

Monitoring and predictions of Marine Heatwave events in the North East Pacific from ocean reanalyses and seasonal forecasts

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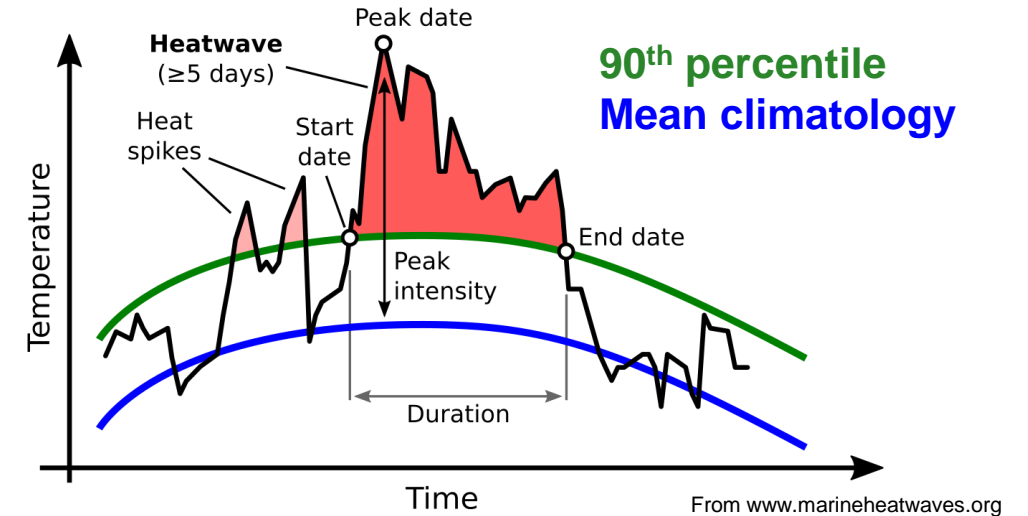
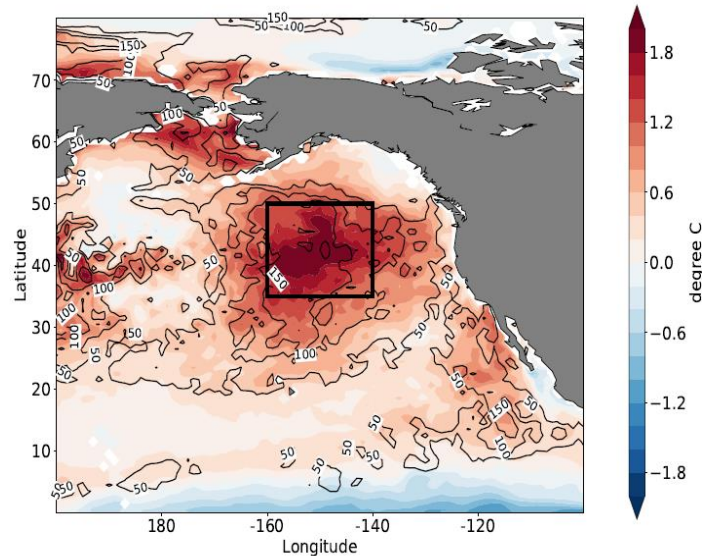
EGU General Assembly 2022 – 24 May 2022



Marine Heatwaves definition and detection

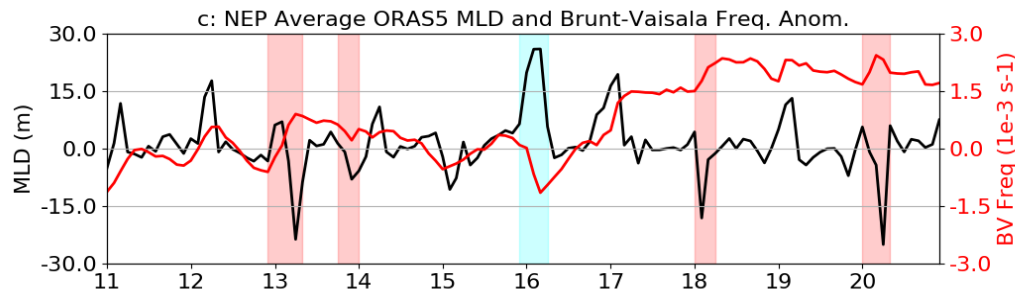
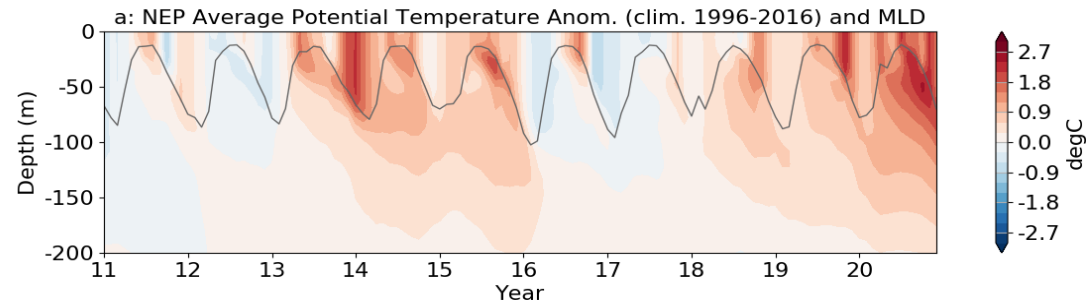
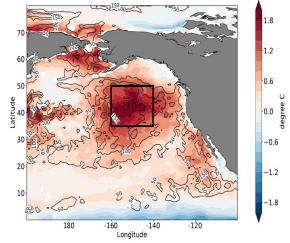
- **Definition (Hobday et al. 2016):** we call Marine HeatWave (MHW) an episode of Sea Surface Temperatures **exceeding the 90th percentile for at least 5 consecutive days**

