

**Position Statement and Recommendations
GREENHOUSE GAS EMISSIONS AND CLIMATE CHANGE: 15th July 2009**

The Geological Society of Australia (GSA) represents more than 2000 Australian Earth Scientists from academe, industry, government and public sector research organizations. Australian Earth Scientists contribute to a better understanding of how climate may change in the future in response to higher levels of atmospheric greenhouse gases. They also contribute to strategies to reduce these emissions, particularly in areas such as CO₂ sequestration, clean coal, geothermal power, and wise development and use of uranium-based energy.

This Position Statement sets out the views of GSA on two key issues: greenhouse gas emissions and climate change.

Human activities have increasing impact on Earth's environments. Of particular concern are the well-documented loading of carbon dioxide (CO₂) to the atmosphere, which has been linked unequivocally to burning of fossil fuels, and the corresponding increase in average global temperature. Risks associated with these large-scale perturbations of the Earth's fundamental life-support systems include rising sea level, harmful shifts in the acid balance of the oceans and long-term changes in local and regional climate and extreme weather events.

CO₂ levels in the atmosphere are now much higher than at any time during the last 800,000 years, and rising rapidly. The composition of the ocean is already showing a measurable response. Significant impacts on society and the environment are inevitable, despite uncertainties about the rate and magnitude of these changes, and the capacity of society and the broader environment to adapt without large-scale disruptions.

GSA has insufficient expertise to advise on the complex matter of short-term climate impacts of increasing levels of anthropogenic greenhouse gas emissions, particularly CO₂. We are, however, concerned about the potentially harmful effects of these emissions and favour strong action to substantially reduce current levels.

Earth's climate system is complex, dynamic, and sensitive to small changes in forcing mechanisms that may initiate changes over a range of time scales. Our understanding of this system is far from complete. The geologic record is the key source of primary observational data about the climate throughout Earth's history. This record shows that atmospheric CO₂ has a strong influence on global climate. It also shows that Earth's climate has changed rapidly in the past, sometimes over time scales of decades to centuries, and that such rapid changes are often accompanied by environmental crises and sometimes by mass extinctions. Therefore the geologic record provides key benchmarks against which predictions for the future can be tested.

The increasing reliance being placed on the outcomes from predictive climate change models to guide economic and social policies highlights the urgent need for integrative research that provides a robust and detailed view of Australia's past and present climate systems. Studies that provide high-resolution data for the Australian continent and surrounding oceans during previous episodes of climate change can provide opportunities for rigorous testing and improvement of predictive climate change models. Such studies should be a high national priority.

Climate change concerns, and the associated social and political debates, will continue for many years. Inherent assumptions and limitations in predictive computer models must be addressed, and these models must be continually strengthened and rigorously tested against the geologic record in the best traditions of science. These efforts will be

incomplete without substantial input from Earth Scientists. GSA believes that Earth Scientists have the capacity to significantly improve our understanding of the causes and effects of climate change. However, that capacity will not be optimised without targeted research and development programs supported by appropriate resources over the long term.

GSA therefore recommends:

1. That strong action be taken at all levels, including government, industry, and individuals to substantially reduce the current levels of greenhouse gas emissions and to mitigate the likely social and environmental effects of increasing atmospheric CO₂.

2. That Earth Scientists with appropriate expertise be included in Australian advisory bodies concerned with public policies relating to long term forecasting of climate change and its consequences.

3. That whenever appropriate, those policies emphasise the need for a substantial increase in high resolution and integrative palaeoclimate studies by Earth Scientists, and for continual testing of predictive climate change models against the geologic record.

4. That sufficient targeted funding and resources be allocated by Australian governments, academe and industry to enable a substantial increase in palaeoclimate studies. These studies should aim to improve our understanding of the key causes and effects of climate change, the likely patterns of climate change across Australia, and to strengthen predictive models.

Geological Society of Australia, Executive Committee, July 2009