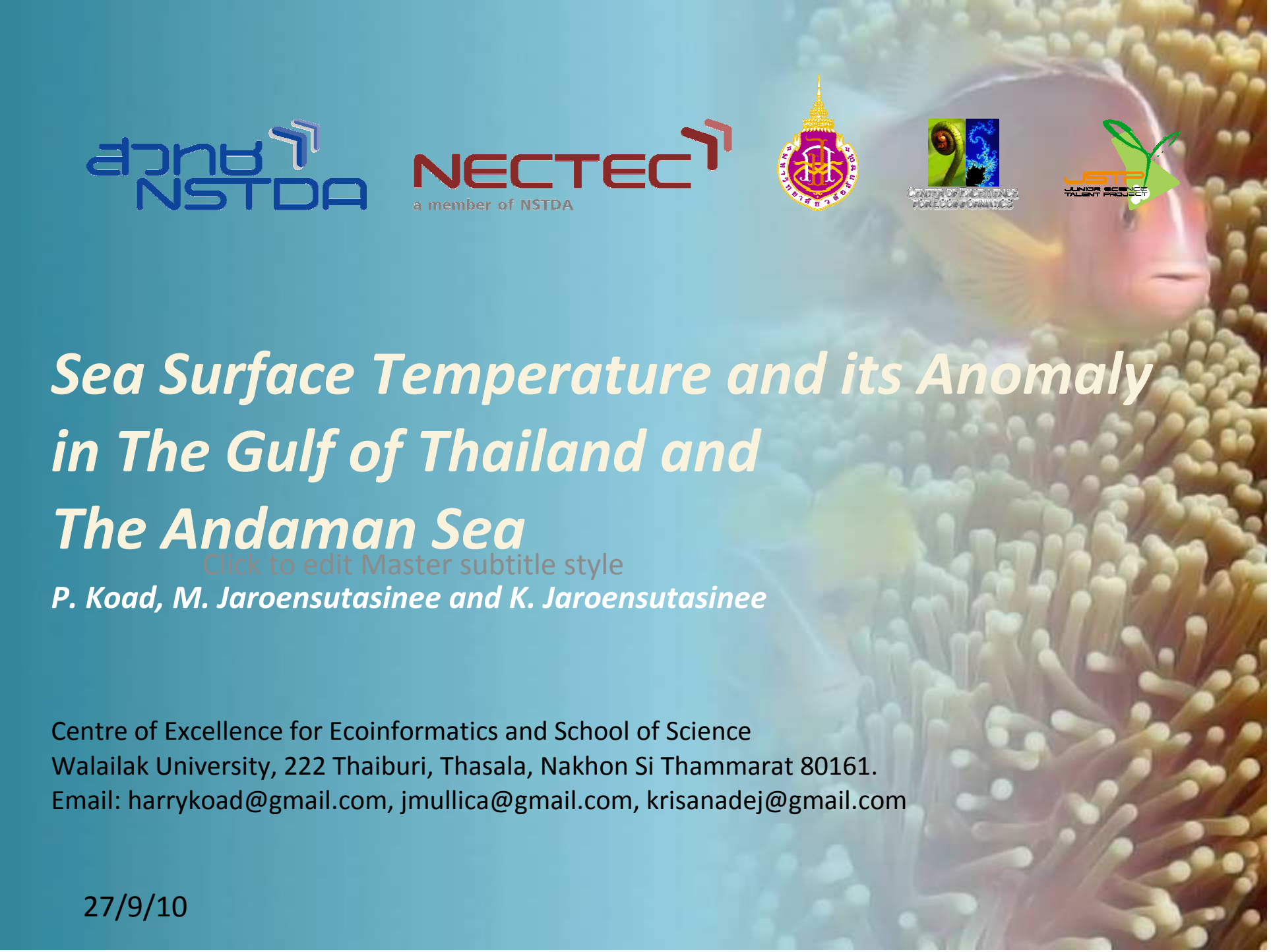

Sea Surface Temperature and its Anomaly in The Gulf of Thailand and The Andaman Sea

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INTRODUCTION

- **Coral bleaching** is most often associated with a significant rise in Sea Surface Temperature (SST).
- **Thermal bleaching** occurs when the coral is exposed to prolonged above-normal temperature.
- Analysis of SST archived data depicts **seasonal and long-term trends** of climate change.

