

# Assessing uncertainty in future drought using multiple projections

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Australia is a “hot spot of uncertainty” when it comes to future hydrological changes

But future projections from multiple sources agree on **more droughts in the future**

## Methods

Multiple future projections available for Australia, ranging from GCMs to RCMs and hydrological models –do they agree?

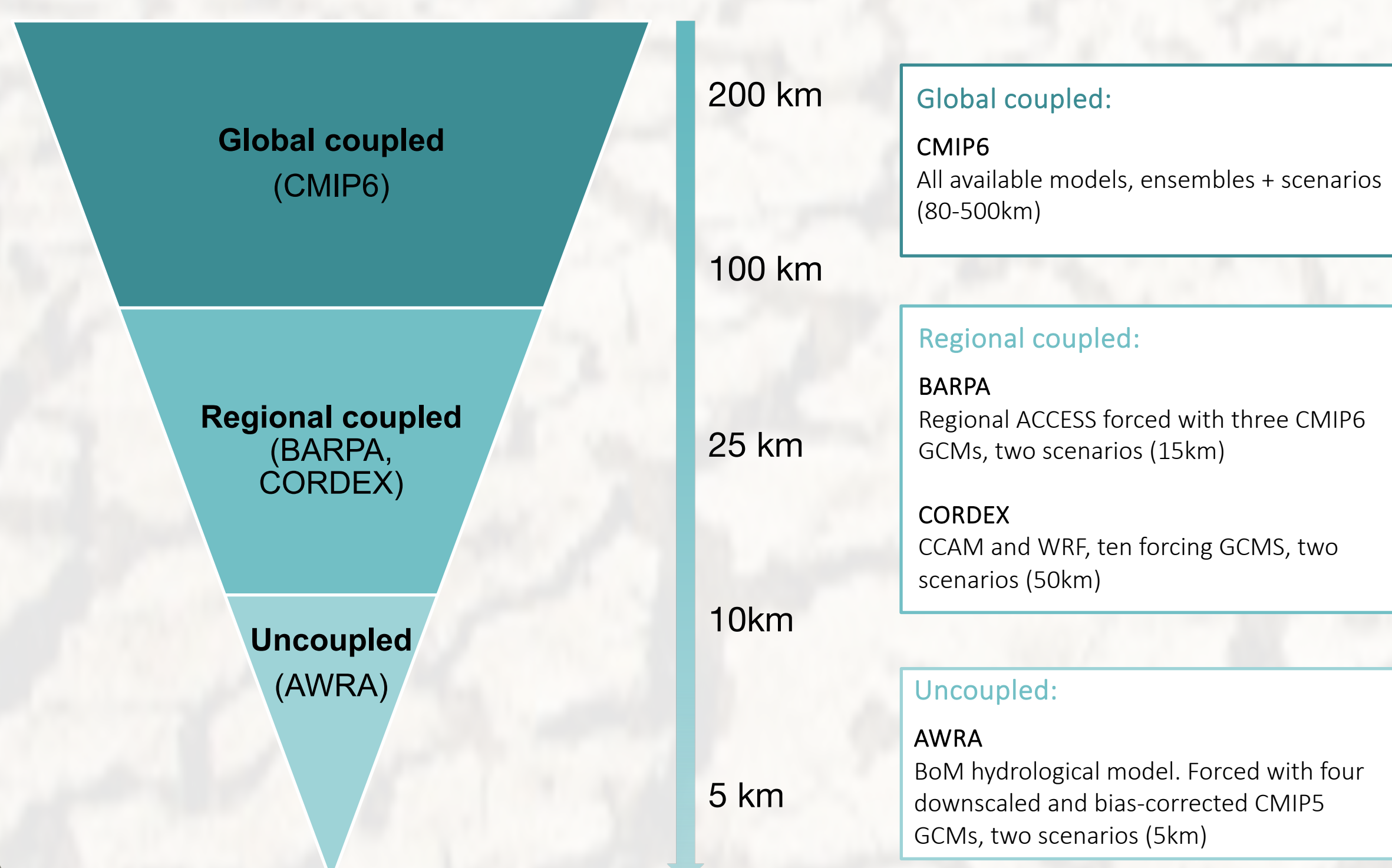
Three drought types: precipitation, runoff and soil moisture

Drought definition: >15<sup>th</sup> percentile determined from the historical baseline period (1970-2005)

