Climatology to Assess Cold Events in the Florida Keys
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ABSTRACT
A cloud filter developed by Hu et al. (2009) for high-resolution Advanced Very High Resolution Radiometer (AVHRR) Sea Surface Temperature (SST), based on the short- and long-term SST variability was tested during anomalous temperature events. Raw images were reprocessed using autonomous cloud filtering and manual delineation. As such, it was determined that the Hu et al. filter underperformed in nearly 20% of images. Improved SST climatologies indicate anomalies of up to 12°C during the cold event in January, 2010, especially in the Florida Bay region, with high spatial heterogeneity throughout. By enhancing the high-resolution SST climatology, this study highlights the need for improved autonomous cloud masking techniques.

RESULTS
• Of 2,703 images, 489 (18.4%) required reprocessing
• Automatic filter improperly masked warm and cold valid SST data
• Largest differences between climatologies seen in shallow environments, especially Florida Bay/Thousand Islands region
• When regressed with matched in situ NDBC data, hybrid filter improves coverage range and error estimates

VALIDATION

CLIMATOLOGY DIFFERENCE

TEMPERATURE COVERAGE

COLD EVENT PERFORMANCE

DISCUSSION
• Climatology based filter underperformed in nearly 1 of 5 images
• Most improperly filtered data within ~20 m isobath
• Thin clouds especially difficult to detect and appropriately mask
• Hybrid method improves range and performance of cloud filter, but is impractical for widespread implementation
• Improved climatology shows extreme (up to 12°C) SST anomaly during January 2010 cold event
• Minimum temperatures (~4°C) well below stress & mortality thresholds for corals, sea turtles, manatees, seagrasses, mangroves, fishes and others
• 11 day duration of improper cloud filtering (Jan 6 - 16)
• High spatial SST heterogeneity throughout study region
• Improved autonomous filter likely requires integration of AVHRR data with expanded network of in situ stations reporting in near real-time
• “Skin” temperature may not be biologically relevant at depth

RELEVANT LITERATURE & ACKNOWLEDGEMENTS

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