

Analysis of Multiscale Ultrahigh Resolution (MUR) Sea Surface Temperature Data Sets

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CSU STAR 2011

Mentor: Dr. Jorge Vazquez

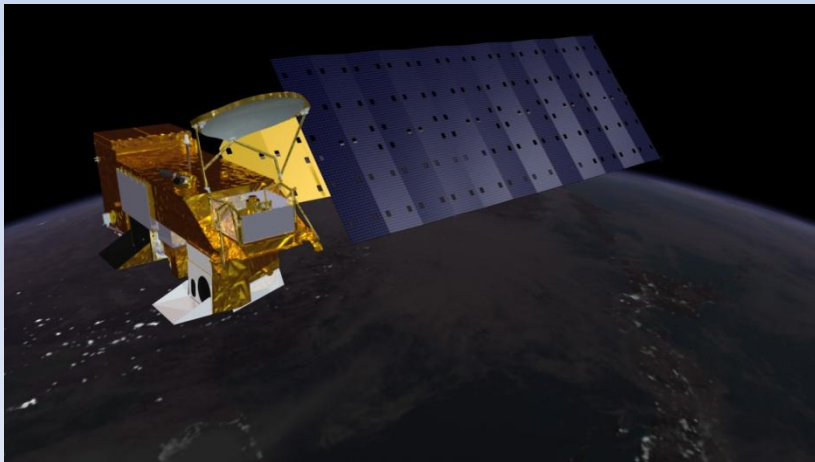
Co-mentor: Dr. Edward Armstrong

Project Outline

- Objective
- Background
- Methods
- Data
- Analysis
- Conclusion
- Acknowledgements

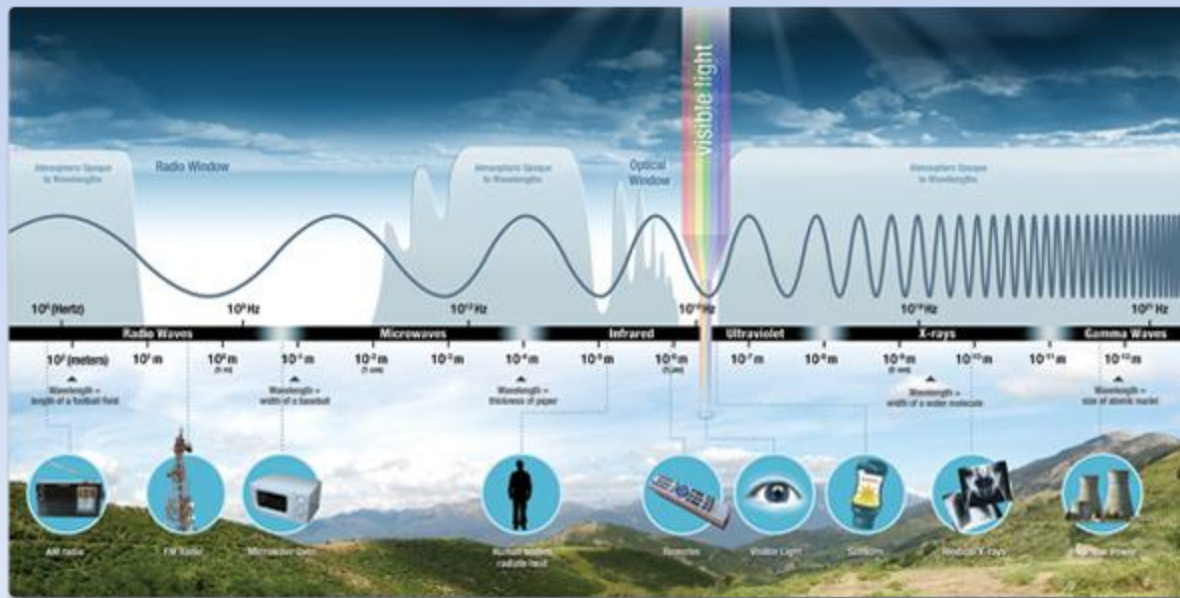
Project Objective

- To determine which spatial resolution of satellite-derived MUR version 2 data best reflects ocean buoy sea surface temperatures:
 - 1 km spatial resolution (i.e. HIGH RESOLUTION)?
 - 9 km spatial resolution (i.e. LOW RESOLUTION)?