OBJECTIVES

- Estimate the recent SST trends using a satellite-based climatology to characterise changes in SST.
- Compare SST between the Gulf of Thailand and the Andaman Sea, Thailand.
- Compare the SST data from HOBO sensors with satellite-based data from National Oceanic and Atmospheric Administration (NOAA).

DATA COLLECTION

We deployed **HOBO Pendant temperature and light data loggers** model UA-002-64 to measure water temperature at two sites:

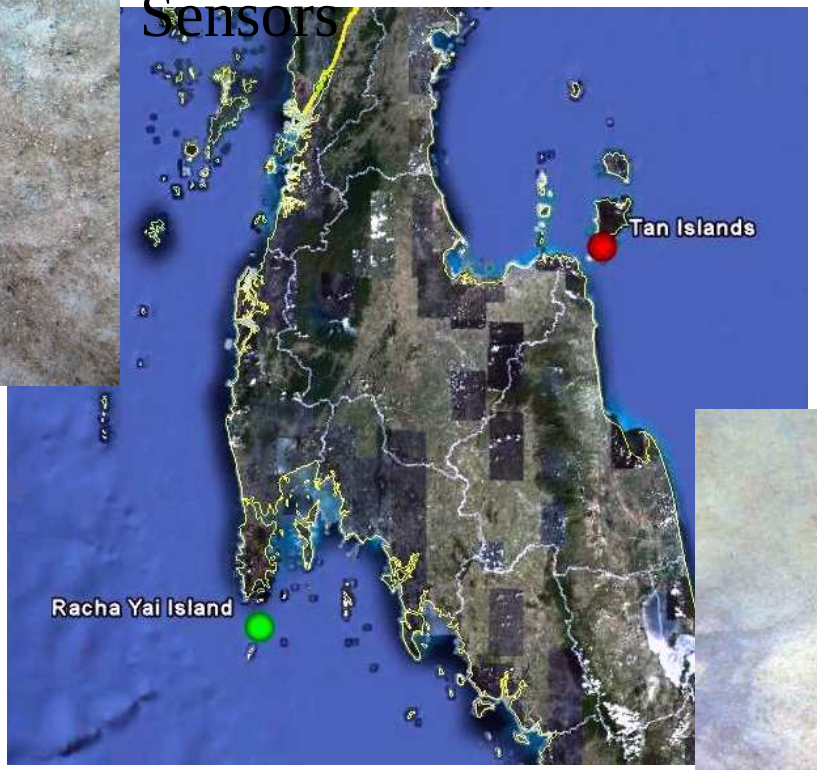
- **Tan Island**, the Gulf of Thailand (16 February 2009-7 May 2010) and

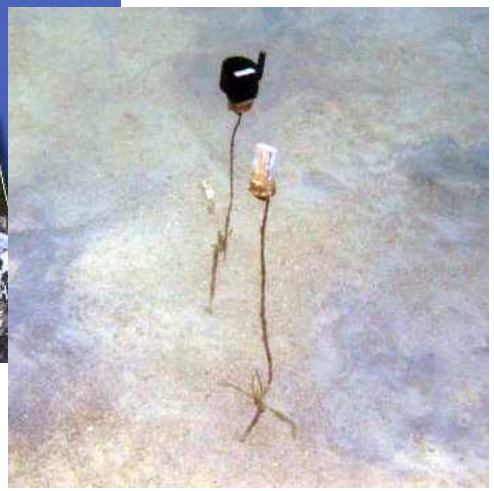
- **Racha Island**, the Andaman Sea (7 June 2008-7 July 2010).

SST and SST anomaly (SSTa) of Tan Island and Racha Island were obtained from **NOAA NCEP EMC CMB GLOBAL Reyn-Smith OI version 2** (1982-2010).

