

# Sensitivity of the satGEM technique to the selection of surface information parameters to project 3D thermohaline structure in the Loop Current region



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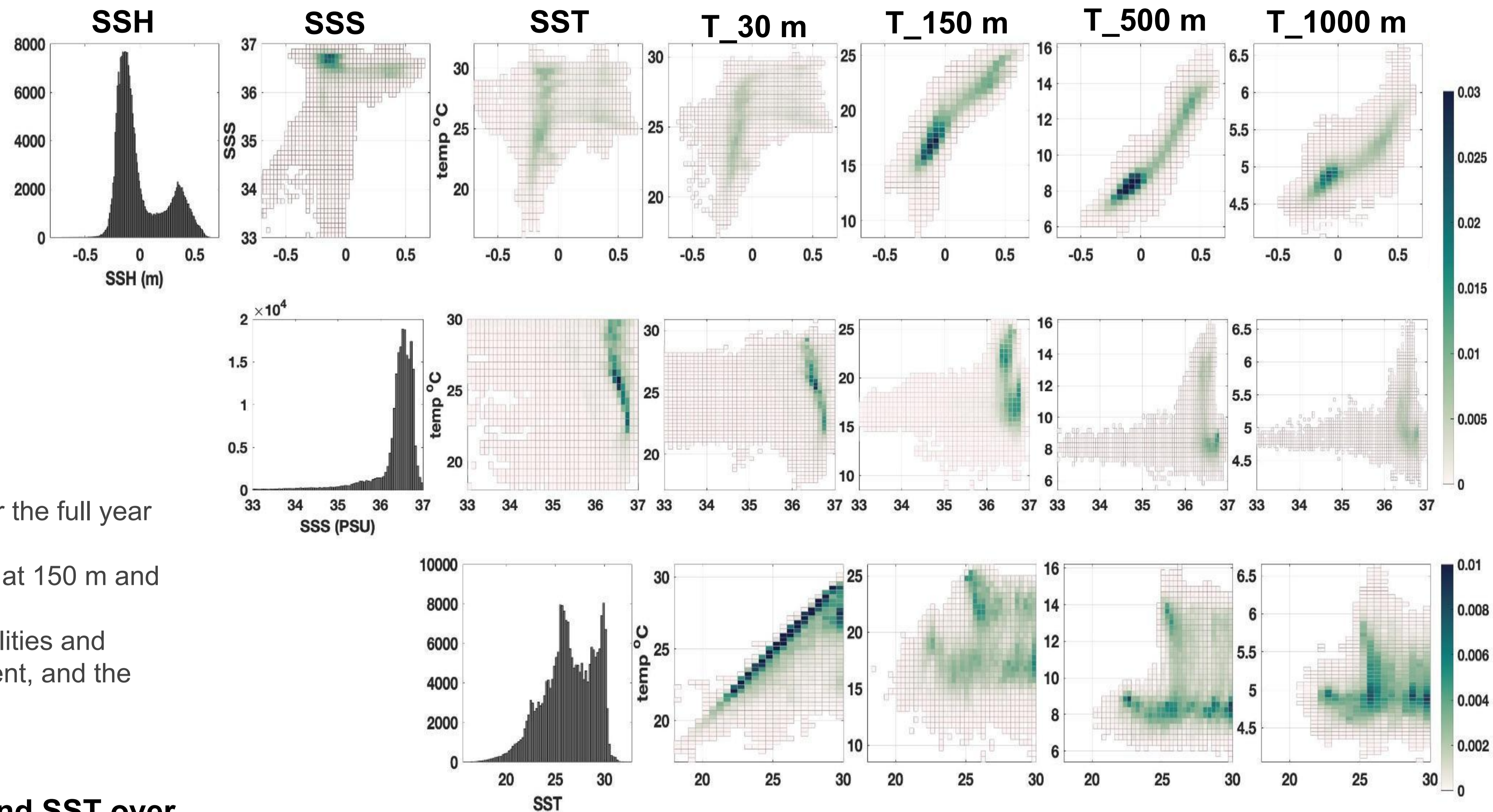
## Introduction

We leverage one year (2017) of the operational model NEMO on a 1km resolution grid over the Gulf of Mexico to explore the sensitivity of the SatGEM technique to the selection of surface information.