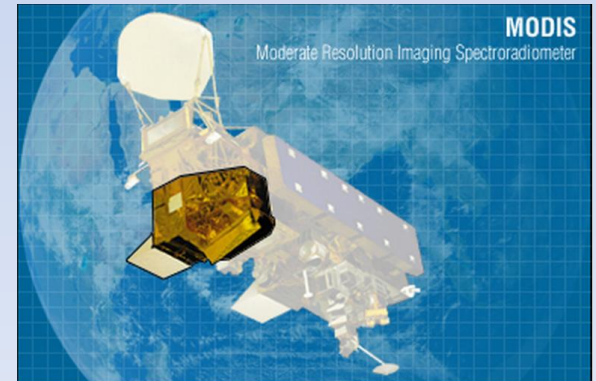
Background: MUR Version 2

- MUR is one of NASA's newest SST products, developed by Dr. Mike Chin
- MUR combines data taken from both
 - Infrared radiation sensors (limited by cloud coverage)
 - Microwave radiation sensors (limited by resolution)



Background: GHR SST

- The study is a part of an international effort by the Group for High Resolution Sea Surface Temperature (GHR SST) to provide high resolution SST data in a uniform format and with a complete description of errors (e.g. bias, standard deviation)
- GHR SST data includes both NASA/NOAA sensors which are used to create the MUR data:
 - Moderate Resolution Imaging Spectroradiometer (MODIS)-NASA
 - The Advanced Very High Resolution Radiometer (AVHRR)-NOAA
 - Advanced Microwave Scanning Radiometer - Earth Observing System(AMSRE)-NASA



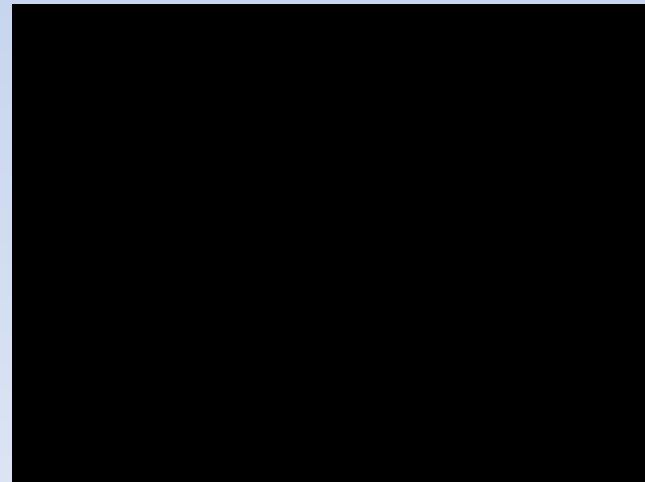
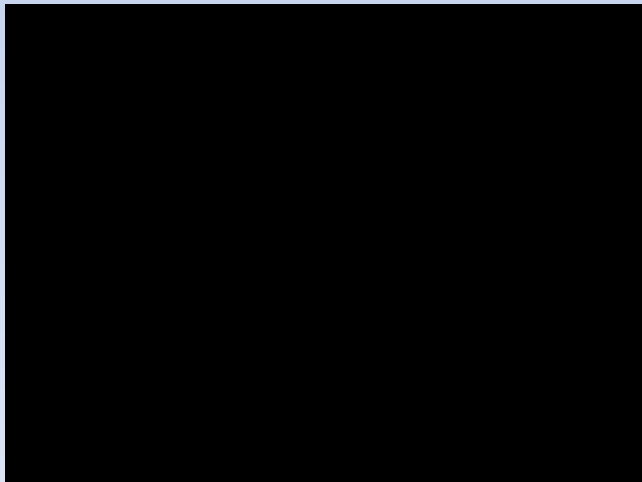
Why is this the study of SST important?

- The National Oceanic and Atmospheric Administration (**NOAA**) has defined SST as an “essential climate variable” (ECV)
- In order to study climate change, scientists must have climate data that does not have a bias between buoy-derived SST and satellite-derived SST.

