NSW GOVERNMENT Primary Industries

FACTSHEET

Modelling Climate Change

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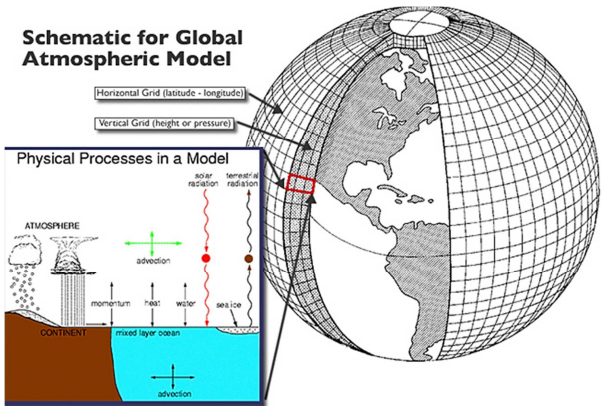
Introduction

Projecting into the future is always difficult and trying to assess the likely impact of global warming can be particularly fraught.

There is no way of making direct measurements of the future so the only way we can assess what the future climate might hold is to use the past as a guide and apply the knowledge of climate science involving the disciplines of physics, fluid dynamics and chemistry,.

Building Climate Models

Scientific understanding of the physics of solar radiation ,the atmoshere the earth and oceans allows the climate scientists to project forward through time using complex computer modelling. Computer models are simply an aggregation of mathematical equations which describe how the physics of each of these systems works and how they interact. In the field of climate science these models are called Global Climate Models (GCM's). GCMs dived the globe into "chunks on a three dimensional grid and then describe how these chunks change over time and how these changes impact on adjacent chunks.



Equations are solved on a 10minute interval and iterated forward through projected time starting from a known system state based on actual land, ocean and atmospheric measurements. Inputs to the model include projected solar radiation and anthropogenic greenhouse gases and aerosols. Additions of greenhouse gases alter the composition of the atmosphere over the projected time interval thus trapping increasing amounts of reflected solar energy causing warming to occur.

Warming feeds back through the model to give projections related to cloud formation and ultimately rainfall trends across the projected time frame.

Which models work best for Australia?

Universities and government agencies around the world have been developing GCM's, each varying slightly in the use of the known physics and the level of detail.

The models are tested by comparing historical weather records with historical simulations and rated according to how closely they match. This process is called hindcasting. It is through hindcasting that scientists have determined that current warming trends cannot be explained without accounting for anthropogenic emissions. This is called attribution and is why climate scientist are so sure that humans have and will continue to warm the globe unless emissions are abated.

In Australia CSIRO has done this specifically for Australian weather data giving each available GCM a skill ranking. GCM's with the highest hindcasting skill for our region give us the best indicator of the level of climate change we might expect.

Refer to the Climate Change in Australia website www.climatechangeinaustralia.gov.au for more information on regional down scaling for Australia.

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