



# Harmonized Observations and Data Products Research Challenges and Opportunities

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## SUMMARY

- Uniformly processed observations and data products will improve the credibility of the first World Ocean Assessment (WOA-I). The same data product would be examined in different geographical regions of the global ocean, including the Wider Caribbean Environment.
- Production of observations and data products of different ocean parameters for analyses in WOA-I should be harmonized to improve synergy in interdisciplinary analyses.
- The challenge is not the production of individual data products, but the generation of harmonized datasets to maximize the impact and benefit for scientific analyses and syntheses.



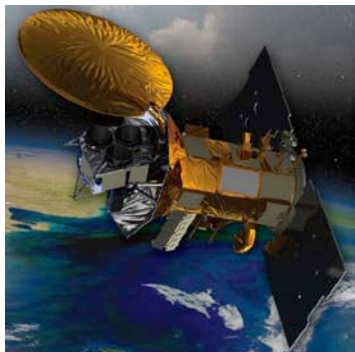
# Multiple Data Products of Same Observation

Example 1: Sea Surface Salinity (SSS)

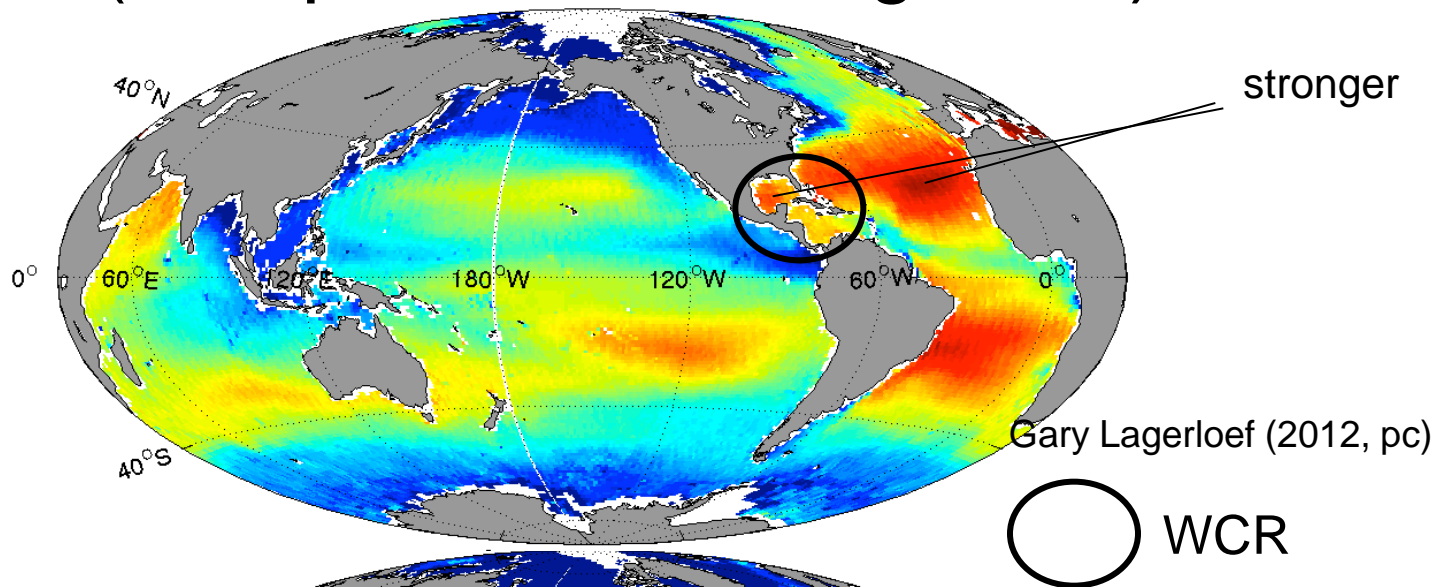


# Sea Surface Salinity

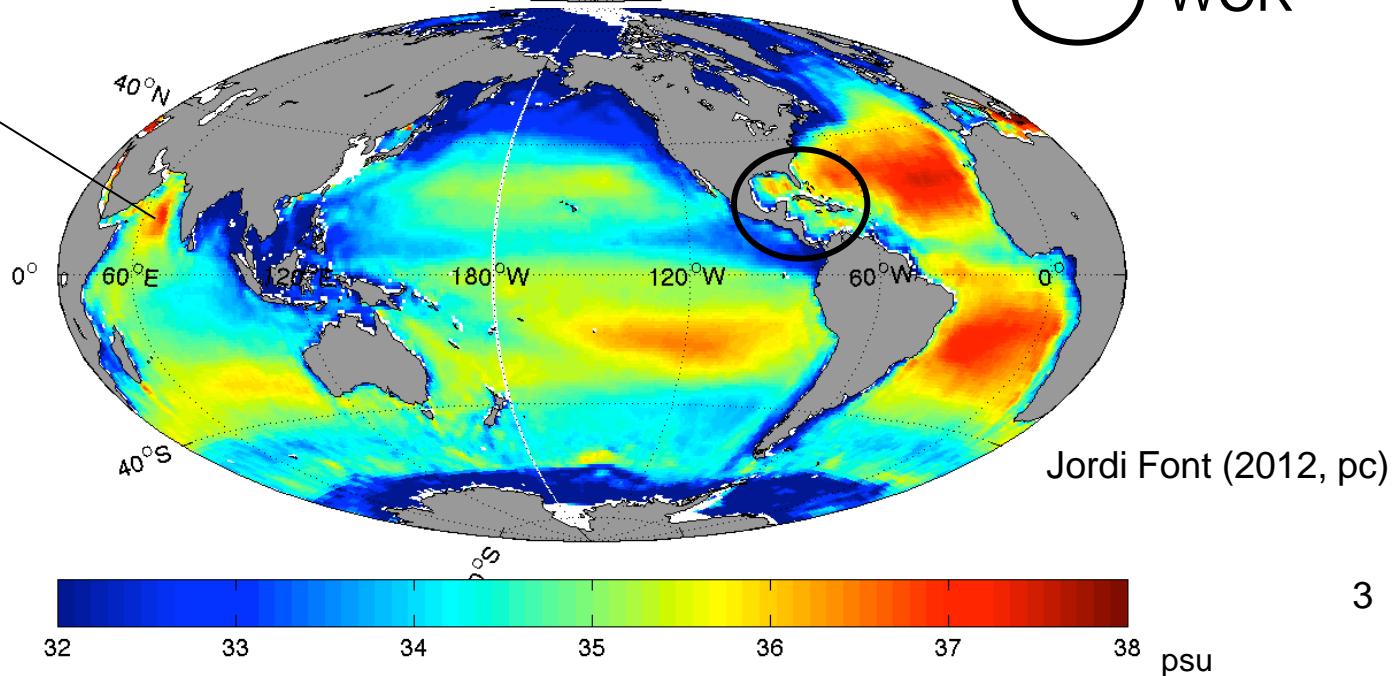
## Annual (1 Sep 2011 – 31 Aug 2012) Mean



