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heatwaveR: A central algorithm for the detection of heatwaves and cold-spells

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Software

- Review
- Repository
- Archive

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Summary

As the world continues to warm, we see not only a steady increase in mean temperatures (IPCC 2014), but an increase in the count and duration of extreme events, known as 'marine heatwaves' (MHW; Oliver et al. 2018). These events may decimate ecosystems (Wernberg et al. 2016) and impact the health of fisheries (Oliver et al. 2017). It is therefore necessary that a standard definition for these events be provided for researchers that allows for the comparison of events at a global scale. The first framework that allowed for the measurement and comparison of events globally was first outlined by Perkins and Alexander (2013) for atmospheric events. Based on this work, Hobday et al. (2016) then developed a definition for MHWs. A publication by Schlegel et al. (2017) then explored the concept of 'marine cold-spells' (MCSs).

The **heatwaveR** package was developed and released in order to provide one central repository for the definition and visualisation of atmospheric and marine heatwaves and cold-spells. It also contains the functionality to calculate and visualise the categories of events as outlined in Hobday et al. (2018). The **heatwaveR** package is a project-wide update to the **RmarineHeatWaves** package, which is itself a translation of the original Python code written by Eric C. J. Oliver. The **heatwaveR** package has brought the inputs and outputs of the R code more in line with the Python code while also introducing substantial speed improvements over the previous R version by deconstructing and modularising it. The slow portions of the code have now been implemented in C++. The modular nature of the code allows for the use of custom baselines and climatologies in the calculations of events. This means that as the techniques for the detection of events change and improve over time, this package will be able to grow with them.

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