

Sea temperature changes linked to mystery North Pacific ecosystem shifts

August 31 2015

Longer, less frequent climate fluctuations may be contributing to abrupt and unexplained ecosystem shifts in the North Pacific, according to a study by the University of Exeter.

Researchers have long been puzzled by two rapid and widespread changes in the abundance and distribution of North Pacific plankton and fish species that impacted the region's economically important salmon fisheries. In 1977, and again in 1989, the number of salmon in some areas plummeted, while it increased in other areas. These events have been dubbed regime shifts by researchers.

Now, in a paper published in the *Proceedings of the National Academy of Sciences (PNAS)*, researchers Dr Chris Boulton and Professor Tim Lenton show that the variability of the North Pacific itself has been changing and that marine ecosystems are sensitive to this. They analysed [sea surface temperature](#) fluctuations in the North Pacific since 1900 and identified a trend toward longer-lived fluctuations. The authors also found the same pattern in the Pacific Decadal Oscillation index, a widely cited indicator of Pacific [climate variability](#) that has previously been linked to the 1977 and 1989 regime changes.

These findings reveal a fundamental change in Pacific climate variability over the last century, to a pattern of oscillations in which the region's ecosystems are more likely to exhibit larger and more abrupt climate-triggered regime shifts. This suggests that changing climate variability contributed to the North Pacific regime shifts in 1977 and 1989.

Dr Chris Boulton, at the University of Exeter, said: "The causes of these dramatic ecosystem shifts in 1977 and 1989 have been a scientific mystery. This is the first time that anyone has looked for changes in sea surface temperature fluctuations in the North Pacific, and we have now gone some way towards explaining what causes these regime shifts, which have extreme consequences for aquatic life."

Professor Tim Lenton, of the University of Exeter, added: "This study shows that the ongoing monitoring of [sea surface](#) temperature variability could help to provide early warning of threats to marine ecosystems."

More information: Slowing down of North Pacific climate variability and its implications for abrupt ecosystem change, www.pnas.org/cgi/doi/10.1073/pnas.1501781112

Provided by University of Exeter

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