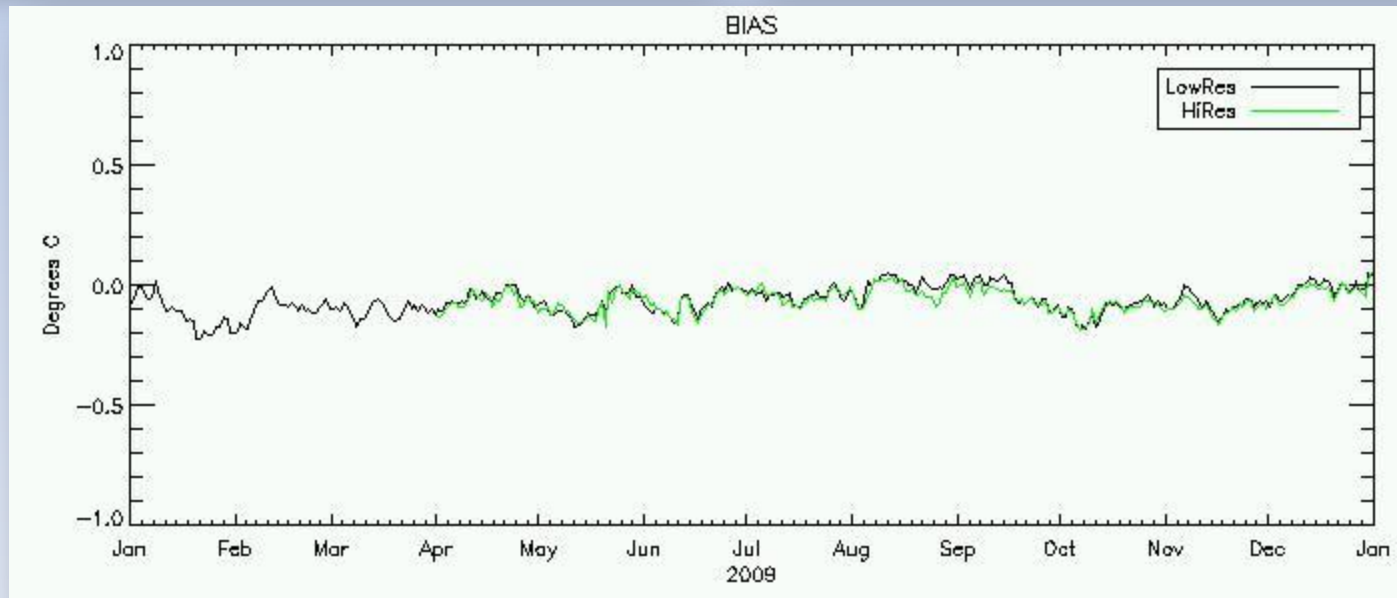
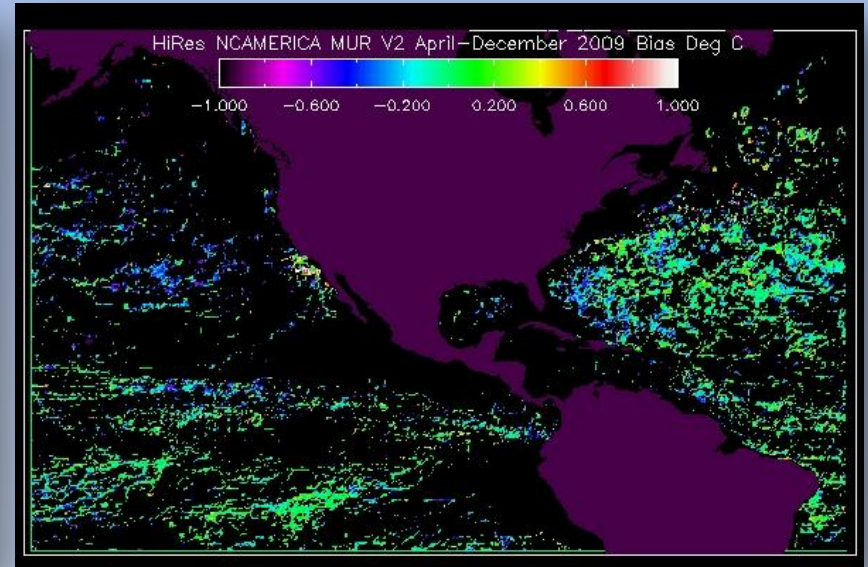
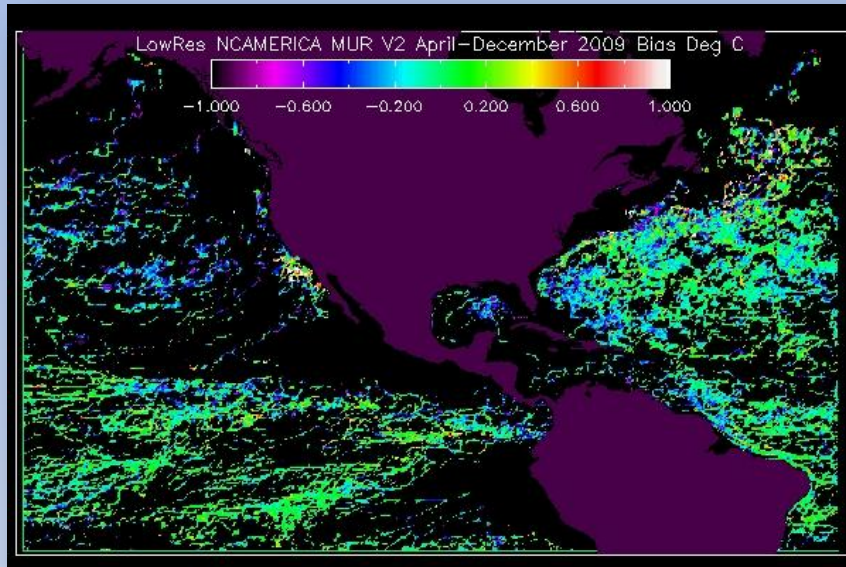
Methodology

