Spotting the killer hot spots

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Killer hotspots of over-heated ocean water which destroy huge areas of coral and bring starvation to birds, fish and other sea creatures can now be pinpointed, thanks to a major advance in the use of satellite technology by Australian and American researchers working under the Marine and Tropical Sciences Research Facility (MTSRF) program.

Advanced satellites and smart mathematics are enabling the scientists to detect the events which cause mass bleaching of corals and disruption of marine food chains with unprecedented precision.

This is revealing the Great Barrier Reef's most threatened areas under global warming.

“Until now we have only been able to detect large-scale events under typical seasonal conditions," MTSRF team leader and University of Queensland researcher Dr Scarla Weeks said.

"The new technology gives us the power to see what is happening in the ocean around the Great Barrier Reef in much finer scale in both space and time,” said Dr Scarla Weeks, of UQ's Centre for Marine Studies (CMS) and Centre for Remote Sensing and Spatial Information Science (CRSSIS).

“These technologies will feed directly into the Great Barrier Reef Marine Park Authority's management of the Great Barrier Reef.”

“It means we can identify those areas most at risk of being hit by hot

water, enabling managers and reef visitors to take greater steps to protect them.

“It also means that we can observe coral bleaching events taking place, which were missed before because the satellite data didn't have the fine scales necessary.”

Dr Weeks said that the 2002 bleaching event, which hit 54 per cent of the Great Barrier Reef was clearly detected using satellite data from the US National Oceans and Atmosphere Administration (NOAA) – but the subsequent 2005/6 event, which hit the southern GBR hard, was not picked up.

“One reason was the 2005/6 bleaching was an anomaly. It struck in November/December, whereas the usual time that warm water enters the GBR is in late summer, around February.

"The existing technology used didn't have the resolution to pick it up. In fact it couldn't observe any reefs close inshore.”

Dr Weeks' team has announced the development of a satellite and mathematical tool that provides a dramatic improvement in the ability to read sea surface temperature anomalies from outer space. It is more accurate in time and can see much smaller areas of water.

“Using this we can identify individual reefs or groups of reefs which are most at risk of hot water and coral bleaching under climate change,” she said.

“This will enable managers and the community to take the necessary steps to provide greater protection.”

Dr Weeks said that eddies of hot water, at 31 or 32 degrees Celsius,

which lingered over the GBR for a number of days, could kill some corals completely, while others took years to recover.

“But hot water also affects the entire marine food chain," she said.

"We've seen devastating evidence that seabirds stop feeding their chicks when the hot water is in the vicinity – probably because the plankton and small fish they depend on also die or disappear.

“If hot water affects birds then it almost certainly also affects fish, as well as marine mammals like dugongs and whales, or turtles and large plankton feeders like manta rays. We are about to start research to examine this.”

Scientists consider the incidence of hot water entering the GBR from the ocean has been on the increase for several decades, and is reflected in more frequent and larger coral bleaching events. They say it is one of the most obvious manifestations of global warming.

"The corals are like the canary in the coal mine," she said.

"By bleaching they are telling us there is something amiss. The cause is these increasing thermal anomalies.

“Now we can see them happening, before our eyes, with far greater clarity and precision than before.

"We are in fact, watching global climate change unfolding in ways that will directly affect the livelihoods and prosperity of tens of thousands of Australians, given the importance of the Great Barrier Reef for tourism, fishing, recreation and the ecosystem benefits it provides.”

Source: The University of Queensland