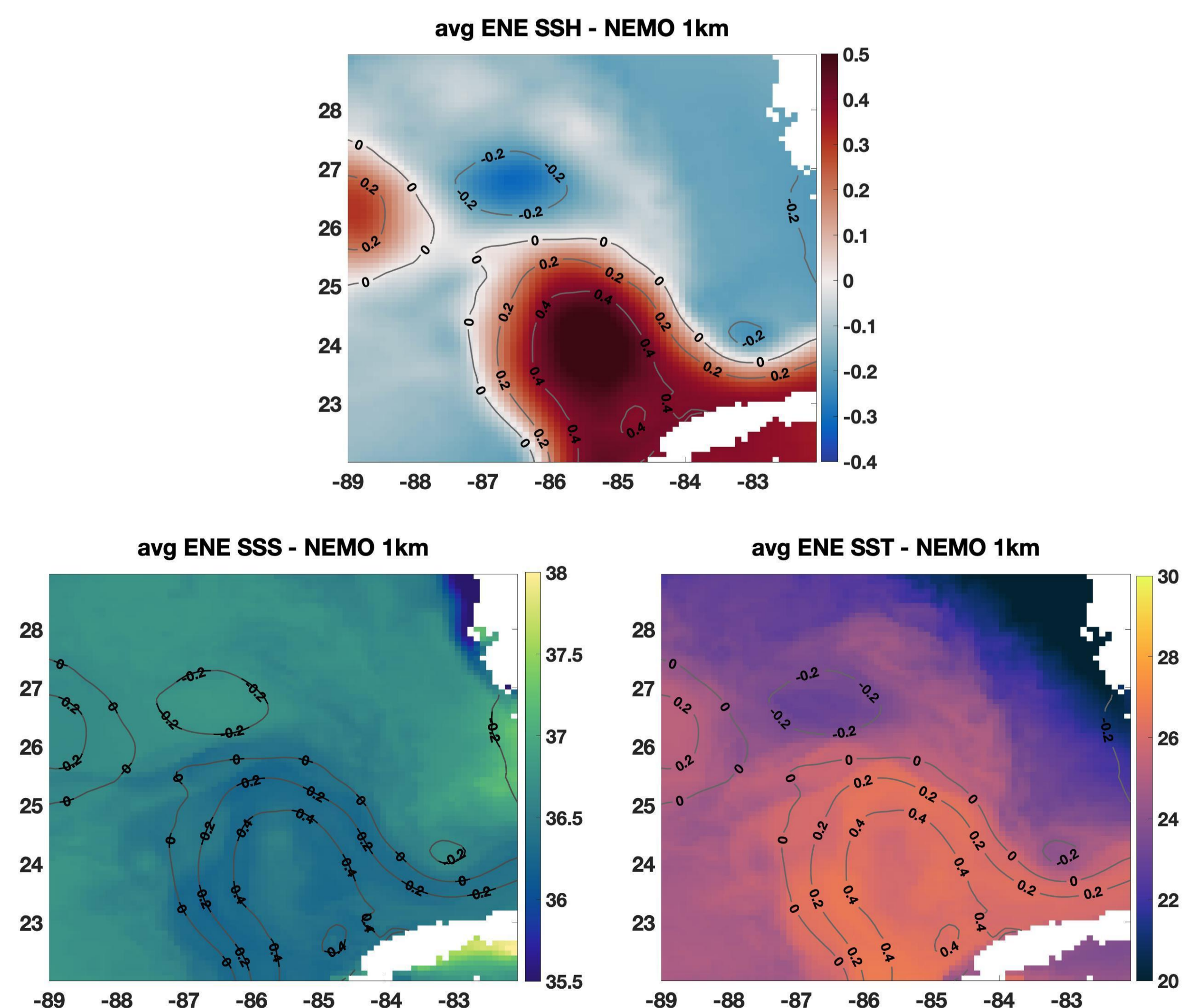
SatGEM uses the relationship between dynamic height and absolute sea surface height (SSH) to generate synthetic profiles at each grid point. We present preliminary results of the relationships of different surface parameters (SSH, SSS, and SST) with temperature at different depths.