Use three IDL validation codes to compare mean bias and standard deviations of low resolution and high resolution data over the period of April 1 – December 31, 2009, for the following oceanic regions

- Oceans surrounding North and Central America
- The California Coast (major region of upwelling)
- The Gulf Stream (major region of ocean heat transport)

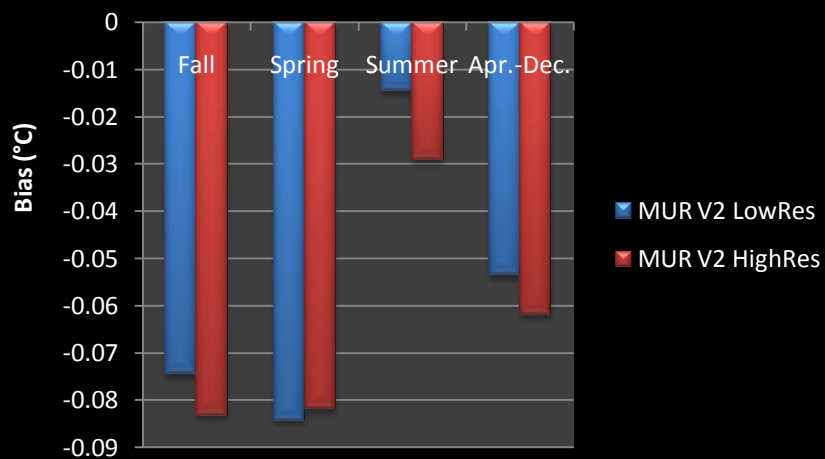


North and Central America

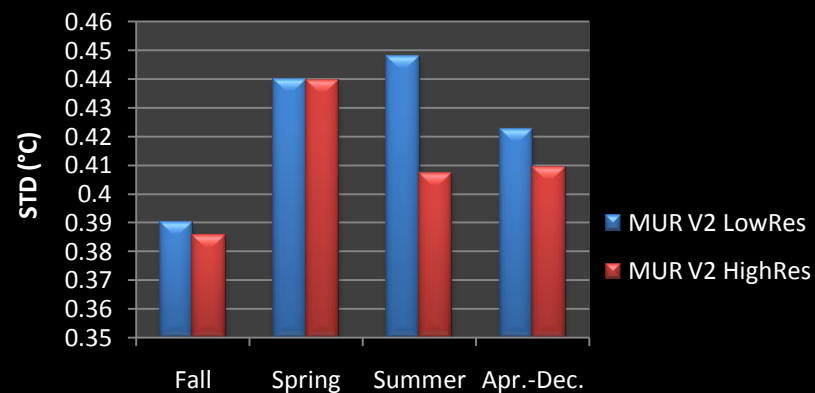


North and Central America

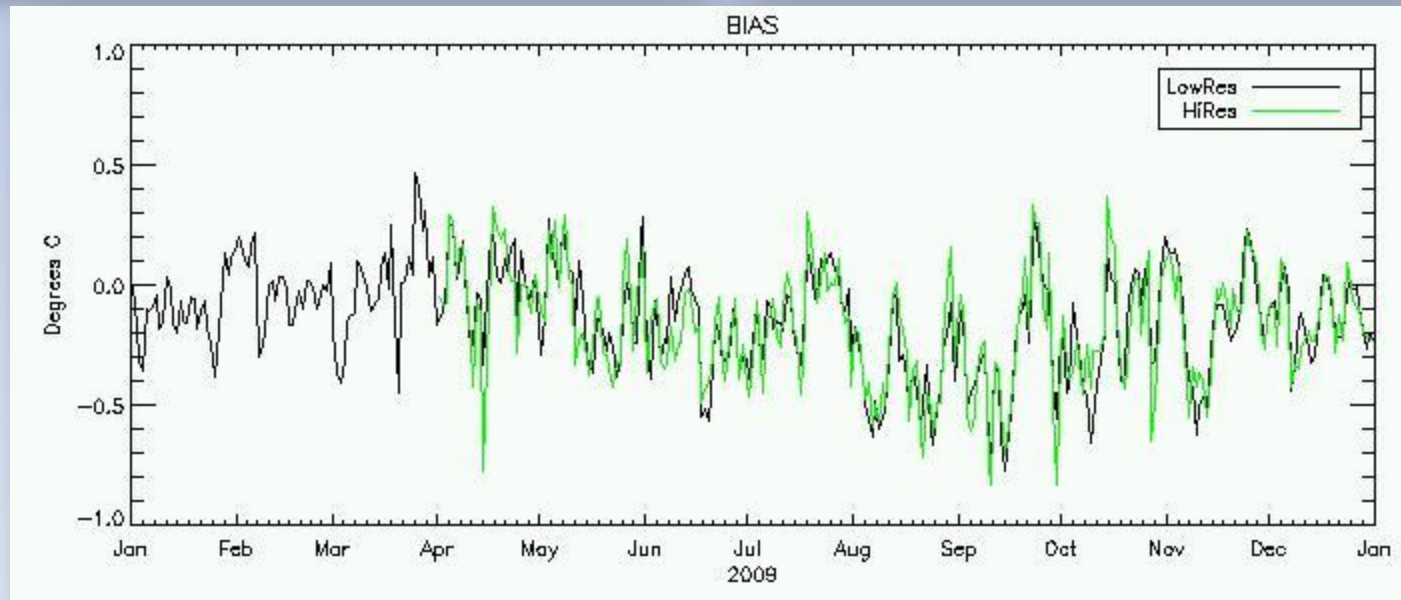
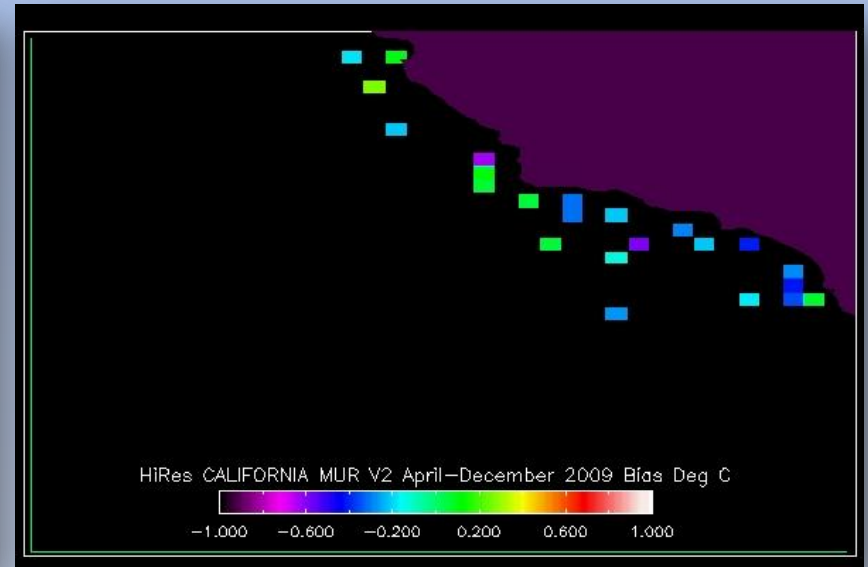
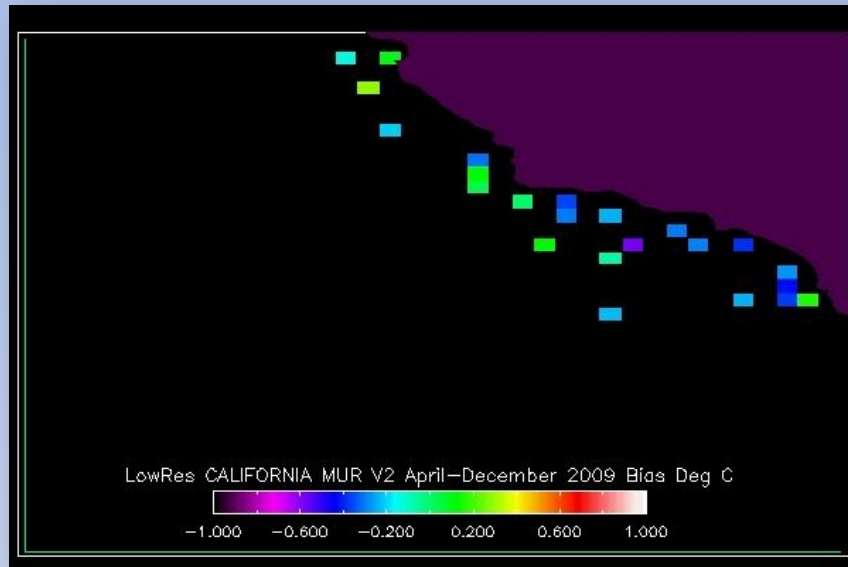
NCAMERICA (Drifting Buoys)