DATA COLLECTION

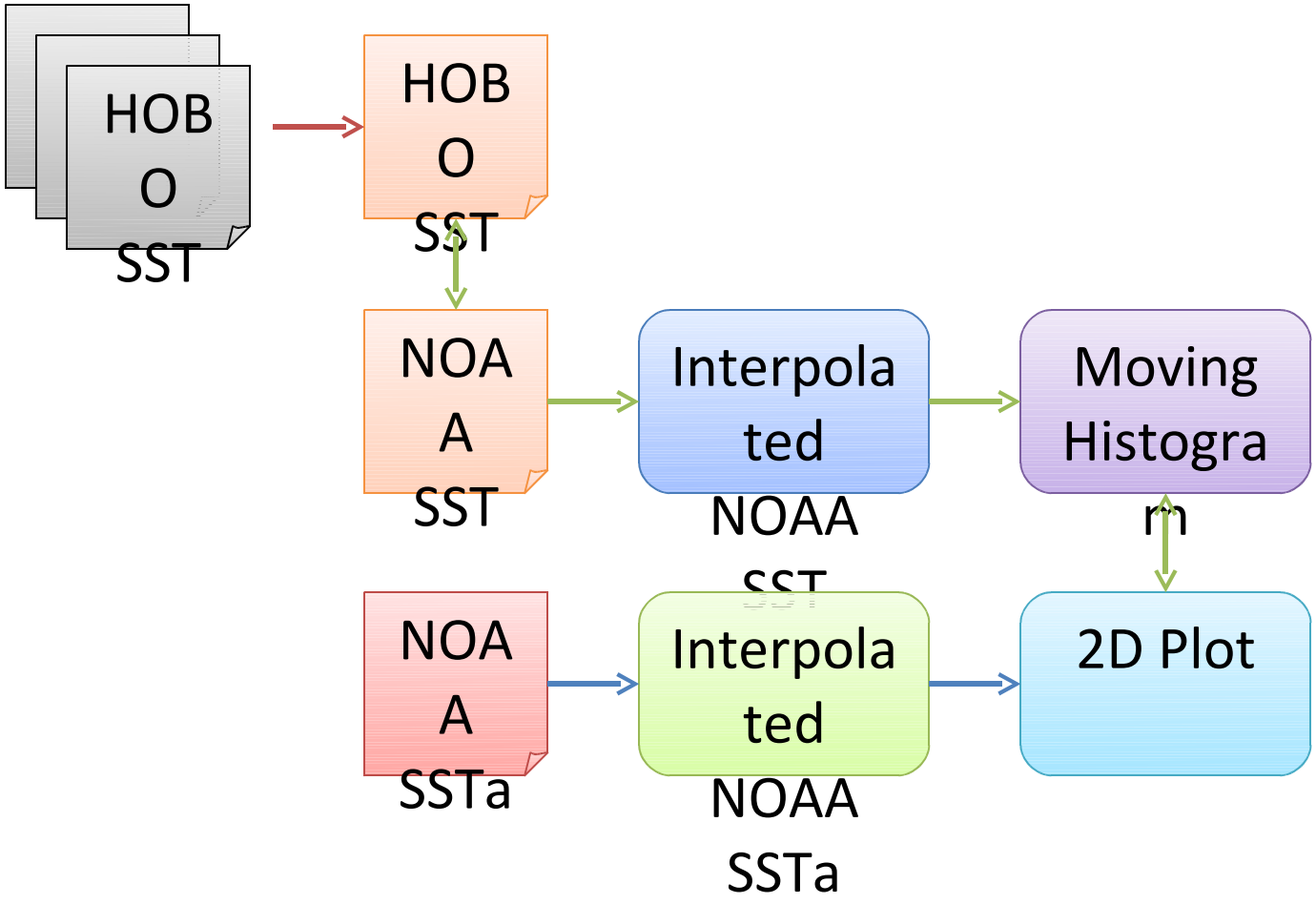
← Racha Island Sensors



