Changing climate zones in south east Australia

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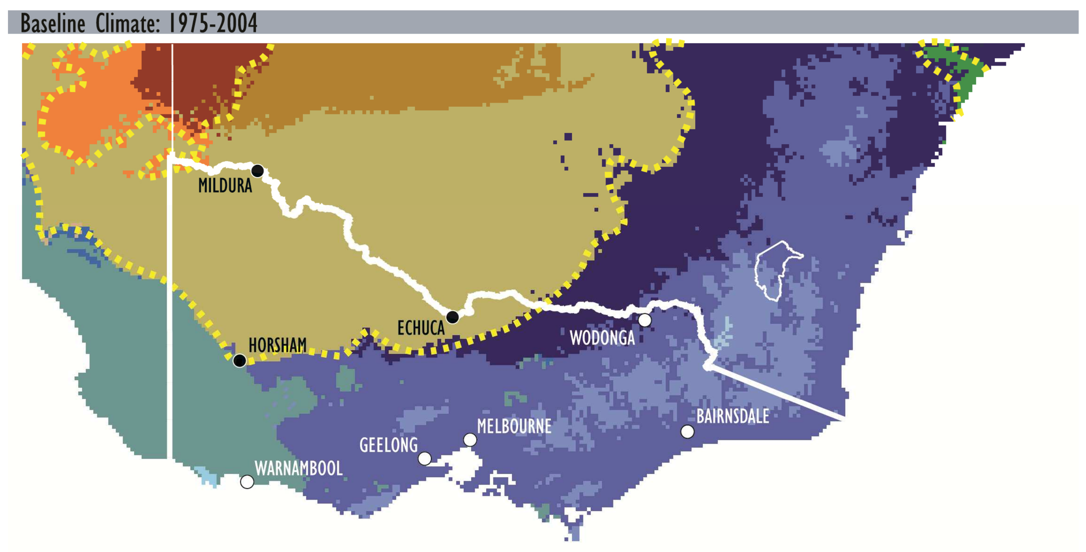
Today's climate



Maps of potential climate outcomes in southeast Australia were produced for *Foundation Paper One: Climate Change*, published by the Commissioner for Environmental Sustainability (CfES). These maps used modified Köppen climate classes[1,2] as a tool for creating an accessible illustration of potential climate change outcomes in 2050. For details, refer to Chapter 1 of *Foundation Paper One.*[3]

The Köppen climate types that typify the region are:

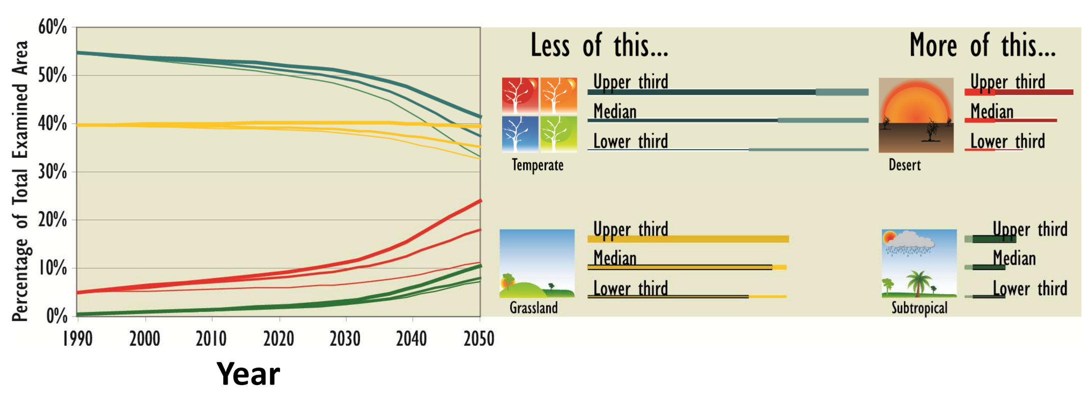
Grassland: A dry climate with variable temperatures. Primarily characterised by warm temperatures and dry winters in Victoria. Occurs in the northern plains of Victoria.

Temperate: Lower temperatures and higher rainfall than Grassland. Dominates the southern and mountain areas.

Subtropical: Moist climate that can be cool or warm. Not currently occurring in Victoria.

Desert: High temperatures; persistently dry - typical of much of the interior of Australia.