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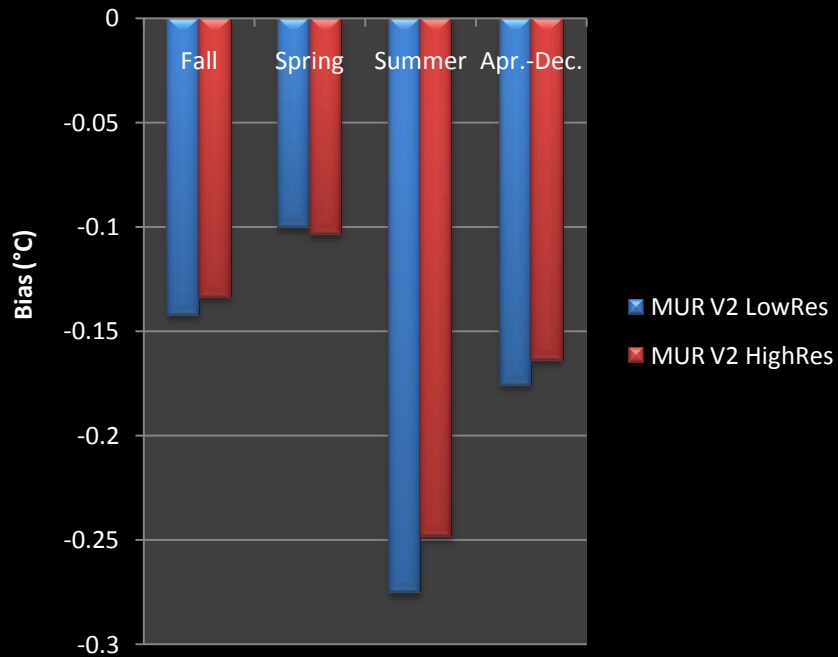