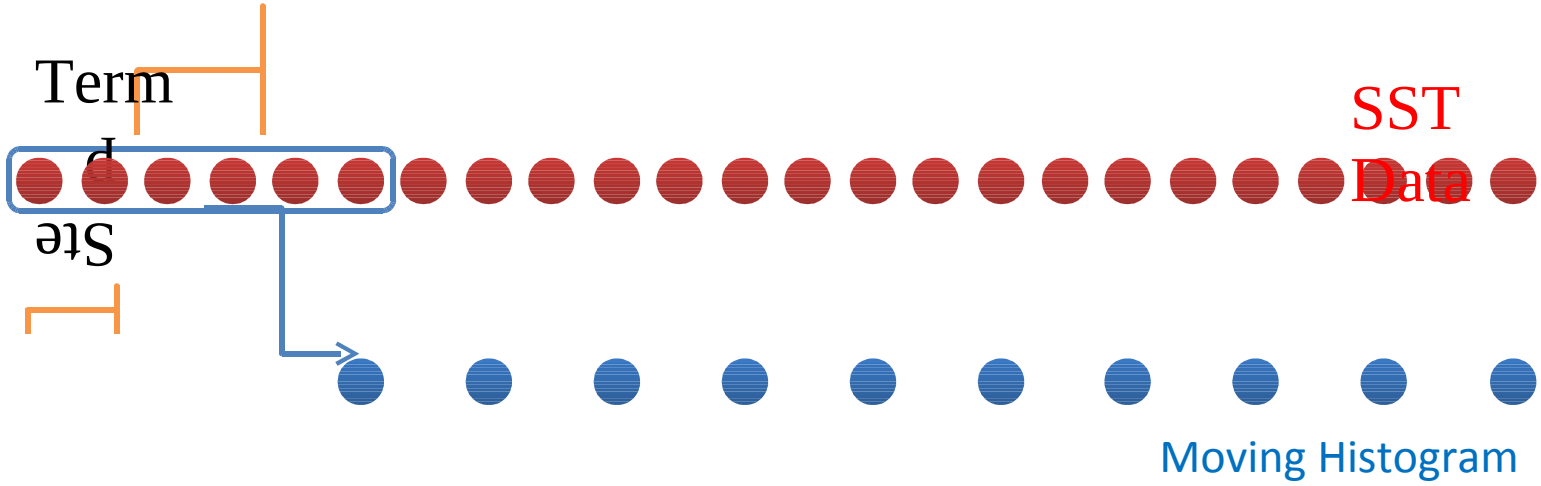


Tan Island Sensors →

DATA ANALYSIS

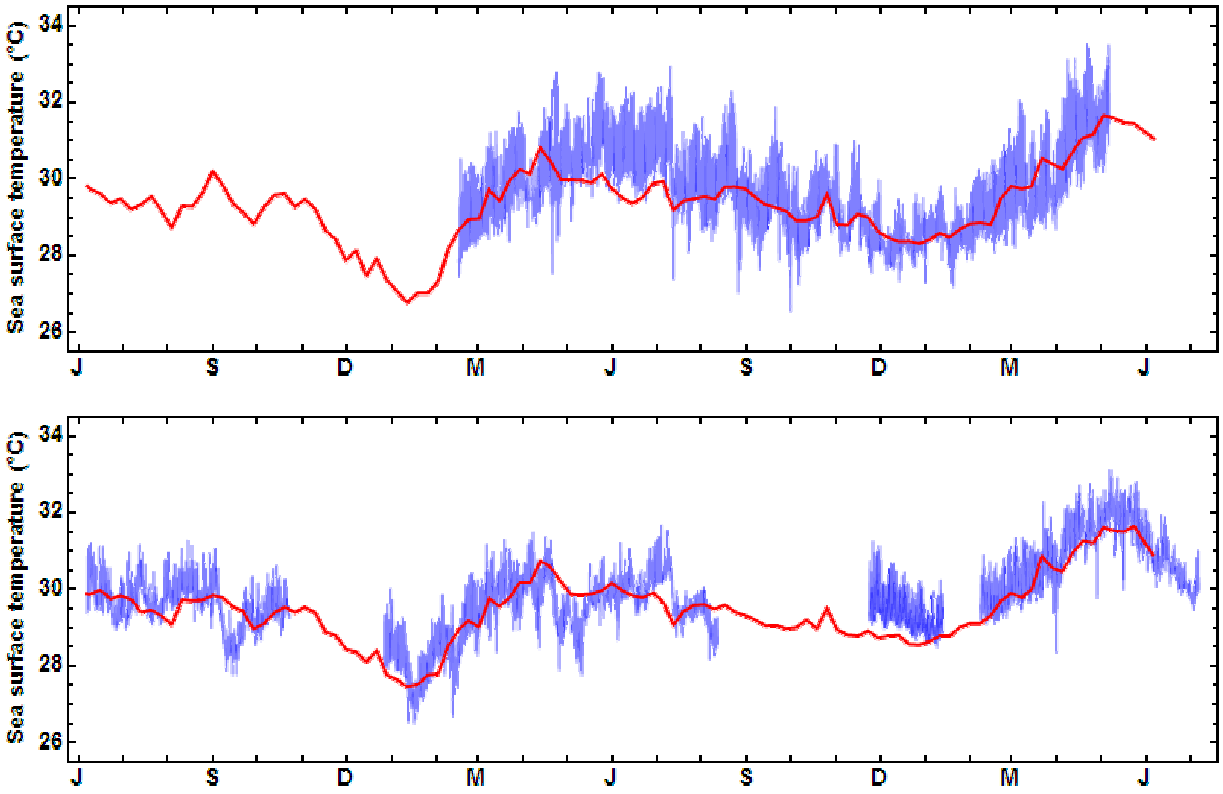


