

## Professor Ove Hoegh-Guldberg's Smart State Premier's Fellowship 2009—2014

### Summary

Professor Ove Hoegh-Guldberg was granted a fellowship from 2009-2014 to conduct climate change research on the Great Barrier Reef. Professor Hoegh-Guldberg is a lead researcher at the University of Queensland and his current research aims to ensure, 'a sustainable future for Queensland through science-based solutions to climate change on the Great Barrier Reef'. The Great Barrier Reef Marine Park Authority (GBRMPA) is a co-sponsor of his research project.

### Background

The Queensland Government has established the Smart State Premier's Fellowships 'to further build the leadership capacity within Queensland's research community and to position Queensland at the forefront of cutting-edge research, development and innovation'.

The fund's aim is to entice experienced researchers of national and international prominence to lead Queensland based research teams. This particular research project has a number of additional contributors. The Climate Change Group hopes this research will endeavour to fill scientific knowledge gaps relating to climate change and its potential long-term impacts on the Great Barrier Reef. Access to more comprehensive scientific knowledge will allow for more effective management and policy decisions to be made.

Professor Hoegh-Guldberg's research aims to ensure, 'a sustainable future for Queensland through science-based solutions to climate change on the Great Barrier Reef'. The core focus of this project is to broaden understanding and to develop the ability to respond to the threat of ocean warming and acidification through five major components: Oceanography, Biology, eResearch tools, Management and Communication. Professor Ove Hoegh-Guldberg is an internationally acclaimed researcher in the field of climate change and coral

reefs. He has contributed to over 120 publications in major journals and books and is internationally one of the highest cited authors on climate change impacts on coral reefs. His current position is as Director of the Global Change Institute at the University of Queensland.

While Professor Hoegh-Guldberg is leading this project, it is a collaborative venture, which aims to connect state, national and international research and management teams and resources.

### Objectives

This project aims to improve our understanding of the link between coastal biology, oceanography and climate change using satellite tools in collaboration with national and international partners. It will then be related to regional chemical and physical changes associated with climate change (i.e. warming, acidification and local factors).



**Project name:** Professor Ove Hoegh-Guldberg's Smart State Premier's Fellowship 2009—2014

**Project number:** 1.2A-400-7-08

**Objective:** broaden understanding and develop ability to respond to ocean warming and acidification through science

**Year:** 2009—2014

An integrated tool for exploring, correlating, analysing and visualising physical, chemical and biological information on the changes and specific vulnerabilities of coastal Queensland to climate change will be established.

Integrated management tools and policy responses for implementation in response to climate change on the Great Barrier Reef, in strong partnership with GBRMPA and other stakeholders will be developed.

Adaptation will be developed in key industries and institutions within Queensland, nationally and internationally through a program of communication and dissemination of the science and management solutions involved with the impending climate change challenges for the Great Barrier Reef.

## Research so far

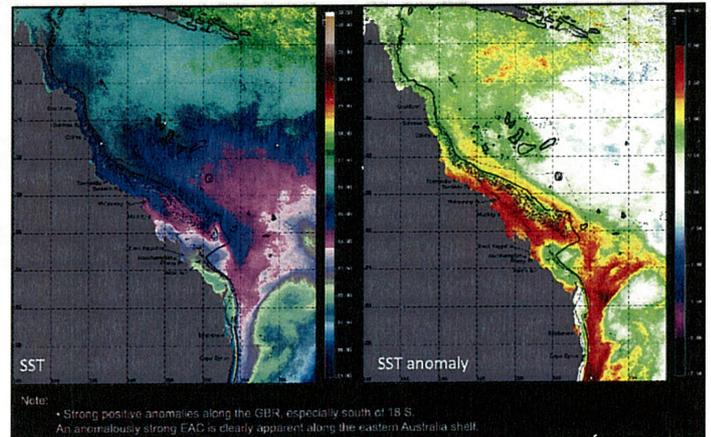
After one year of project operation (1 January 2009-1 January 2010), significant progress has been made. The integration of databases so reef managers can quickly and easily access different data sets and predictive models has commenced. This will aid in planning and implementing management strategies state wide and further afield. Different types of data can be integrated, such as observational data, sea surface temperatures and 3D benthic data.

In December 2009, the project team began operating the first Free Ocean Carbon Enrichment (FOCE) experiment on Heron Island to investigate the effects of climate change on calcification. This system allows the *in situ* manipulation of acidification conditions on the reef and how rising atmospheric carbon dioxide levels will affect marine organisms, in particular reef building corals while minimising the modification of other environmental parameters. This is a world first and has attracted the participation of collaborators from Stanford University in California.

In addition, investigations of the distribution of the corals' symbiotic microalgae and their influence on coral vulnerability are proving to be successful.

## Research implications

Satellite ocean imaging was conducted and the GBRMPA was updated regularly (see figure 1 for an example image). These images contributed to the existing coral bleaching Early Warning System. This early warning allows researchers and managers to prepare for bleaching events.



**Figure 1:** NASA Satellite Imaging day/night September 2009 Queensland coast. (source: UQ\_OceanSpace Group)

The following sponsors, co-sponsors and collaborators will be working together:

**Sponsor**  
University of Queensland

**Co-sponsors**  
Great Barrier Reef Marine Park Authority  
Great Barrier Reef Foundation (GBRF)  
Reef and Rainforest Research Centre

**Collaborators**  
Great Barrier Reef Ocean Observing System  
Queensland Climate Change Centre of Excellence  
Future Reef Partnership (Rio Tinto Aluminium/ GBRF)  
Australian Research Council (ARC) Centre for Excellence in Coral Reef Studies  
Australian Institute of Marine Science  
Coral Reef Targeted Research Project

**International collaborators**  
National Aeronautics and Space Administration (NASA)  
National Oceanic and Atmospheric Administration (NOAA)



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