Aquarius

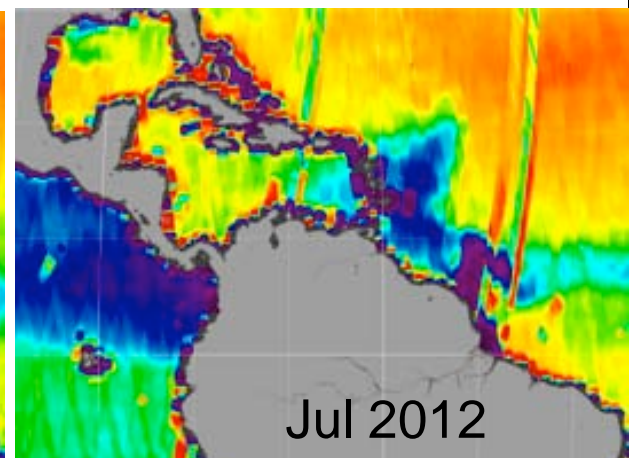
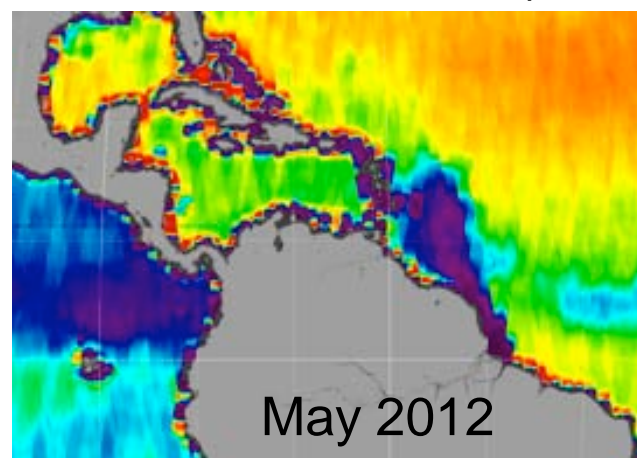
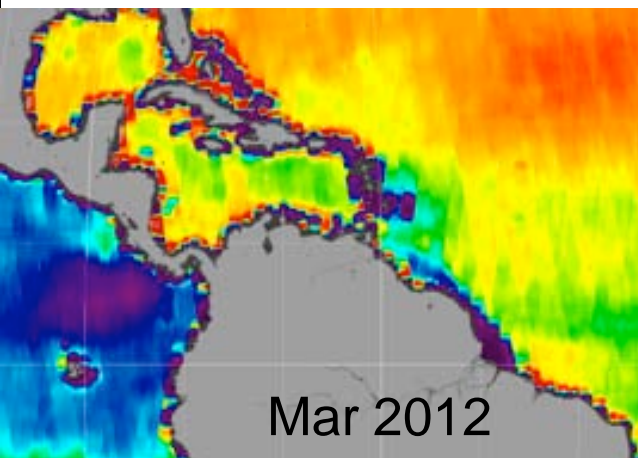
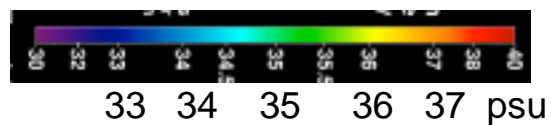
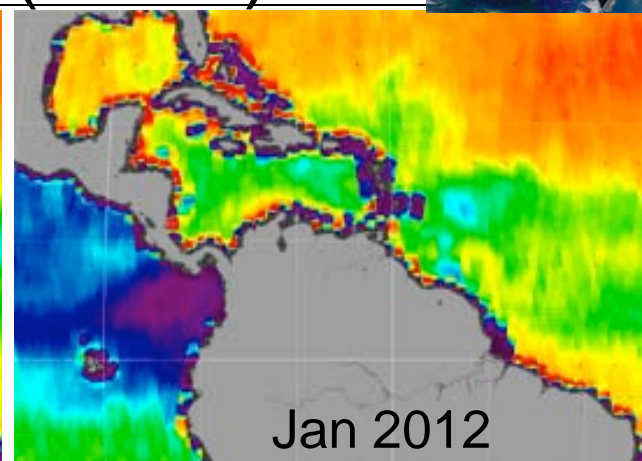
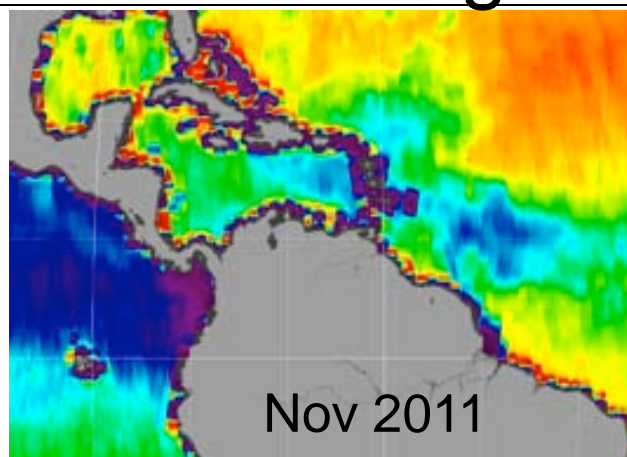
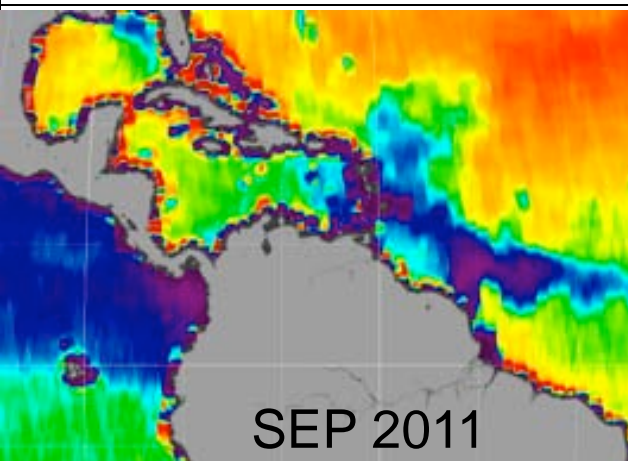
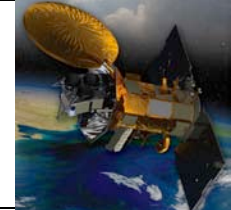


