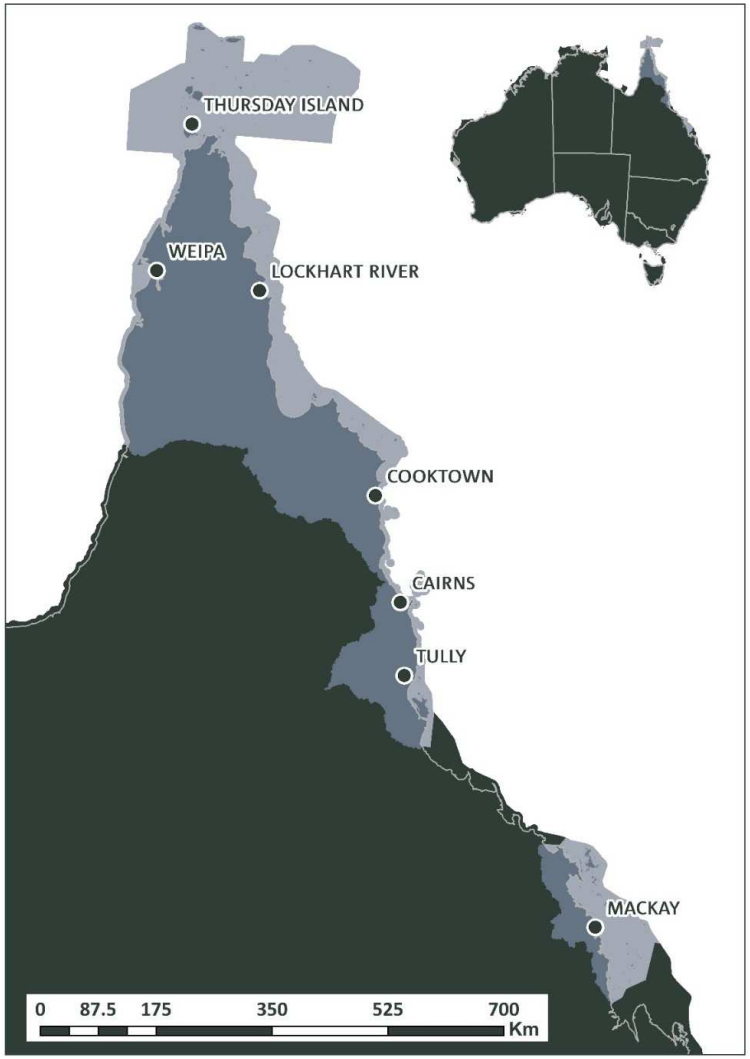
Climate projections for the Wet Tropics



The following projections are for the Wet Tropics cluster in far northern Queensland.

The cluster contains considerable biodiversity assets, for example within national parks and the Great Barrier Reef World Heritage area.

The climate of this cluster is characterised by two seasons; the monsoonal wet season (from around December to April), which is dominated by prevailing north-westerly winds, and the dry season (May to November), when south-easterly trade winds dominate.

Some of the content for this Pamphlet drawn from Gerbing, C. Webb, L. and McInnes, K. 2015 Wet Tropics Cluster brochure, CSIRO and BoM.

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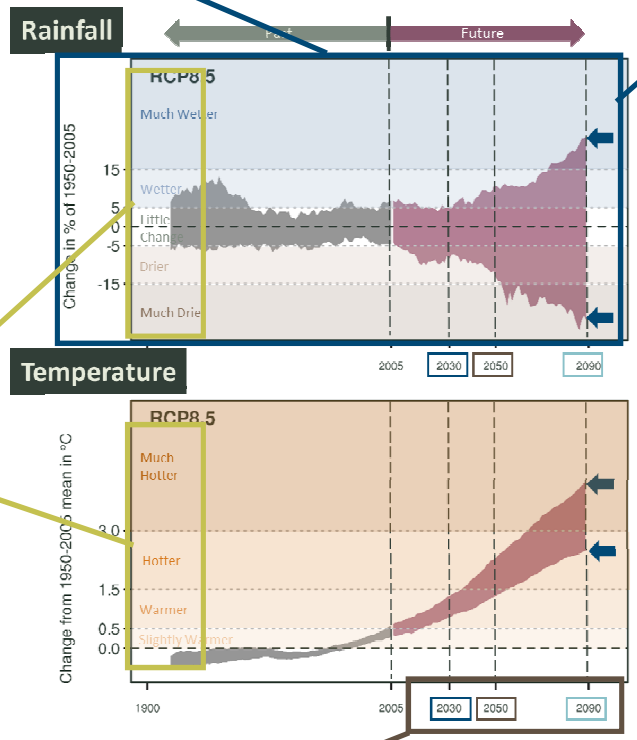
KEY TO THE PROJECTIONS SLIDES

Time series of rainfall (top) and temperature (below) for the historical period (1900 to 2005; grey) and projected period (2005 to 2099; purple) showing the 10th to 90th percentile of the 20-year running mean from 40 CMIP5 models.