OSTIA SST anomalies April-Nov 2020



- MHW can be monitored in NRT by both observation-based **SST analyses and ocean analysis systems**. Ocean analyses give access to the **vertical structure**
- Both datasets capture a **series of MHW events from April to November 2020** in the NE Pacific

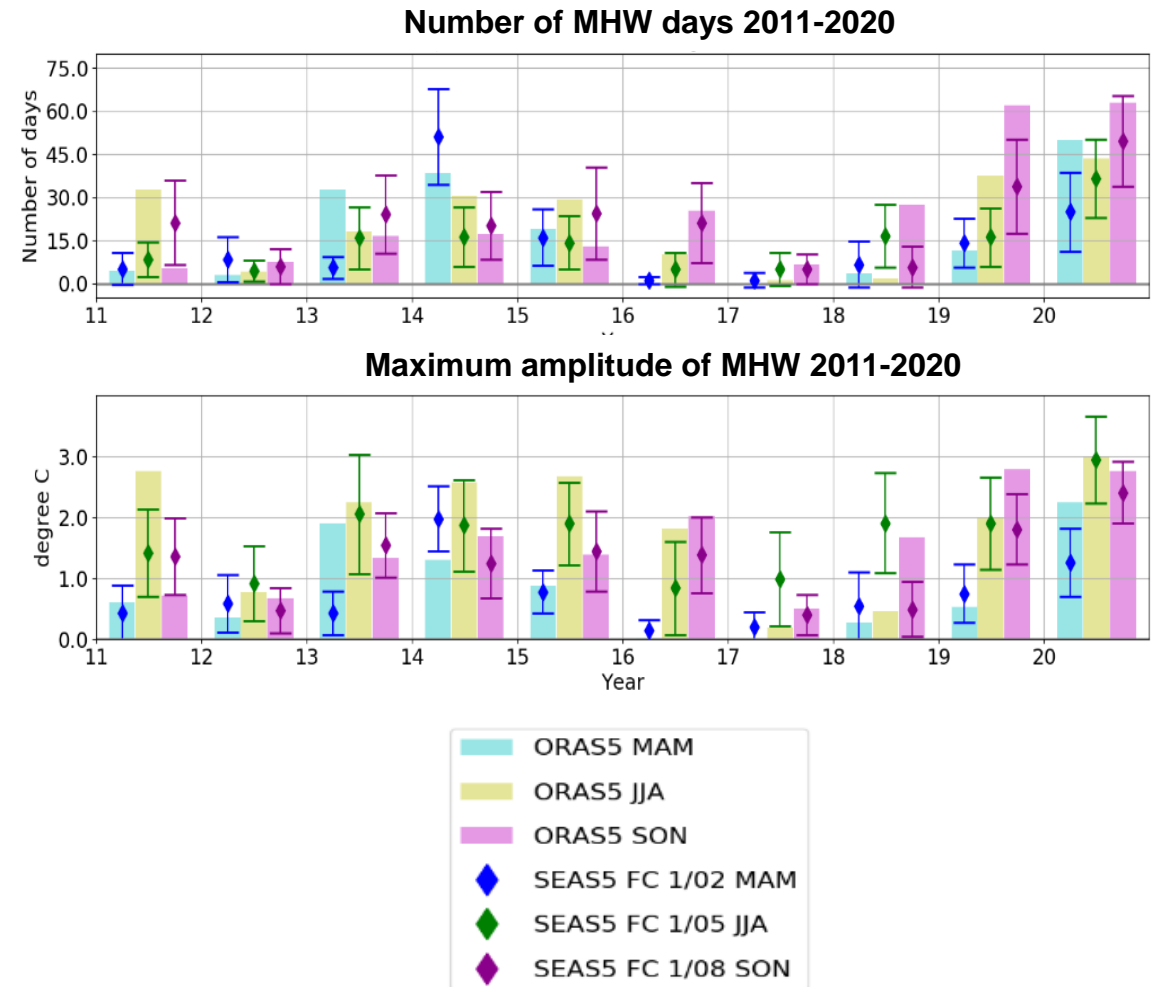
Monitoring of vertical structure of Marine Heatwaves in Ocean reanalyses