The California Coast

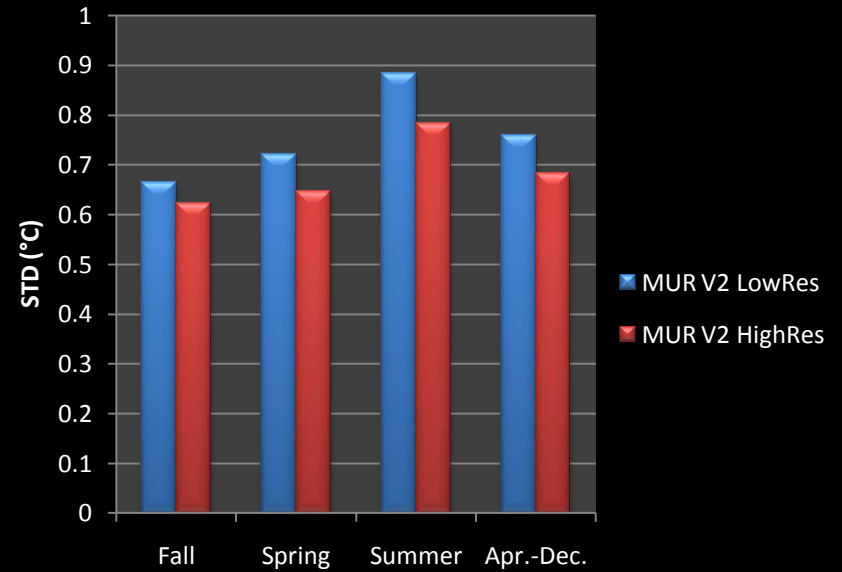


The California Coast

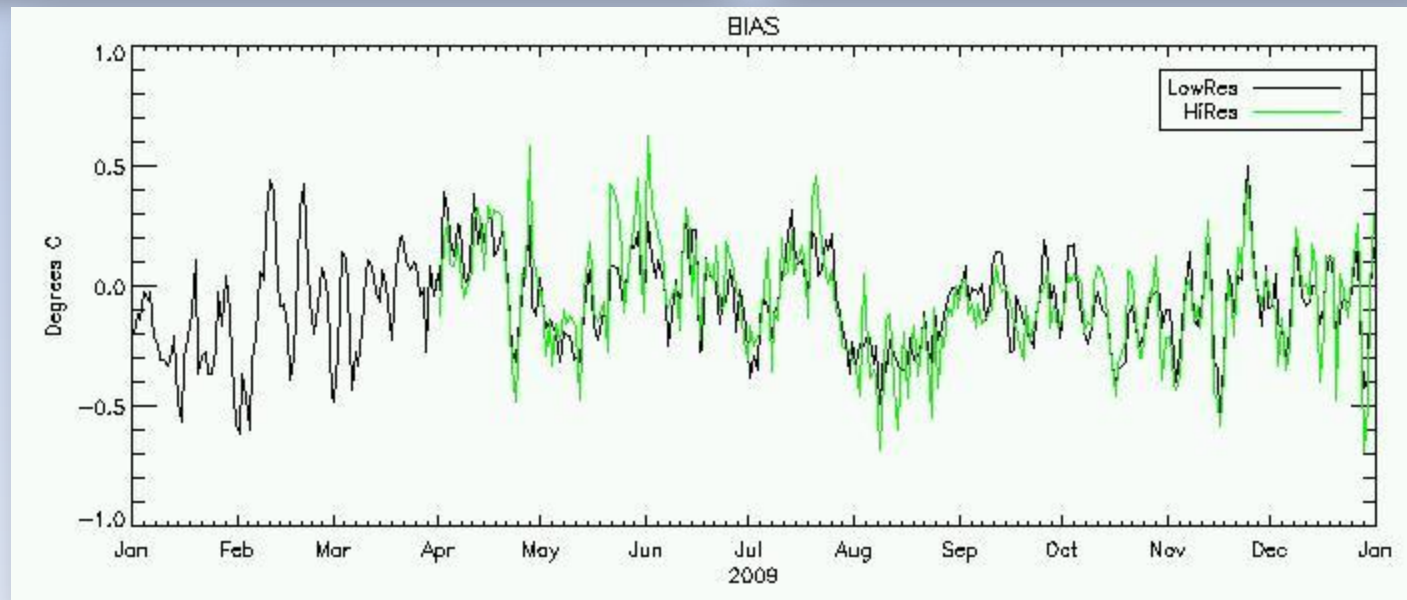
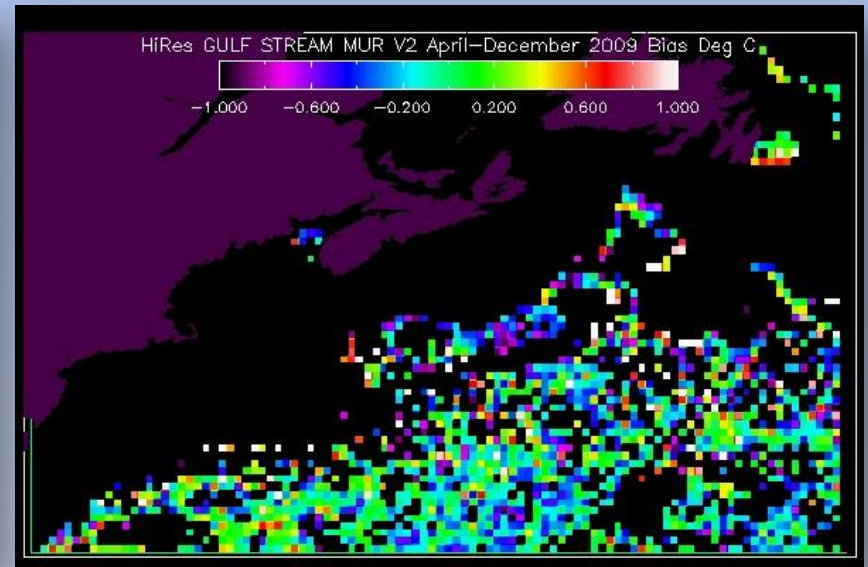
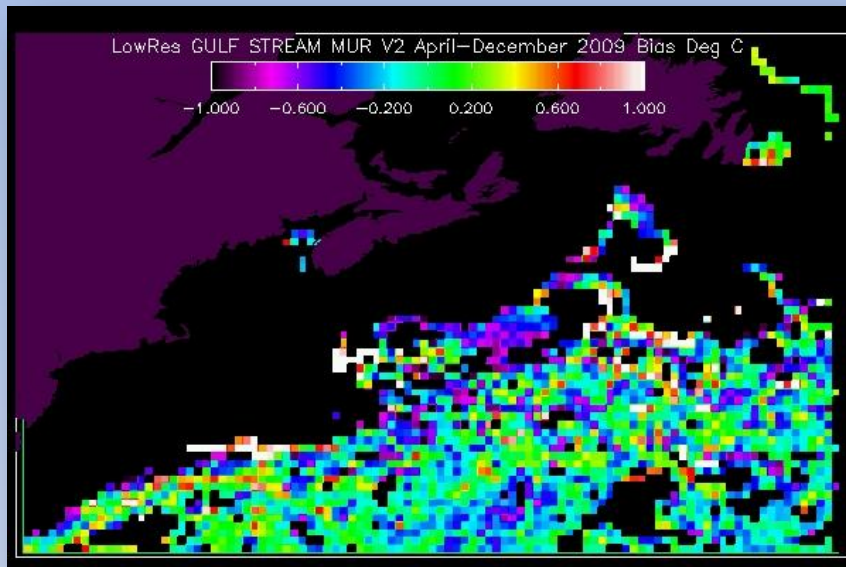
California Coast (Fixed Buoys)