Projected period colour code:
Purple: high emissions (RCP8.5)
Blue: intermediate emissions (RCP4.5)
Green: low emissions (RCP2.6)

Categories of warming and rainfall changes are indicated by colour shading on the graph as described in the table:

Rainfall (% change relative to 1950 - 2005)	Temperature (degrees Celsius change from 1950-2005)
Much Wetter (> 15 %)	Much Hotter (> 3.0)
Wetter (5 to 15 %)	Hotter (1.5 to 3.0)
Little change (-5 to +5 %)	Warmer (0.5 to 1.5)
Drier (-5 to -10 %)	Slightly Warmer (0 – 0.5)
Much Drier (> -15%)	



Outlook periods explored are 20 year periods centred on 2030, 2050, 2090.

For adaptation planning, consider top and bottom of the range of plausible change, indicated by the blue arrows.

Descriptions of what could be expected given model representation (40 CMIP5 models) in the various future periods:

2030: Warmer with most models showing little change in rainfall or drier climate, with a chance of wetter climate.

2050: Warmer or hotter with some models showing little change in rainfall, and other models indicating wetter or drier climates (e.g. ± 10 %).

2090: Hotter to much hotter with some models showing little change in rainfall, with other models showing much wetter or much drier climates (e.g. ± 30 %), resulting in an increase in the range.

*Seasonal projections may differ from annual. Seasonal detail shown later. Maximum model consensus by 2090, if it exists, is indicated by orange bar. For adaptation planning, consider top and bottom of the range of plausible change. The 2090 range is indicated by the blue arrows.

Maximum consensus (at least 33% of models) indicated by orange box. In this example, the maximum consensus future by 2090 could be described as 'much hotter with no consensus on rainfall'.

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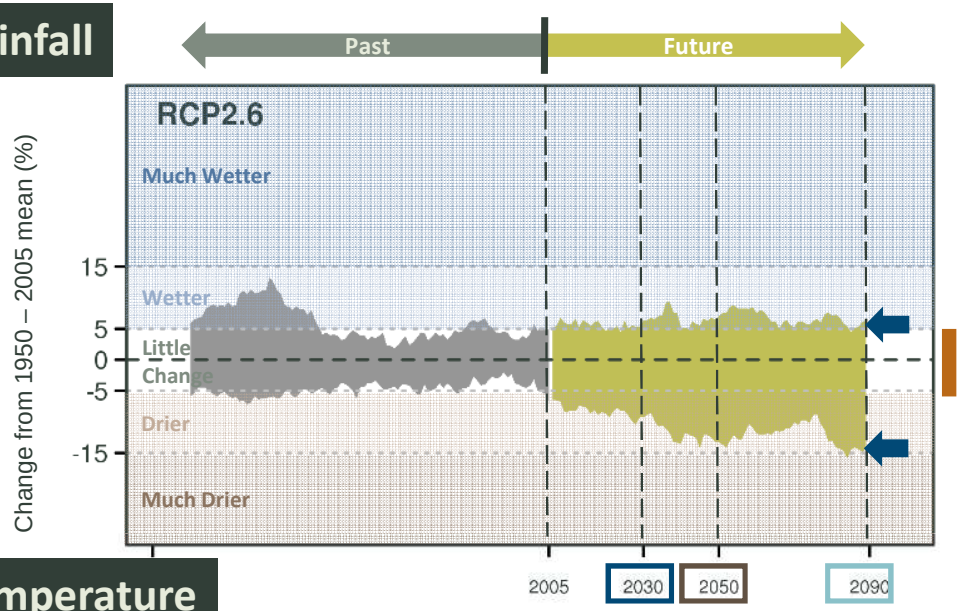
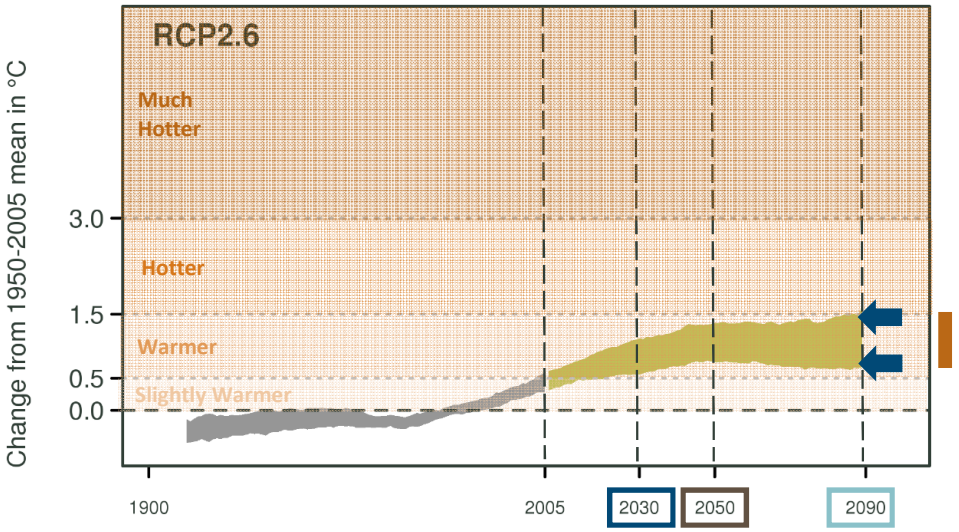
Climate projections for Wet Tropics (annual*) : Low emissions