MOVING HISTOGRAM



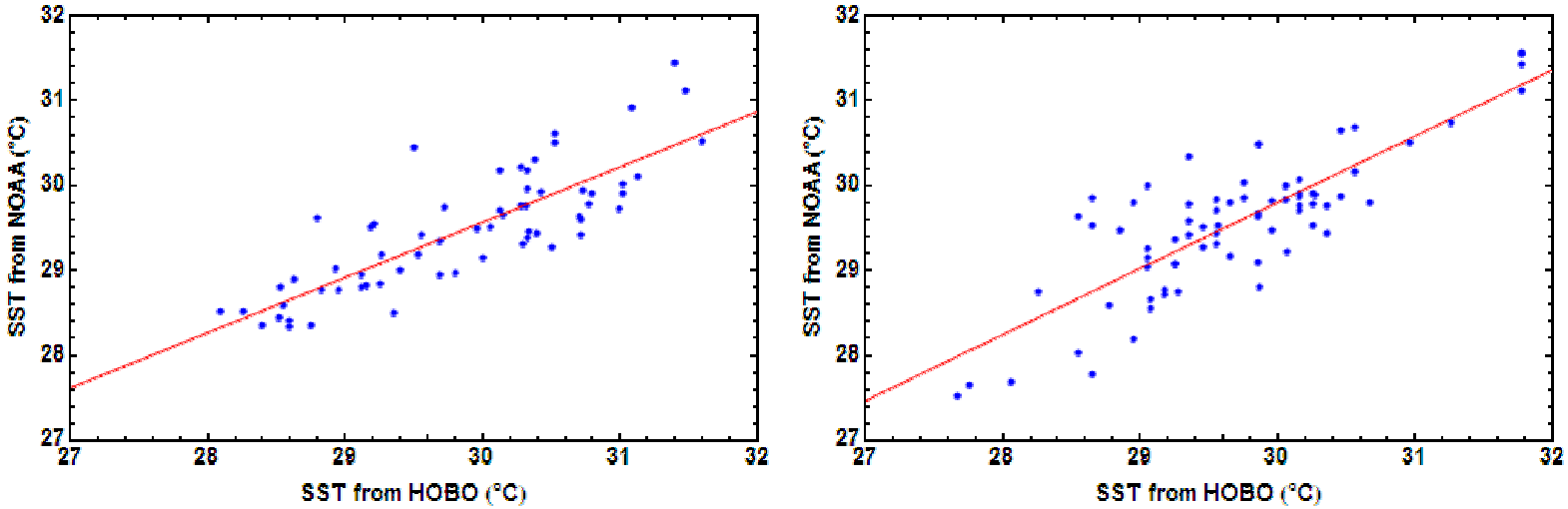
The most difficult part of this study!

