. In these regions and at these times there is a tendency for an increased likelihood of extreme heat, which POAMA faithfully represents. The negative SAM phase and MJO provide skill over regions where the likelihood of an extreme heat event is high, namely eastern Australia in spring and northern Australia in summer in association with the SAM, and over northern Australia in winter and south-eastern Australia in spring during MJO phase 2. Understanding the capability of POAMA for predicting subseasonal extremes underpins the potential future delivery of appropriate forecast products.
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