Rainfall



Temperature



2030: Slightly warmer to warmer with most models indicating little change in rainfall, some models indicating a drier climate, and a chance of wetter climate also occurring.

2050: Warmer with most models indicating little change in rainfall, but a chance of wetter, drier, or much drier climate.

2090: Slightly warmer to warmer with many models indicating little change in rainfall, some models indicating drier, and a chance of wetter climate also exists.

***Seasonal projections may differ from annual. Seasonal detail shown later.**

Maximum model consensus by 2090, if it exists, is indicated by orange bar.

For adaptation planning, consider top and bottom of the range of plausible change. The 2090 range is indicated by the blue arrows.

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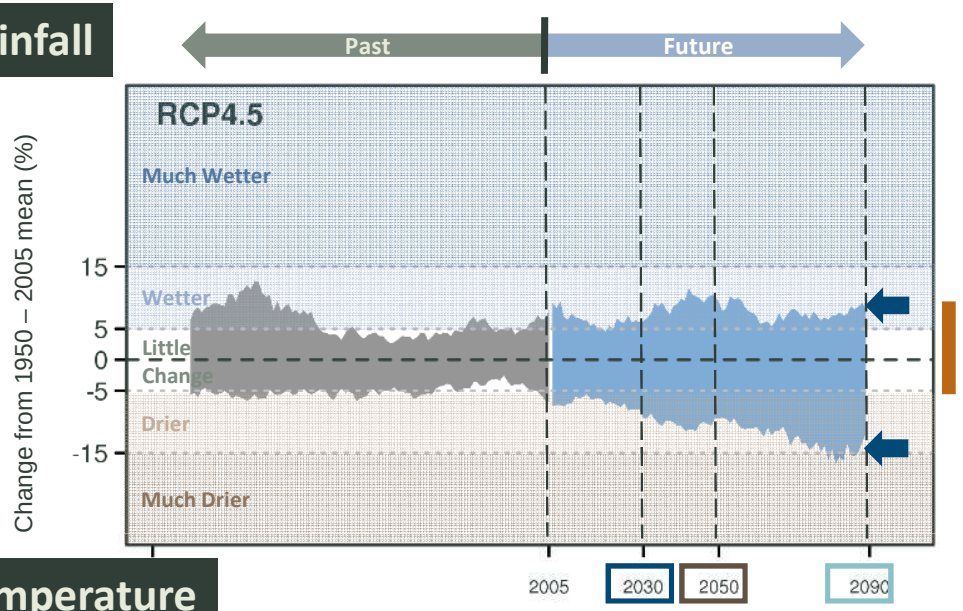
Climate projections for Wet Tropics (annual*) : Intermediate emissions