RESULTS



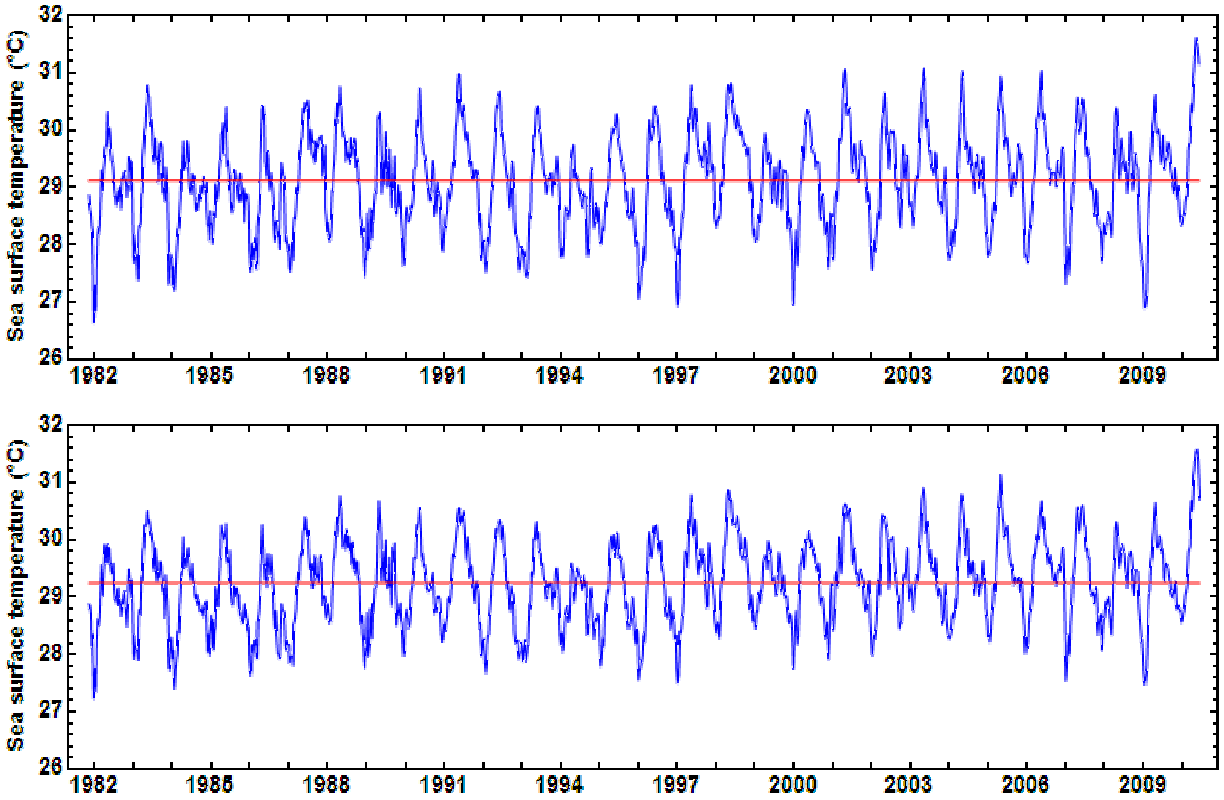
SST from HOBO (blue line) and NOAA (red line) at Tan Island in the Gulf of Thailand (16 Feb 2009-7 May 2010) (top) and Racha Island in the Andaman Sea (7 June 2008-7 July 2010) (bottom).

RESULTS



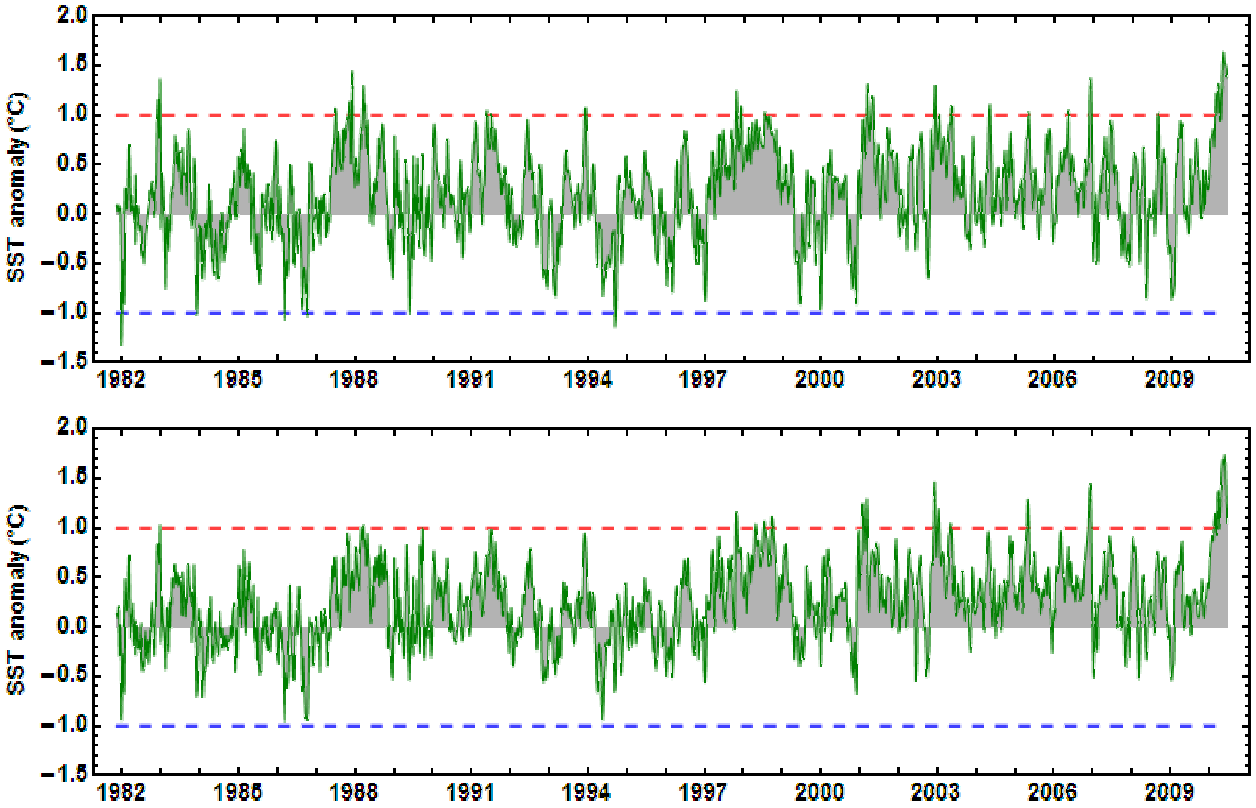
SST from the HOBO data loggers was positively correlated with SST from satellite derived NOAA website at both islands (Pearson's correlation: Tan Island: $r62 = 0.824$, $P < 0.001$; Racha Yai Island: $r77 = 0.866$, $P < 0.001$). Therefore, SST from NOAA were used to analyse the moving histogram.

