Characteristics And Evolution Of Marine Heatwaves In The Coastal Region Of Peru-Chile

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Marine Heatwaves (MHWs) globally impact marine ecosystems and fisheries. In the very productive Peru-Chile Upwelling System (PCUS), MHWs range from brief to months-long, with reports of events exceeding a year during El Niño (EN) positive phase. Global Climate Models predict an increase in MHW frequency and intensity worldwide in the future. Notably, Eastern Boundary Upwelling Systems(EBUS) show varied evolutions, with evidence suggesting that upwelling may mitigate warming trends.

After an initial analysis of satellite sea surface temperatures, which revealed significant variations in the properties, drivers, spatial organization, and preferred season of occurrence of MHWs based on their duration (Pietri et al., 2021), this study delves into the future evolution of these extreme events using an ensemble of global climate models. Comparative assessments of MHW statistics, characteristics, and trends are conducted for two distinct time periods: the near future (2020-2060) and the distant future (2060-2100). Employing an innovative statistical method to track MHWs in both space and time, the investigation separates the analysis to distinguish trends in El Niño-related MHWs from the more common non-El Niño events. Our findings reveal that, by 2060, a persistent state of MHWs is anticipated when assessed against a historical threshold (1980-2010). However, a moving threshold analysis underscores a reduction in MHW exposure (number of days) and intensity (in degrees Celsius) in the near future, followed by a substantial increase in both aspects in the distant future. This study contributes to our understanding of MHW evolution but also emphasizes the importance of considering different temporal and statistical perspectives in predicting future extreme events.

Pietri, A., F. Colas, R. Mogollon, J. Tam, and D. Gutierrez (2021): Marine Heat Waves in the Humboldt Current System from 5-day localized warming to year-long El Niños. Scientific Reports, 11:2117, https://doi.org/10.1038/s41598-021- 00340-4