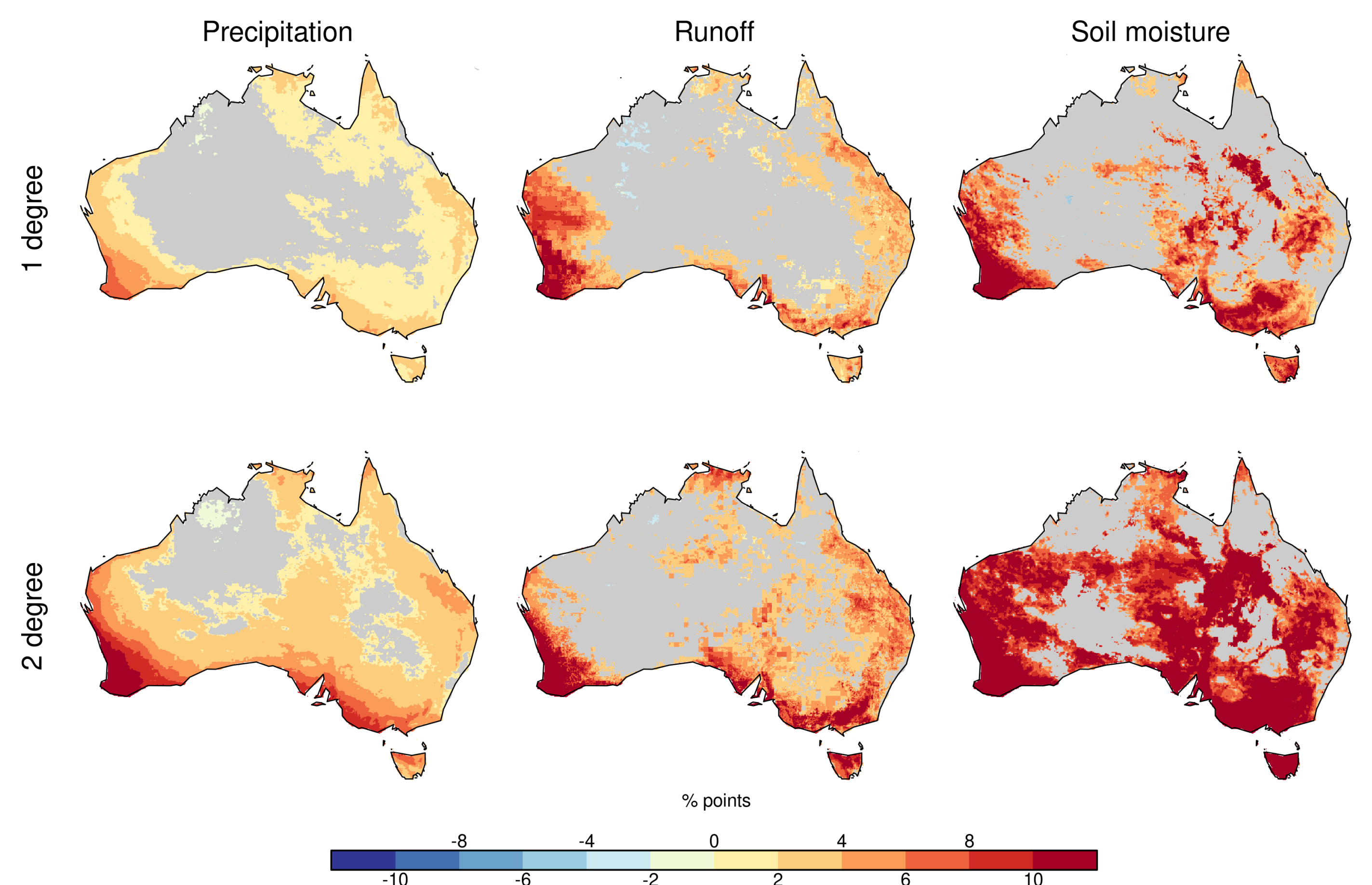
Warming levels: analysed future changes when Australian mean temperature 1 and 2 degrees higher than baseline

Time under drought: percentage of time spent under drought conditions (15% of time by definition during the baseline period)

A hierarchy of projections:



## More time under drought



Future change in “time under drought” averaged across all projections. Regions where models agree are shown in colour (grey: no model agreement).

