



UNIVERSITY OF  
LIVERPOOL



Proudman  
Oceanographic Laboratory  
NATURAL ENVIRONMENT RESEARCH COUNCIL

Research Centre for

**MARINE SCIENCES**  
and **CLIMATE CHANGE**

## THE BIG PICTURE

Climate change is the single greatest environmental challenge facing the world as we know it.

Variations in the global climate have occurred naturally throughout the history of the planet. There are now on-going changes in climate, which are partly reflecting the effects of the rapid expansion of the human population over the last 100 years.

These changes will have serious impacts on the environment and on the lives of millions of people.



## THE EVIDENCE

There is increasing evidence of climate change. Records reveal the warmest air temperatures since 1850, a reducing snow line in the northern hemisphere, a reduction in Summer sea ice in the Arctic and warming of the upper ocean.

Along with these physical changes, there are biological and chemical responses, ranging from earlier bird migration and leaf unfolding, to coral reef damage through warming.

Future predictions of climate change include rising sea level and the oceans becoming more acidic.



## THE CHALLENGES

The challenges for the scientific community are:

- To unravel the signals of climate change, understand their causes and provide a critical view as to which signals are due to human impacts or natural variability.
- To assess the likely impacts for society.

At Liverpool, there is extensive expertise at both the University and the Proudman Oceanographic Laboratory (POL), supported by the Natural Environment Research Council (NERC), based on campus.





## THE SCIENCE AND RATIONALE

The role of the ocean and coastal seas is particularly important for climate change. The ocean plays a crucial role in storing and redistributing heat and carbon over the globe:

- More than 80% of the heat added to the climate system is absorbed by the ocean
- There is more than 50 times as much carbon stored in the ocean, as in the atmosphere
- The growth of plankton in the ocean provides a long term drawdown of carbon dioxide from the atmosphere

In the shelf and coastal seas, there is particular concern about amplified signals of climate change:

- Changes in sea level in the coastal seas can be much larger than in the open ocean
- There is a clear signal of coastal warming in the shelf seas
- There is the potential for rapid changes in the ecosystem including the invasion of new species and changes in fisheries.

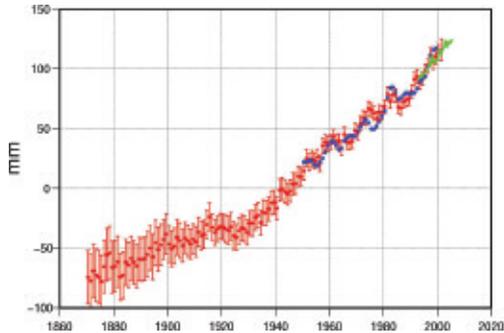
## OUR PRIORITIES

The priorities of the Research Centre for Marine Sciences and Climate Change are to:

- Provide a research forum at the University of Liverpool to understand marine sciences and how climate change operates, as well as consider the broader impacts on society, well-being and health
- Develop strategic research initiatives within the University which complement the research strengths at POL
- Link to and contribute to the national strategy being developed by research councils, particularly NERC.

## GLOBAL THREAT

A major threat is the rise in sea level, resulting from the warming of the oceans and melting of ice on land. Sea level has risen by 2mm a year on average over the globe, but varies regionally and in time. This rise in sea level, together with the effect of storms and high tides, poses a serious threat to coastal communities.



*The graph above shows the change in global average sea level (mm) from tide gauge (blue from researchers at POL; red from other historical inferences) and satellite (green, based on the difference from 1961-1990 average).*

From the Intergovernmental Panel on Climate Change 4th Assessment Report.

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