



The Royal Society of Queensland

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Incorporated by Letters Patent issued under the

Religious, Educational and Charitable Institutions Act 1861

Science, Scientific Method and Climate – FAQs, 23, 24 March 2019

What is science?

Science is the search for knowledge about natural systems through ‘scientific method’. It traces cause and effect by the application of rational analysis to experimental data.

Do you need a tertiary degree to be a scientist?

Yes and no. Sometimes the term ‘scientists’ is confined to qualified professionals in contrast with ‘naturalists’. But scientific method can be applied by anybody, such as through the growing movement of ‘citizen science’ that welcomes people of all ages and backgrounds.

What is the connection between science and environmental activism?

Scientists seek knowledge and their studies lead to evidence-based decision-making. Environmentalists seek to influence policy and development decisions. Environmentalists rely upon scientific knowledge to assess the consequences of development and so they can be regarded as ‘translators’ of that knowledge. Science is inherently non-activist.

How can I learn more about science?

The simplest method is to join a science-based club or society. Browse the list of 21 member societies of the Queensland Science Network for a group with an appealing focus.

What is the history and current role of the Royal Society of Queensland?

There is a Royal Society in each of the Australian States. The Royal Society of Queensland is the State’s senior learned institution, tracing its ancestry from 1660 – founding of the Royal Society of London. It was established in 1884 and in the same year published the first issue of its annual *Proceedings*, a generalist peer-reviewed journal, now in its 123rd volume.

Traditionally, its scope has been general science, science-related policy and education. It has recently broadened the scope of its activities to embrace other evidence-led fields of scholarly expertise. The Society is non-elitist and imposes no educational qualifications for membership.

The Society seeks to increase awareness of and respect for evidence-based enquiry in Queensland. It endeavours to serve as a custodian of scholarly tradition. It encourages original research and the application of scientific knowledge and method to policy-making and decision-making. In an era of “fake news”, this mission is more vital for public affairs than ever.

The Society is not politically aligned nor beholden to commercial interests. Its main contemporary activities are advocating for evidence-led policy, networking between members, government and the community; holding seminars crossing disciplinary and sectoral silos; and publishing the annual *Proceedings* plus special themed issues.

The Royal Society of Queensland Research Fund sponsors small-scale research projects in the natural sciences. Donations to the Fund are tax deductible.

The Society convenes an informal Queensland Science Network, a collaboration of 21 knowledge-based, community scientific societies. The Governor of Queensland His Excellency The Honourable Paul de Jersey AC is Patron.

The Society is run by volunteers, many highly eminent, but is constrained by lack of funds to build their expertise into public advocacy. Philanthropic donations welcome.

Does science move forward by consensus?

No and yes. By examining evidence, scientists continually challenge the boundaries of current knowledge. Once a theory is accepted by a majority of researchers in the field, new research tends to build on the current consensus and to examine new questions without continually revisiting previously settled answers. However, previous orthodoxy is always open to revision if non-conforming evidence arises. In this way science is continually self-correcting.

Why is there so much argument about climate science?

There is very little argument within scientific circles about the reality of climate change or about the primary cause – being emissions of carbon dioxide through the burning of fossil fuels. Almost 100% of credentialled climate scientists accept this consensus. The consensus is threatening for many companies whose business depends upon burning fossil fuels. These industries have funded campaigns to spread doubt about the scientific consensus and about the good faith of prominent scientific spokespeople. Also, people with an ideological hostility to environmentalists have joined the denialist campaigns.

How can scientists be sure that their climate consensus is correct?

The confidence in scientific explanations of global warming derives from reinforcement by numerous scientific disciplines: atmospheric physics, oceanography, ecology, pollen studies and many others. Any single discipline can sometimes be side-tracked on a false trail until new experimentation eliminates fallacies, but the fundamentals of global warming have been well attested since the first report of the Intergovernmental Panel on Climate Change in 1990.

A theory explaining the connection between atmospheric carbon dioxide and global temperature was published by physicist Svante Arrhenius as long ago as 1896.

References on climate science

'Climate science' is shorthand for a cluster of scientific disciplines. The public authorities CSIRO (www.csiro.au/en/Research/Environment/Atmosphere-and-climate) and the Bureau of Meteorology (www.bom.gov.au/climate/) are the primary sources of Australia-specific raw data and interpreted data. Both bodies are non-partisan and authoritative.

Two books by The Spinney Press give good summaries of the science and its implications:

The Climate Change Crisis: <http://spinneypress.com.au/books/the-climate-change-crisis/> and

Extreme Weather and Natural Disasters: <http://spinneypress.com.au/books/extreme-weather-and-natural-disasters/>. These can be ordered online.

The website *Skeptical Science* <https://skepticalscience.com/> has an extensive treatment of climate phenomena and misconceptions. Features of the public controversy are traced and explained.

Do recent weather extremes prove that the climate is changing?

Yes and no. Recent examples of extremes:

- Temperatures in January were the hottest ever recorded in Australia for that month.
- Floods in North Queensland; the Ross River Dam filled to 242% its capacity.
- Fires burnt across Tasmania for up to 6 weeks.

Weather is not climate and extreme events could in principle be a result of natural variability. However, the pattern of repeatedly broken records, of all kinds, around the world, is consistent with scientists' predictions of the effects of climate change. Also, the rise in average global temperature of more than 1 degree C is causing far-reaching effects on evaporation, plant vigour and animal distribution. Ω