

# The perfect storm arriving at a shore near you

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It will last at least 10,000 years, cover three quarters of Earth's surface and impact us all. We cannot see or hear it but its impacts are already being felt, from oysters and the multimillion dollar aquaculture business on the west coast of North America, to the sea butterfly (marine shelled snails called pteropods) in Antarctic waters, a key link in the ocean food web.

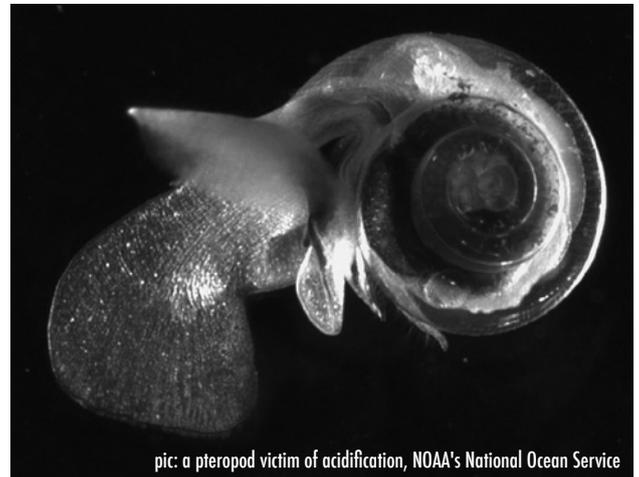
This invisible storm is called ocean acidification but scientists can detect it by measuring the rapid chemical changes that the ocean is undergoing. The cause is global – carbon dioxide (CO<sub>2</sub>) produced from our fossil fuel combustion. The solution is global – urgent and substantial reduction of CO<sub>2</sub> emissions.

Ocean acidification is directly caused by the increase of CO<sub>2</sub> levels in the atmosphere. When CO<sub>2</sub> enters the ocean it rapidly undergoes a series of chemical reactions, which increase the acidity of the surface seawater, lowering its pH. The ocean has already removed about 30% of anthropogenic CO<sub>2</sub> over the last 250 years, decreasing pH at a rate not seen for around 60 million years. This effect can be considered beneficial, since it has slowed the accumulation of CO<sub>2</sub> in the atmosphere and the rate of global warming; without this ocean sink, atmospheric CO<sub>2</sub> levels would already be greater than 450 parts per million. However, the continuation of such a fundamental and rapid change to ocean chemistry is bad news for life in the sea; it will not only cause problems for many organisms with calcium carbonate skeletons or shells (such as oysters, mussels, corals and some planktonic species) but could also impact many other organisms, ecosystems and processes, with potentially serious implications for society.

Spearheading the message at COP18 for a large international partnership to combat ocean acidification, renowned ocean expert, Dr. Carol Turley OBE of the Plymouth Marine Laboratory, stressed:

“The health of the ocean is of vital importance to each and every one of us, making it crucial that its value and benefits are recognised in such discussions. With the ocean facing a multitude of stressors, we, as a global society, need to ensure that the marine environment is protected for the benefit of future generations.”

The world is already committed to some acidification and we are now detecting impacts from it, so we need to consider



pic: a pteropod victim of acidification, NOAA's National Ocean Service

adaptation strategies, as well as the all-important mitigation strategies, to prevent further acidification in the future.

In addition to the impacts noted above, ocean acidification can also make species more susceptible to the impacts of warming waters, which have decreased oxygen levels, further stressing marine organisms. Acting together, these three major stressors could more rapidly threaten biodiversity, biogeochemical cycles, ecosystems and the goods and services the ocean provides to society, thereby increasing the risk to human food security and industries that depend on productive marine ecosystems.

To help increase awareness of the key issues impacting on the ocean in a high CO<sub>2</sub> world, the partnership has produced an Ocean Stress Guide. It is imperative that international decision-makers, in particular, understand the enormous role the ocean plays in sustaining life on Earth and the consequences of high CO<sub>2</sub> emissions for the ocean and society. The publication has already received support from a number of internationally significant bodies including the World Bank, European Union and UN bodies.

## MORE INFO

The partnership has been active at the UNFCCC meetings since 2009 and at the UN Conference on Sustainable Development, Rio+20. The partners include Plymouth Marine Laboratory, the European Programme on Ocean Acidification (32 partners from 10 countries), UK Ocean Acidification Research Programme (27 partners from the UK), Mediterranean Sea Acidification in a Changing Climate Programme (16 partners from 10 countries), Biological Impacts of Ocean Acidification Programme (19 partners from Germany), SCRIPPS Institution of Oceanography, OCEANA and the Ocean Acidification International Coordination Centre (OA-ICC) ■

The Ocean Stress Guide is available in English and Arabic:  
[http://www.pml.ac.uk/media/latest\\_news/cop18.aspx](http://www.pml.ac.uk/media/latest_news/cop18.aspx)