California Coast (Fixed Buoys)

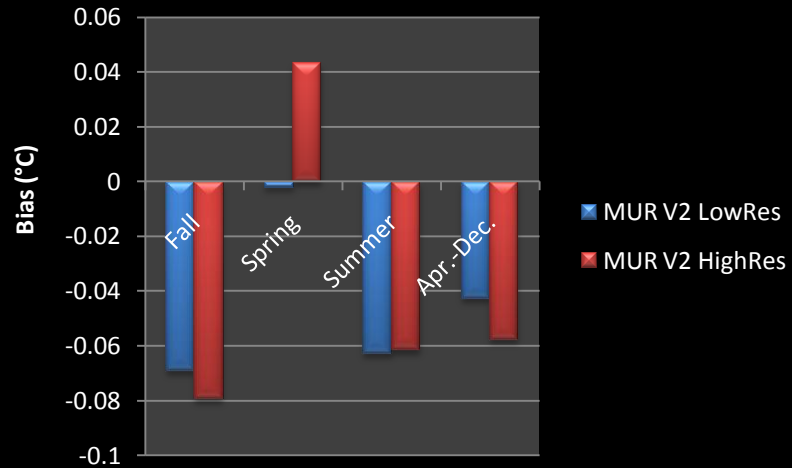


The Gulf Stream

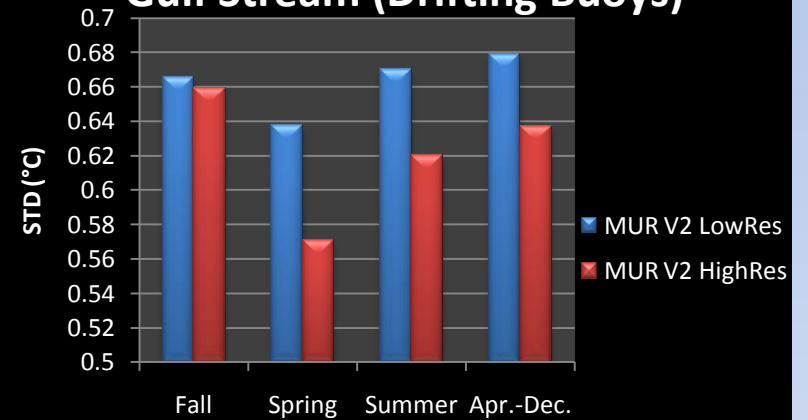


The Gulf Stream

Gulf Stream (Drifting Buoys)



Gulf Stream (Drifting Buoys)



Conclusion

- Over the entire NCAMERICA region, including the oceans off the coast of California and in the Gulf Stream, the higher resolution dataset has consistently smaller bias and standard deviation values
- Off the coast of California, the largest biases and standard deviation values occur during times of upwelling.

Future Work

- Compare the high resolution and low resolution data sets using the same exact grids
- Look more carefully at the seasonal differences between HiRes/LowRes datasets in terms of their biases and standard deviations
- Better understand what is causing the bias to be +/- in certain geographic locations

Acknowledgements

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