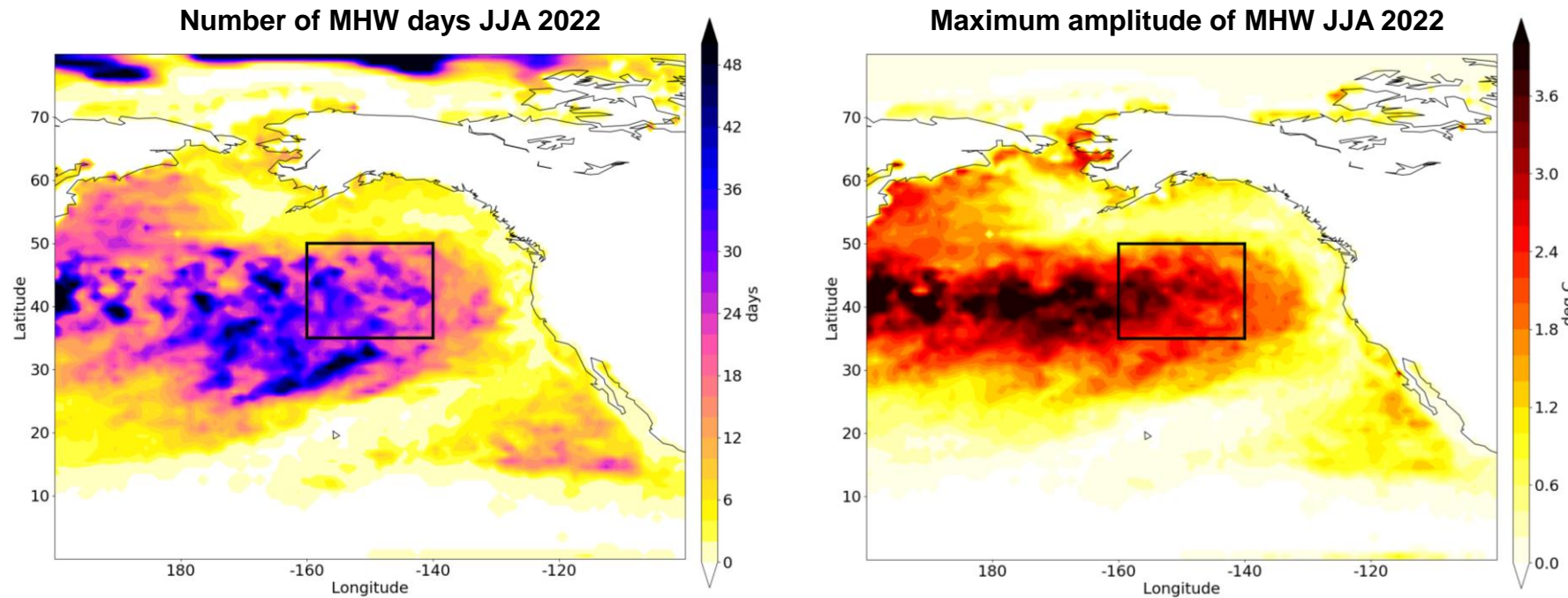
- Ocean reanalyses show that warm anomalies can **spread below the mixed layer**
- Increased stratification since 2017 **precondition** the upper ocean for the occurrence of MHW
- Ocean reanalysis provide **IC for coupled seasonal FC** systems
- MHW properties from hindcasts from **ECMWF SEAS5** (Johnson et al, 2019) compared to ORAS5

Seasonal prediction of Marine Heatwaves properties

- **Number of MWH days** and **MHW max amplitude** computed for forecast range **1-4 month** for starting dates on 1st Feb, 1st May and 1st Aug
 - ✓ Predicts the MHW conditions for the season following the starting date (MAM/JJA/SON)
- Seasonal FC missed the start of “the Blob” in spring 2013 and wrongly predicted a large MHW in summer 2018
- Prediction more accurate when IC well **preconditioned** for MHW (from summer 2013 to 2016 and in 2019-2020)
- Need to assess FC reliability with probabilistic scoring techniques



Seasonal prediction of Marine Heatwaves for summer 2022



- Seasonal FC starting on 1st May 2022 predicts **30-40 days** of MHW conditions in the N Pacific with amplitudes of **2.5-4 degC**
- **Features in OSR6:** Monitoring and predictions of the series of Marine Heatwave events impacting the Northeast Pacific in 2020 (de Boissésou et al)