## Key preliminary results

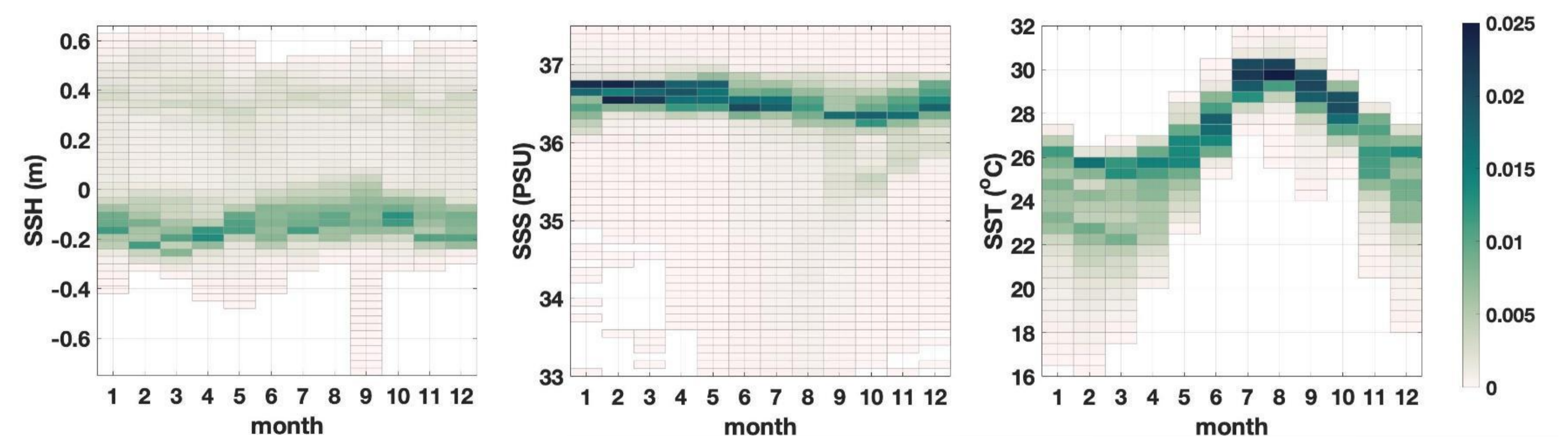
- Probability distribution of SSH, SSS, and SST over the full year 2017 and their relationship to each other
- SSH shows a clear relationship with temperatures at 150 m and 500 m depth
- SSH of 0.4 m and -0.2 m have the highest probabilities and correspond to the warmest edge of the Loop Current, and the region surrounding detaching eddies



## Average January (2017) for SSH, SSS, and SST over the sample are of the Gulf of Mexico



Probability distribution for each variable pairs. The x-axis along the first, second, and third rows show values of sea surface height (SSH), sea surface salinity (SSS), and sea surface temperature (SST) respectively. The color scale is the number of observations in every bin divided by the total number of observations. Columns 4 to last show temperatures at [30 150 500 and 1000] m in the y-axis



Probability distribution for sea surface height (SSH), sea surface salinity (SSS), and sea surface temperature (SST), left to right. The x-axis represents the month of the year 2017 of the operational model NEMO (1 km) subsampled every 10 km and every 10 days