

Study of Marine Heatwaves in a semi-enclosed coastal area: understanding their drivers and quantifying their impact using a combination of satellite and in situ data, and hydrodynamic modelling

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Introduction

- **Marine heatwaves (MHWs)** are discrete warm-water anomalies events occurring in both coastal and open ocean¹
 - Generally caused by a combination of oceanic and atmospheric conditions favouring the increase of the SST and/or reducing the heat transfer from the ocean to the atmosphere
 - Major impacts on ecosystems, fisheries and aquaculture
- We are investigating the formation of such events in the semi-enclosed sea of Chiloé (Chile), how MHWs affect the sea water properties and if they could be correlated with open-ocean MHWs².
 - The first part of the PhD is dedicated to the construction of a **monthly climatology** of the **sea temperature** which will be used to detect marine heatwaves. It has to be sufficiently precise to resolve the fjords. As the entire work will depend on this climatology, it must be very accurate and must represent the truly environmental conditions of the Sea of Chiloé.

Methodology

Data:

- In situ SST from 1950 to present
- Monthly averaged satellite SST (MODIS/Aqua; resolution 4km) over the last 20 years (only 36 satellite points per 100km² and per month are selected)

The SST data are spatially interpolated with DIVAnd³ (Data-Interpolating Variational Analysis in n dimensions) to create a spatial interpolation of it thus providing a continuous field in 3-dimensions at high resolution (0.02°)

As there are few data inside the Sea of Chiloé during certain months, we completed our dataset with satellite data

Lower weight is given to the satellite data compared to the *in situ* ones so the *in situ* data are dominant for the reconstruction of the SST field

Still ongoing...

- Parts of the sea are still not completely accurate
- How to **improve** the SST climatology ?
 - By using more satellite points ?
 - By giving more weight to the satellite data ?

References:

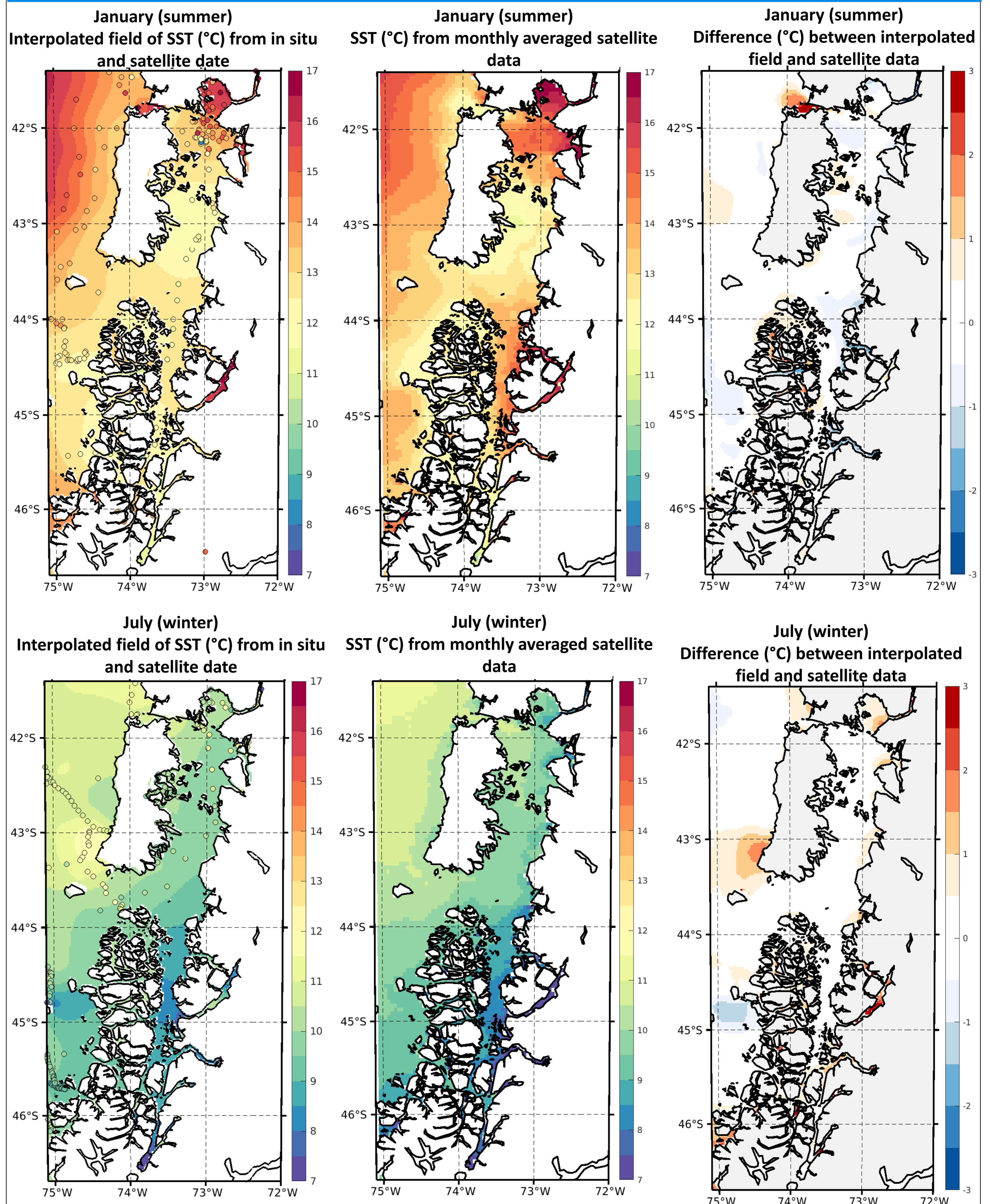
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Results



The spots on the left figures represent the SST in situ points.

The reconstruction is generally good for months with high number of in situ points and less accurate for months with poor in situ data coverage.

Channels between the islands separating the South Chiloé from the open ocean are generally badly represented.



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