How climate zone coverage will change across the region



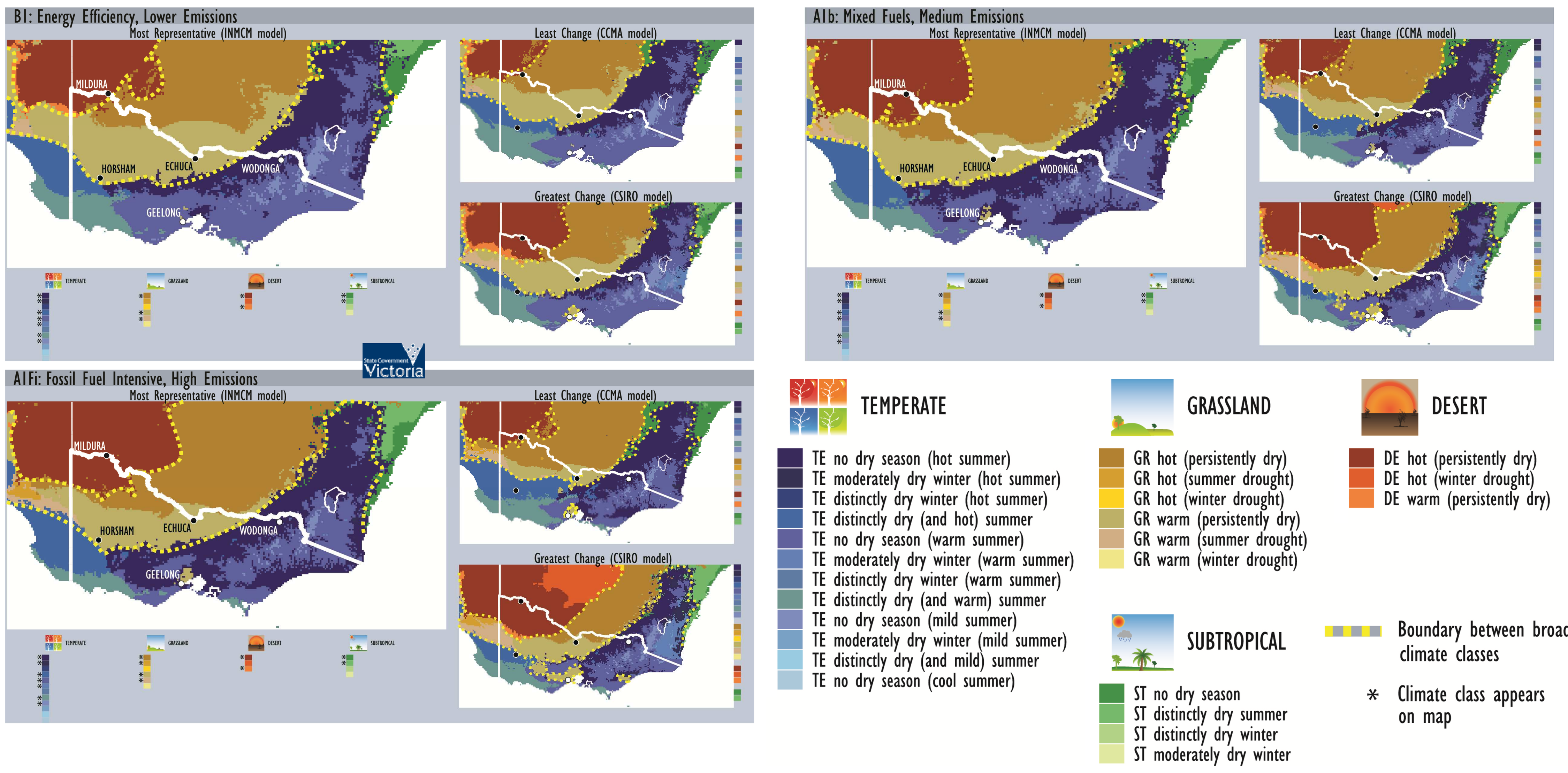
Projections show a range in the magnitude of change but all models indicate a southward movement of the Temperate and Grassland and movement of Desert climate into the north west of the state. This movement reflects rising temperatures and a general decrease rainfall.

Across southeast Australia, by 2050 there is:

- Large decreases in area covered by Temperate and Grassland climates.
- An increased area of Desert Tropical zones driven by southward movement towards, and possibly into, northwest Victoria.
- The emergence of a persistently drier climate than present in the western districts.
- Rising temperatures in and around Melbourne leading to hotter summers.

Under the lower emissions scenario (B1) the most severe changes were often avoided in southern Victoria but substantial changes in climate were still seen in the north west.

Climate outcomes in 2050



Scenarios and models

Köppen classes were calculated for south-east Australia using a 30 year (1975-2004) observed dataset taken from the Australian Water Availability Project[4,5] (top left). Projections for these classes, shown above, were calculated using the following methods.

To test the sensitivity of changes in climate zones to greenhouse-gas emissions three SRES scenarios were explored:

A1FI Rapid economic growth, globalisation, energy derived from fossil fuels.

A1B Rapid economic growth, globalisation, energy derived from a mix of renewable and fossil fuels.

B1 Sustainable development, regional focus.

