1. Title Slide

Title: **Assimilation of VIIRS SSTs and Radiances into Level 4 Analyses**

Authors and Affiliations

Andy Harris	*UMD-CICS*
Jonathan Mittaz	*UMD-CICS*
Robert Grumbine	*NCEP/EMC/MMAB*
Mark Eakin	*NOAA Coral Reef Watch*
Eileen Maturi	*NOAA/NESDIS/STAR/MECB*

Topics: *Non-convective forecasting applications*

Program: *JPSS RR/PG*

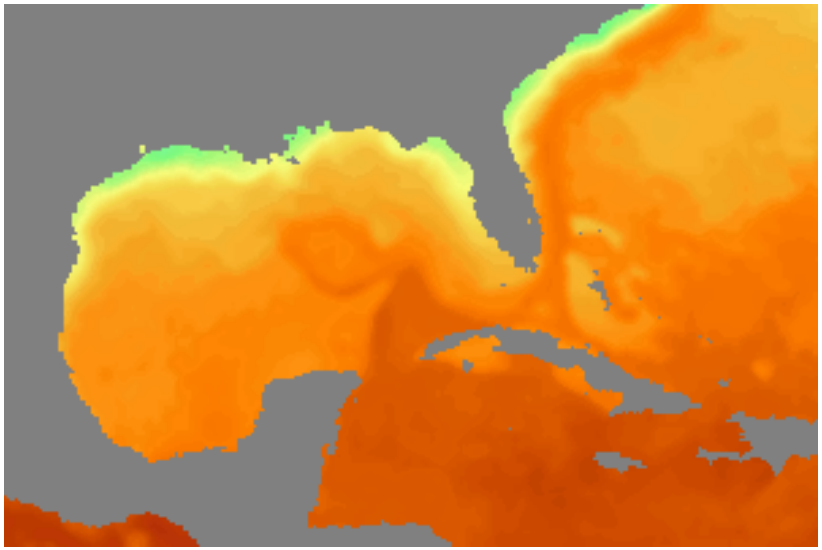
2. Introduction

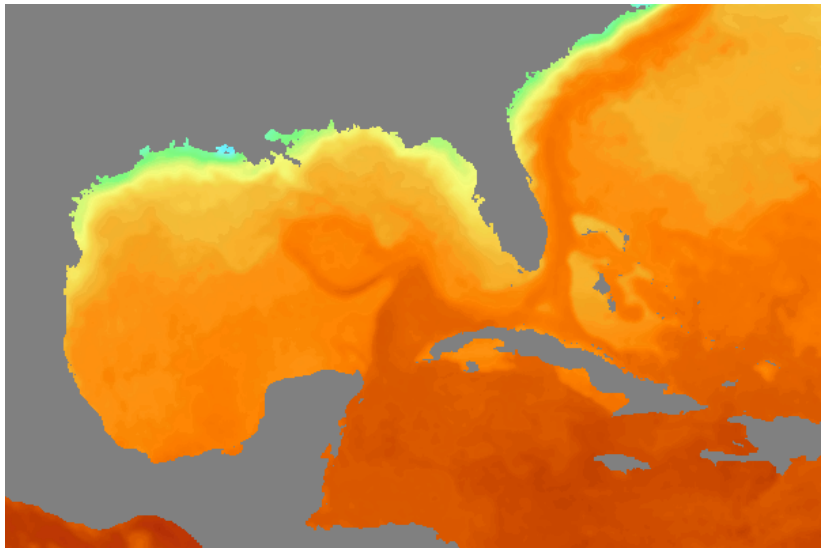
- Accurate high resolution sea surface temperature analyses have a critical role
  - operational weather and ocean forecasting
  - ecosystem assessment, tourism and fisheries research
- One such application is Coral Reef Watch
  - only known global early-warning system
  - Monitors environmental stressors that threaten the health of coral reef ecosystems
- This project addresses improvements to two major analyses produced by NOAA
  - Real Time Global SST product (RTG)
  - Geo-Polar blended product
  - Used by NWS, OPC, Coral Reef Watch, Oceanic Heat Content product, CoastWatch & OceanWatch

3. Methodology/Expected Outcomes

- Use VIIRS as input to two SST analyses, the RTG and the Geo-Polar blended product
- Improvements are likely to be significant given that VIIRS is a much better characterized and less noisy sensor than those currently used in the analyses
  - Should lead to immediate improvements in the analyses
- Higher spatial resolution *cf.* AVHRR GAC SST → improvements in the data ingested
  - Reduction in data noise: effective VIIRS NeΔT will be further improved by spatial averaging over each analysis grid cell
  - Greatly increased number of pixels per analysis cell → extra QC to remove any residual cloud contaminated observations