Where models agree, they overwhelmingly point to **more future droughts for all three drought types**

Droughts projected to increase in frequency across many **highly populated areas, key agricultural and hydropower regions**

Model agreement defined from a t-test between a historical and future mean (models deemed to agree when the difference in means was significant). Working on a more robust metric 😊

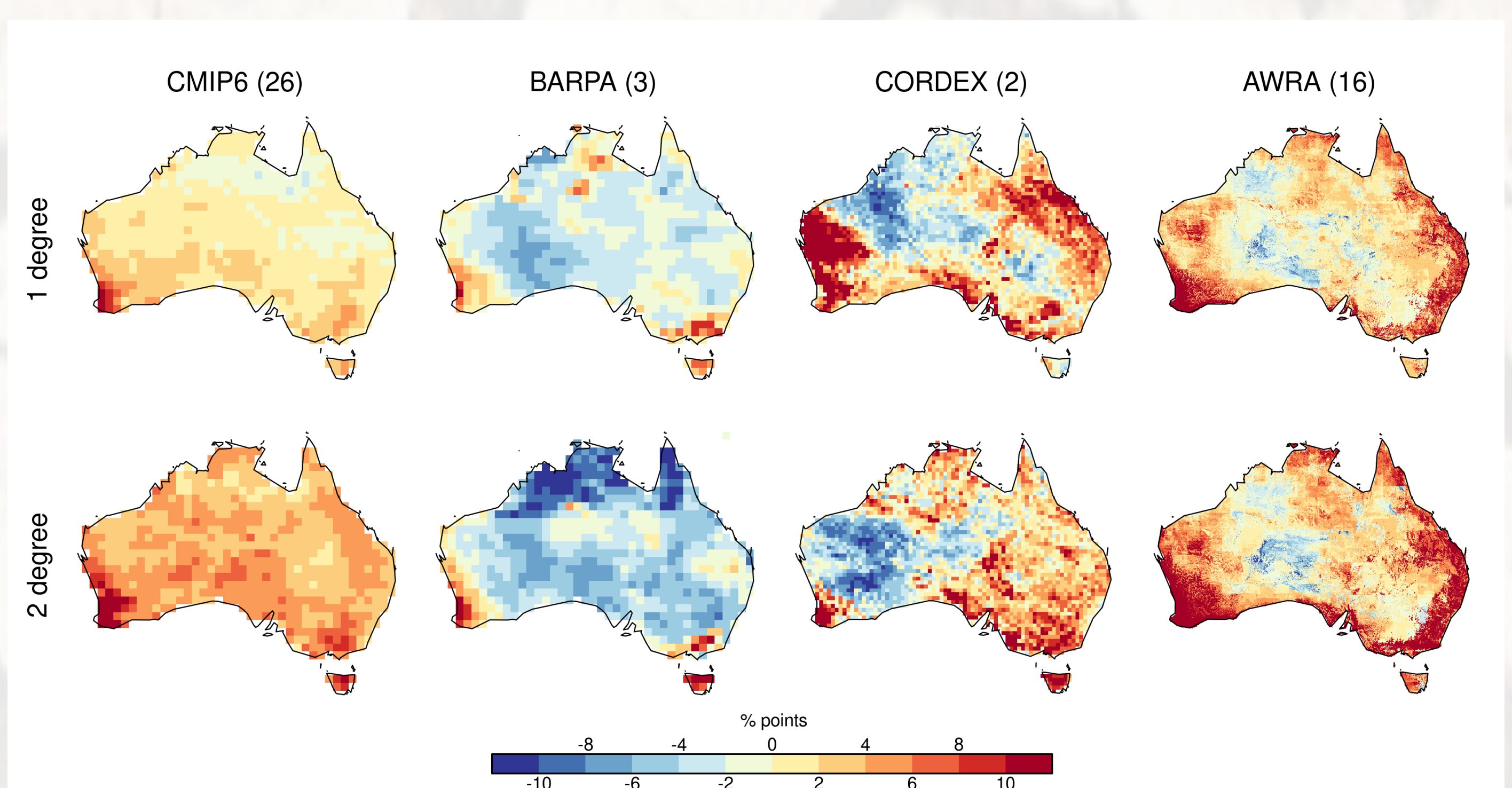
## Differences across projections

But there are differences across individual projections...

Here showing runoff drought change into the future (differences for precipitation drought are somewhat smaller)

BARPA looks rather different but only a couple of model runs were available which might be the key reason behind this

Nevertheless common hot spots: Southwestern WA (not a surprise), Tasmania, Victoria and southeast Qld



Ensemble mean future change in “time under drought” for different projections. Number of models is shown in brackets.