RESULTS



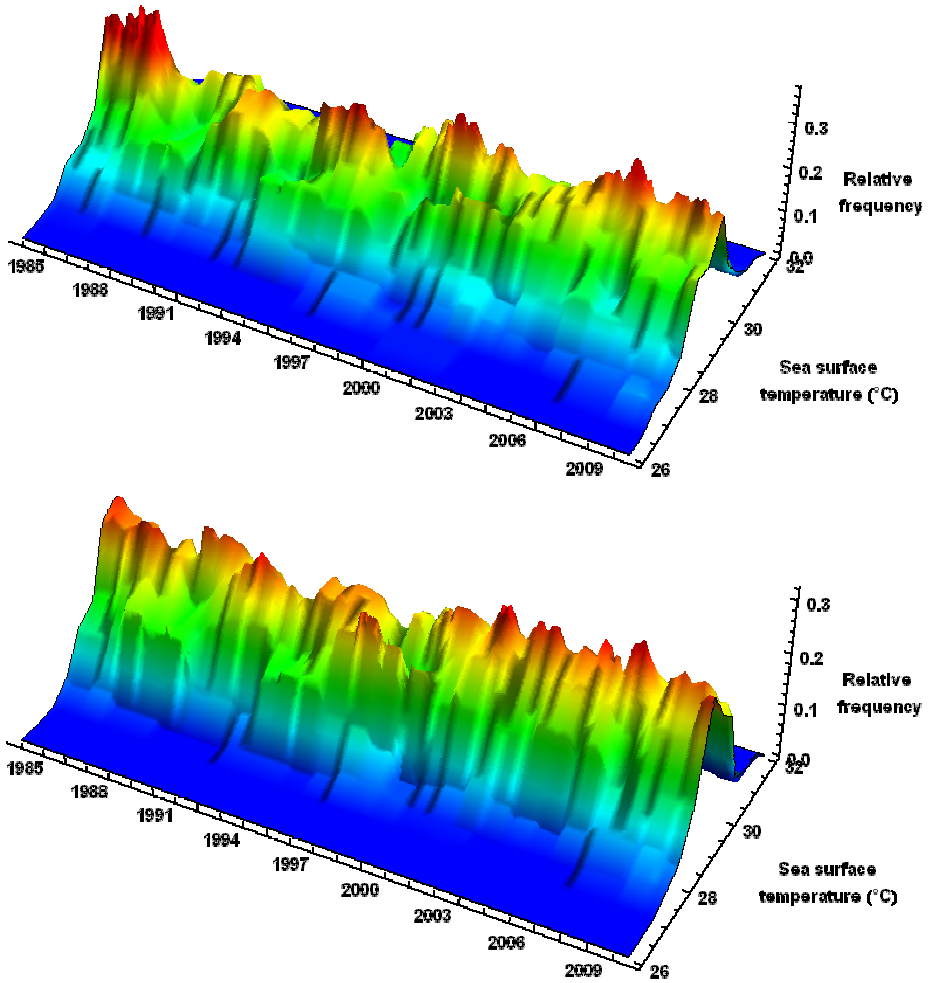
SST from NOAA during 1981-2010 at Tan Island (top) and Racha Island (bottom). Red line represents mean SST.