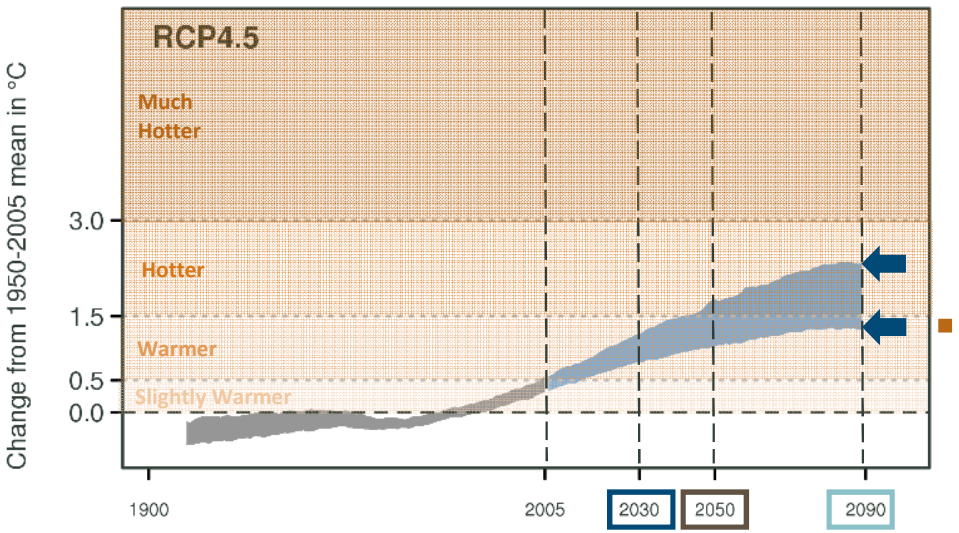
Rainfall



2030: Warmer with most models showing little change in rainfall, with some models indicating drier climate.

2050: Warmer with most models showing little change in rainfall, and other models indicating wetter climates (e.g. + 10 %).

Temperature



2090: Warmer or hotter with many models showing little change in rainfall, however other models show a chance of wetter or drier climates.

***Seasonal projections may differ from annual. Seasonal detail shown later.**

Maximum model consensus by 2090, if it exists, is indicated by orange bar.

For adaptation planning, consider top and bottom of the range of plausible change. The 2090 range is indicated by the blue arrows.

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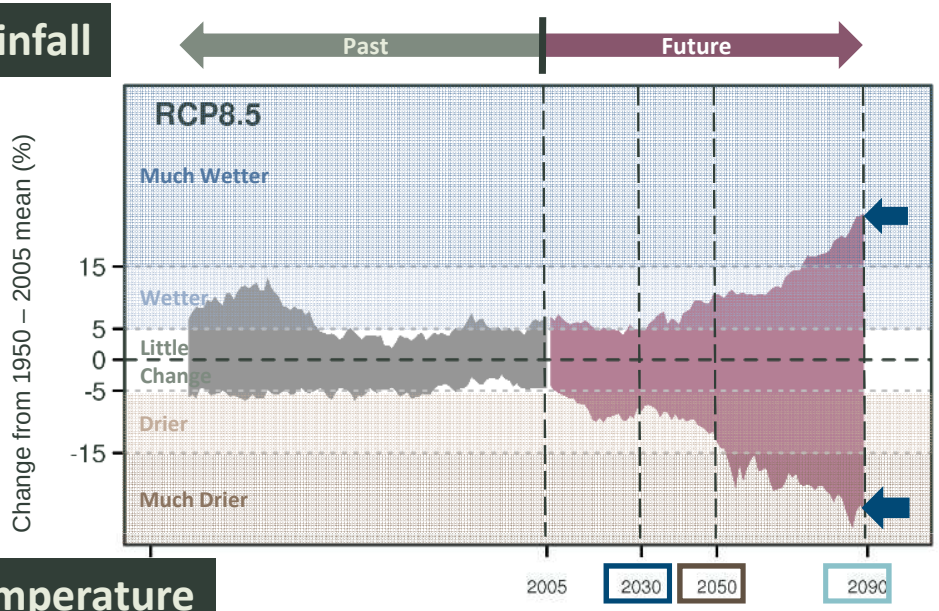
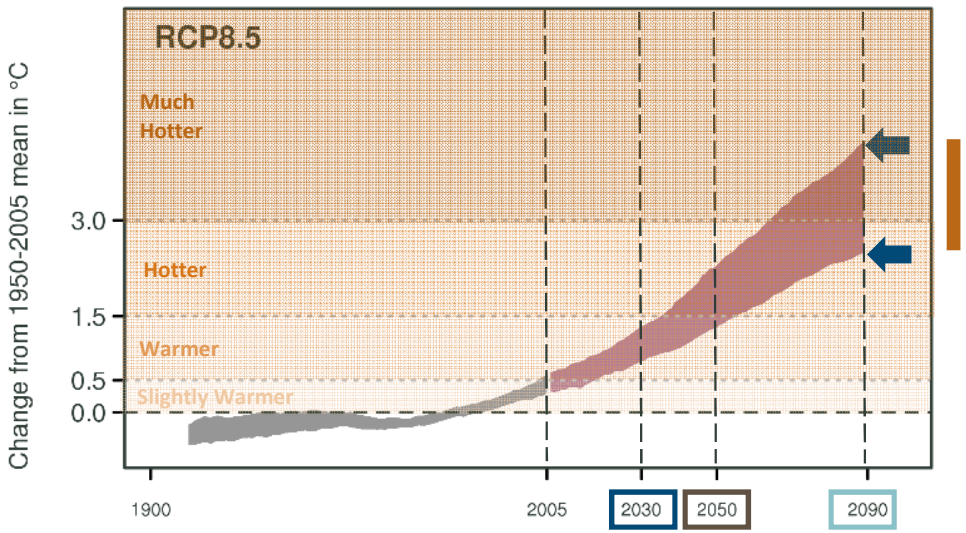
Climate projections for Wet Tropics (annual*) : High emissions

