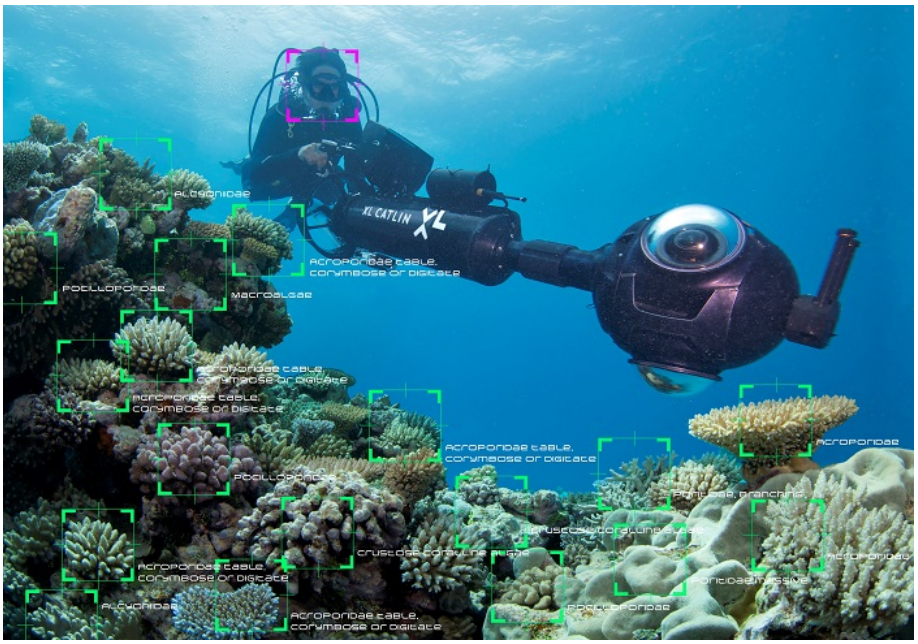
Fight to save coral reefs boosted by technology breakthrough

- *XL Catlin Global Reef Record gives a turbocharged boost to coral reef research with computer analysis now matching the accuracy of marine biologists…at superfast speed*
- *Breakthrough creates coral data goldmine.*



Computers trained to identify species are helping to save coral reefs

Credit: 'XL Catlin Global Reef Record' – Click to download high resolution images from our photo gallery

Scientists engaged in the urgent battle to save the world's coral reefs have a powerful new resource at their disposal following an innovation in the analysis of coral reefs. New data is now available at the XL Catlin Global Reef Record which has been produced by a powerful combination of computer learning techniques with advanced image recognition.

The automated analysis is delivering two vital elements in the battle to save coral reefs: data which is processed 900 times faster than before and accuracy matching a human expert. The collected image

data from the XL Catlin Seaview Survey would have taken three decades to process manually. Using 3 state-of-the-art General Processing Units (GPU), capable of analysing 90 images per minute, the whole archive was analysed in a few weeks.

According to The University of Queensland's Professor Ove Hoegh-Guldberg, chief scientist of the four year-old project sponsored by (re)insurer XL Catlin, it opens up the chance to work at a scale unimagined before. "It is a major leap forward. The XL Catlin Global Reef Record and its game-changing technology will allow the world's scientists to rapidly assess the health of coral reefs at scales never dreamed of before. This is extremely powerful as well as being timely in addressing the challenges that coral reefs are currently facing. We need rapid, accurate and detailed information on the condition of coral reefs across the planet if we are to save them from climate change and other stresses."

The new analysis is the result of a partnership between the Global Change Institute at The University of Queensland and the UC Berkeley Artificial Intelligence Research Center which developed advanced image analysis technologies based on "deep learning". The computer searches every photograph to record the details on 40 different criteria. The information is immediately available to scientists.

"The technologies enable us to identify changes in the structure of coral reefs – including different groups of corals, sponges, algae and other reef dwellers," said computer scientist, Dr. Oscar Beijbom, who led the algorithmic development as a joint Postdoctoral Researcher at UC Berkeley and the Global Change Institute.

Dr. Manuel Gonzalez Rivero, a Research Fellow on the project from the Global Change Institute, said: "We can now analyse hundreds of thousands of images using software trained to interpret them and identify corals and other major reef players. We can also see how events such as mass coral bleaching and mortality are likely to play out across hundreds of kilometres of reef-scape."

Scientists gathered at the International Coral Reef Symposium in Hawaii where the breakthrough was announced, say the scale, speed and scope of their work will be boosted by this resource at exactly the time when the crisis facing the world's reefs from global coral bleaching is at its most extreme.

Mark Eakin, coordinator of NOAA Coral Reef Watch at the National Oceanic and Atmospheric Administration, said: "This new tool is spectacular as it provides detailed mapping and analysis of coral distribution on reefs, coupled with the XL Catlin Seaview Survey images. This will be an invaluable tool, especially for the large number of formerly unmapped reefs around the world. As they continue to add new reefs and data on bleaching, this will be an unmatched resource for analyzing the extent of the ongoing global coral bleaching event."

Ruth Gates, President of the International Society for Reef Studies and Director of the Hawaii Institute of Marine Biology, described the breakthrough as an unprecedented opportunity to "explore and analyze coral reef complexity and monitor the health of these critical systems over time".

Chip Cunliffe, Director of Environmental Science Programmes at sponsor XL Catlin, said the breakthrough would be of practical value: "As an insurer and reinsurer, we know how important healthy coral reefs are as they act as a natural barrier to waves and storm surges along coastlines. Using these new techniques to identify areas that may become more susceptible to the impacts of erosion and flooding will help increase local resilience to these changes."

With collaboration seen as the best way of quickly advancing coral reef science, access to the XL Catlin Global Reef Record is free to encourage collaboration. Professor Hoegh-Guldberg said the technology and partnerships can empower countries that don't have huge resources to collect information about their own coral reefs.

"Ultimately, the sharing of data at this scale will lead to benefits for everyone," he said. "By sharing, we will rapidly advance the global coalition needed to make the case for rapid action on climate change and the many other threats that confront coral reefs."

About the XL Catlin Global Reef Record

For the last four years scientists based at the Global Change Institute at The University of Queensland have worked on the XL Catlin Seaview Survey, using unique underwater camera technology to make a visual record of more than 1,170 kilometres of reefs across the world.

A complete record of the Great Barrier Reef, Coral Sea, Caribbean and Bermuda surveys is now online at the XL Catlin Global Reef Record. There is more to be added in the near future from the Coral Triangle, Indian Ocean and Hawaii. It now hosts the data from the powerful new analysis alongside the original visual and field records. The entire site is free to use by researchers.

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FURTHER INFORMATION

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About The Global Change Institute

The Global Change Institute (GCI) at The University of Queensland (UQ), Australia, was established in 2010 as an independent source of game-changing research, ideas and advice for addressing the challenges of global change. GCI advances discovery, develops solutions and advocates responses that meet the challenges presented by climate change, technological innovation and population change. UQ is one of the world's premier teaching and research institutions. It is consistently ranked in the top 100 in four independent global rankings. With 50,700 students and 6,800 staff, UQ's teaching is informed by research, and spans six faculties and eight research institutes. http://www.gci.uq.edu.au/