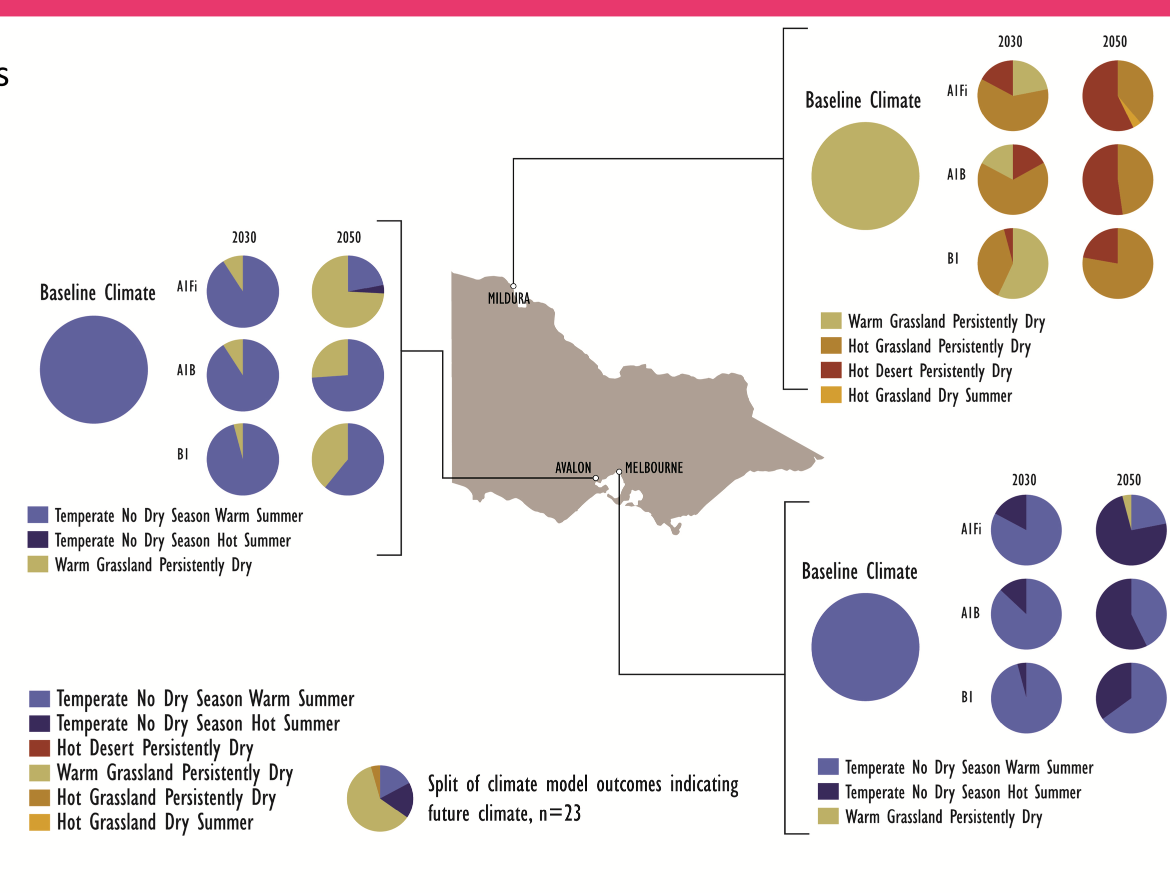
After analysing ranges of projected change from 23 Coupled Model Intercomparison Project (CMIP3) models[6], three were selected to represent the potential range of outcomes. These are described as:

- The most representative "consensus model"*
- Most change model
- Least change model

*Correlation coefficients were calculated to assess the agreement between models in estimating the percentage change in area of climate zones. The model with the highest correlation coefficient was described as the 'most representative' model.

How will climate zones change in Victorian cities?

Outcomes of 23 climate models in 2030 and 2050 for selected locations in Victoria



Adaptation in Mildura

At present, Mildura sits in a Warm Grassland climate. Most models show transition to hot-dry climate types in the northwest of Victoria by 2050. Under the A1FI and A1B scenarios, over 50% of models show a transition to Hot Desert climate by 2050, while the rest show Hot Grassland. Even under the B1 scenario, all models move to a warmer climate than present.

40% of Mildura businesses have an agricultural base with large areas (29,000ha) of production that depend on irrigation. 20% of the employment is agriculture related.

Transition to a Desert climate will have impacts that include:

- Higher occurrence of prolonged drought
- Less water for irrigation
- Loss of farming jobs
- More soil erosion and acidification

Climate class maps can be used to identify areas (eg in South Australia) where adaptation measures are being practiced eg:

- Improved water efficiency (e.g. drip irrigation)
- Dominance of non-irrigated farming systems (e.g. wheat)
- Diversify economic base to include from agriculture (e.g. retail, education, tourism).

References

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