Rainfall



Temperature



2030: Warmer with most models showing little change in rainfall or drier climate, with a chance of wetter climate.

2050: Warmer or hotter with some models showing little change in rainfall, and other models indicating wetter or drier climates (e.g. ± 10 %).

2090: Hotter to much hotter with some models showing little change in rainfall, with other models showing much wetter or much drier climates (e.g. ± 30 %), resulting in an increase in the range.

***Seasonal projections may differ from annual. Seasonal detail shown later.**

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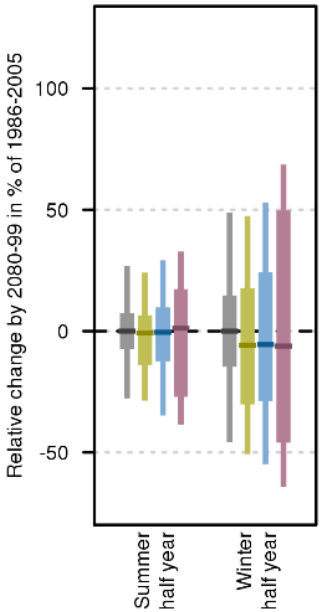
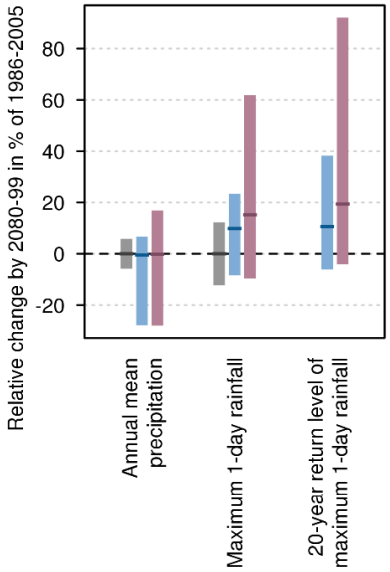
Seasonal Rainfall

Graph shows projected change in seasonal precipitation for 2090 (2080-99) in (from left) summer, autumn, winter and spring. Anomalies are given in % relative to 1995(1986-2005) under RCP2.6 (Green), RCP4.5 (blue) and RCP8.5 (purple). Natural climate variability is represented by the grey bar.



Extreme Rainfall

Modelled differences (per cent) in annual average rainfall, rainfall on the wettest day of the year, and rainfall on the wettest day in 20 years for 2080-2099 compared to 1986 to 2005 under RCP4.5 (blue) and RCP8.5 (purple). Natural climate variability is represented by the grey bar.



Providing confident rainfall projections for the Wet Tropics is difficult because global climate models offer diverse results, and models have shortcomings in resolving some tropical processes. In the near future (2030) natural variability is projected to predominate over trends due to greenhouse gas emissions. By late in the century, projections generally have low confidence.
Impact assessment in this region should consider the risk of both a drier and wetter climate.

Despite uncertainty in future projections of total rainfall for the Wet Tropics, an understanding of the physical processes that cause extreme rainfall, coupled with modelled projections indicate with high confidence a future increase in the intensity of extreme rainfall events. However, the magnitude of the increases cannot be confidently projected.

Drought will continue to be a feature of the regional climate variability, but projected changes are uncertain.

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