RESULTS



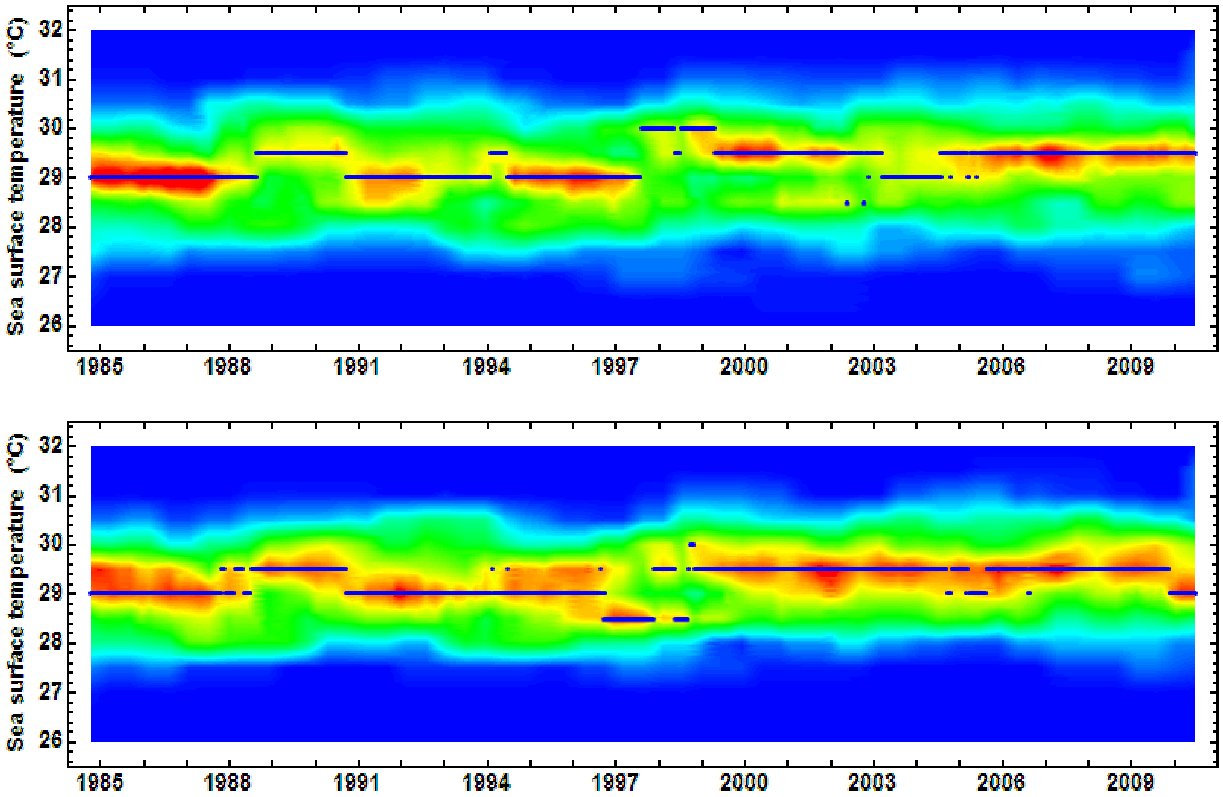
SSTa from NOAA during 1981-2010 at Tan Island (top) and Racha Island (bottom). SSTa value that lies outside the range of -1.0 to 1.0 °C may cause coral bleaching events.

DISCUSSION



3D moving histogram at Tan Island (top) and Racha Island (bottom).

DISCUSSION



SST contour moving histogram at Tan Island (top) and Racha Island (bottom). Blue dots represent SST modes.

CONCLUSION

- SST moving histogram can be used to explain mechanisms of coral bleaching events **better than the mean SST**.

- SST moving histogram can show the **frequency of SST** in all temperature intervals, especially during 1997-1998 where the distribution of SST is the **bimodal distribution**, not the **normal distribution**. Moreover, moving histogram can be used with **SSTa** to determine the **coral bleaching rate**.

- SST moving histogram can be used to predict mass coral bleaching events. Mass coral bleaching events are likely to occur when there are **sudden increases in SST over a short period** or **a small increase over a long period** due to **ENSO every 5 years**.

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