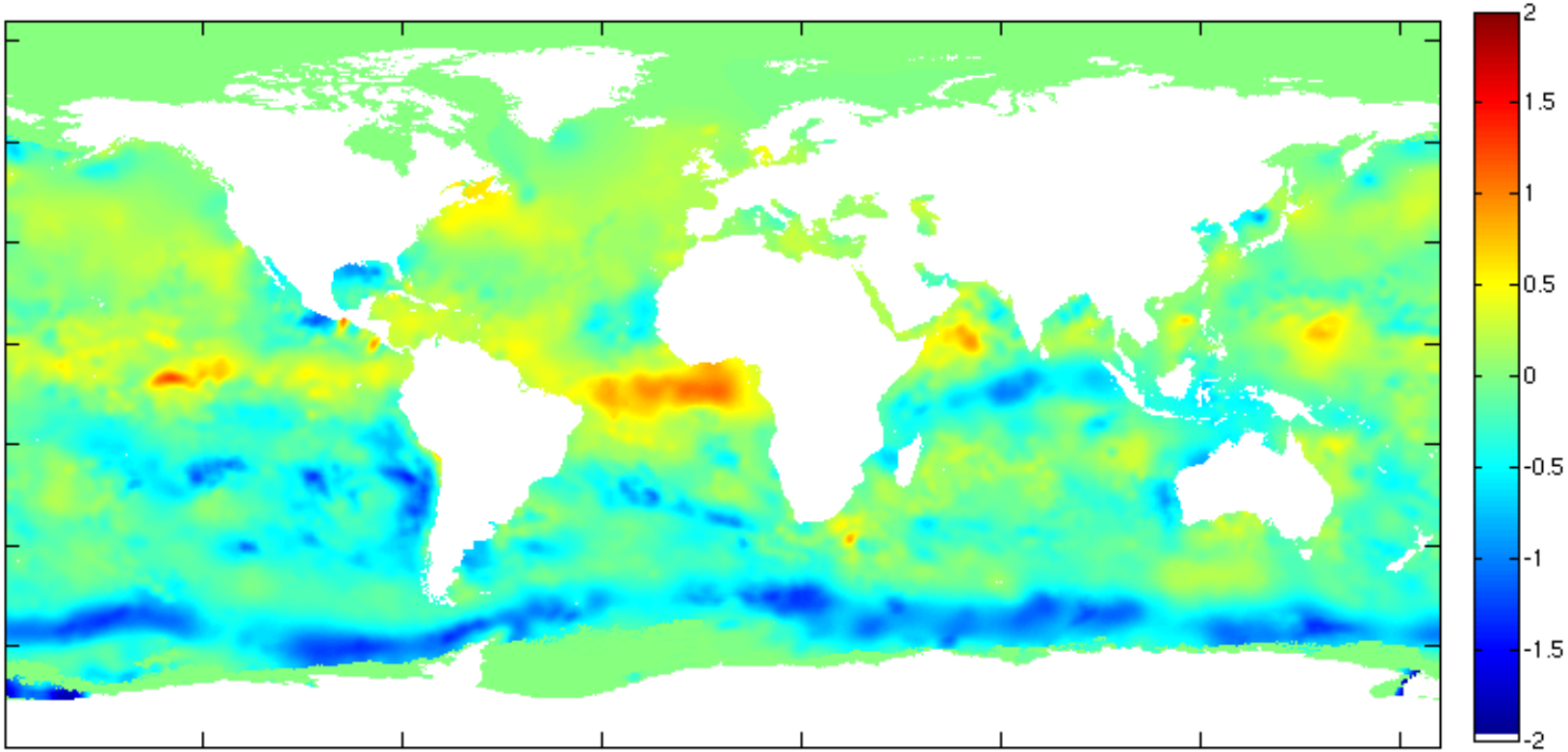
4. Results





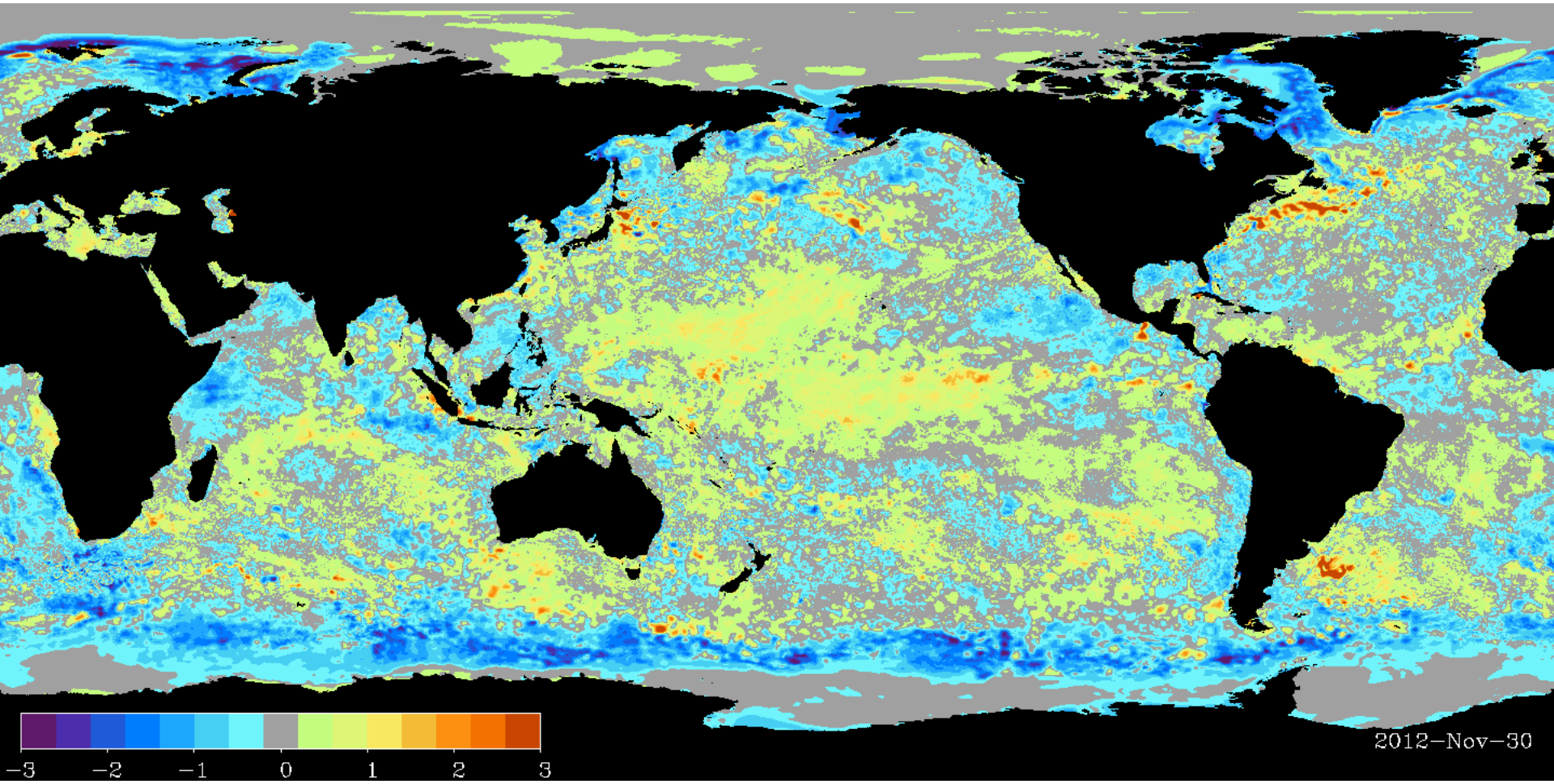
- Example of improvement in feature resolution with 0.05°×0.05° Geo-Polar analysis (right) *cf.* 0.1°×0.1° (left)
  - Definition of coastal features and shallow areas is much improved
  - Analysis grid resolution is related to true resolving power
- How accurate are the actual analysed SSTs?
  - Satellite data require bias correction prior to analysis step

4. Results (cont'd)



- Typical bias correction field NOAA-19 AVHRR (nighttime)
  - Mostly within ±1 K
  - Related to large-scale geophysical phenomena (*e.g.* biomass burning aerosol off Africa)
  - Large bias in Southern Ocean (see next slide)
- Anticipate reducing these biases with VIIRS data

4. Results (cont'd)



- Typical map of Geo-Polar SST – Daily-OI ¼° SST
- Note large-scale bias in Southern Ocean
- Satellite bias corrections (prev. slide) derived w.r.t. RTG

5. Possible Path to Operations

- Since both the RTG and Geo-Polar SST analyses are operational, the VIIRS data can be implemented as part of their operational input data streams
  - Geo-Polar SST will require implementation in NOAA/NESDIS/OSPO
  - RTG requires implementation in NCEP

6. Future Plans

- Investigation into the causes of observed “residual” biases in the VIIRS may lead to the following improvements in VIIRS EDRs
  - Improved VIIRS cloud detection
  - Improved VIIRS SST retrieval algorithms
- Also, improvements to analysis methodologies
  - Improved bias correction methodology for Geo-Polar SST
  - Improved bias correction for RTG SST
- Retrospective analysis of MODIS data (VIIRS precursor) for incorporation in reprocessed Geo-Polar SST
  - May be critical for anomaly-based applications (such as Coral Reef Watch) which require a long stable reference climatology

7. Publication List

- References
  - N/A
- Project Publications
  - N/A