Monday 17 June 2019

Marine heatwaves: driven by local processes and climate variations

An Institute for Marine and Antarctic Studies (IMAS)-led study involving scientists from five countries has provided the first consistent global assessment of marine heatwaves and their drivers.

The study appearing in the journal *Nature Communications* combined an assessment of global research in the published literature dating back to 1950 with daily satellite records of sea surface temperatures since 1982.

The study identified key local and remote processes that drive marine heatwaves in 22 regions around the world.

IMAS Professor Neil Holbrook, who led the study, said that the authors and other scientists are becoming increasingly aware of the impacts that marine heatwaves can have on marine ecosystems and the human communities reliant on them.

"However, unlike for atmospheric heatwaves, scientific understanding of marine heatwaves is in its infancy," Professor Holbrook said.

"Given the increasing frequency of marine heatwave events and projections that this trend will continue, there is a pressing need to understand better the physical mechanisms that drive them."

Professor Holbrook said that like atmospheric heatwaves, marine heatwaves are caused by the interaction of local processes and larger scale modes of climate variability.

"Our study of past research and recent sea surface temperature records allowed us to classify marine heatwaves under four broad ocean-climate zones.

"In the **tropical Pacific**, two-thirds of documented marine heatwaves have been associated with El Niño events.

"In **middle and high latitudes**, where seasonal variability is greater than in the tropics, heatwaves have been associated with shifts in warm ocean currents, large eddy activity, and atmospheric influences. In the Mediterranean Sea large-scale atmospheric anomalies and reduced wind speeds have been found to elevate sea surface temperatures well above their normal range.

"A complex range of influences, including weakening currents and suppressed upwelling, can result in marine heatwaves in **Eastern boundary current** regions – at the eastern extent of subtropical gyres and which run along the western sides of continents – such as the Benguela system off western Africa, and the California and Peru Current systems off North and South America.

"Prior to 2017, reports of marine heatwaves in **Western boundary current** regions, at the western extent of subtropical gyres, are notably absent from the scientific literature, apart from the eight-month event in the Tasman Sea during 2015/16.

"Our capacity to detect marine heatwaves is improving with advances in remote sensing and *in situ* instruments, as well as new datasets that allow us to understand the three-dimensional structure of these events.

"Further improvements in our monitoring and understanding will be increasingly important in the future if we are to improve our capacity to predict marine heatwaves and provide rapid assessments to the communities they affect," Professor Holbrook said.

Media contact: Duncan Abey (03) 6226 1735, email: duncan.abey@utas.edu.au

Media contact: Andrew Rhodes (03) 6226 6683, email: ajrhodes@utas.edu.au

Information released by:
Communications and Media Office
University of Tasmania
+61 3 6226 2124
Media.Office@utas.edu.au
Twitter.com/utas_newsroom