SMOS





# Annual Cycle of Aquarius SSS Wider Caribbean Region (WCR)



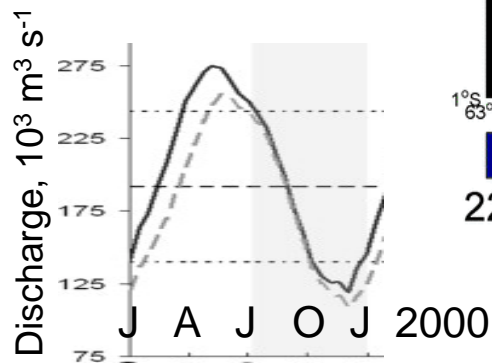
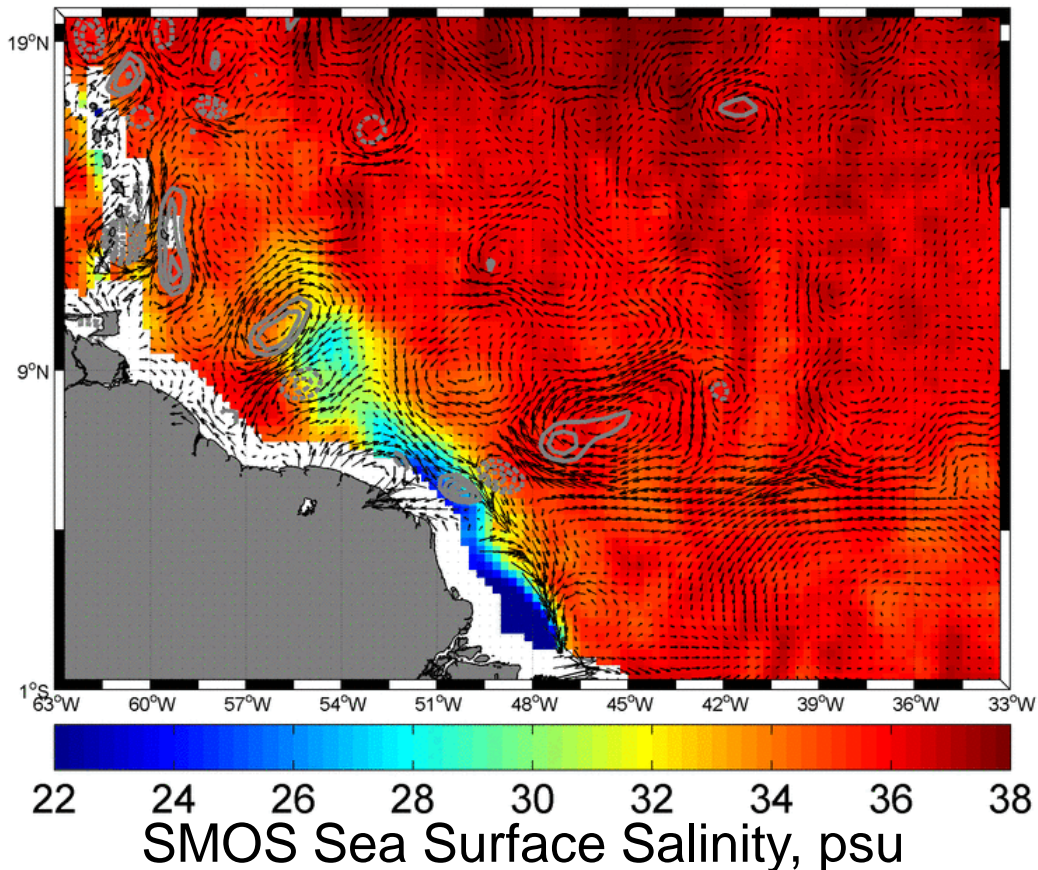


# Amazon River Outflow and North Equatorial Countercurrent

SSS = Sea Surface Salinity

SSS Averaged from Apr 20 through Apr 30 2011

↗  
Surface  
geostrophic  
current, from  
Jason satellite  
altimetry



Nicolas Reul (IFREMER/LOS, 2012, pc)



# Multiple Data Products of Same Observation

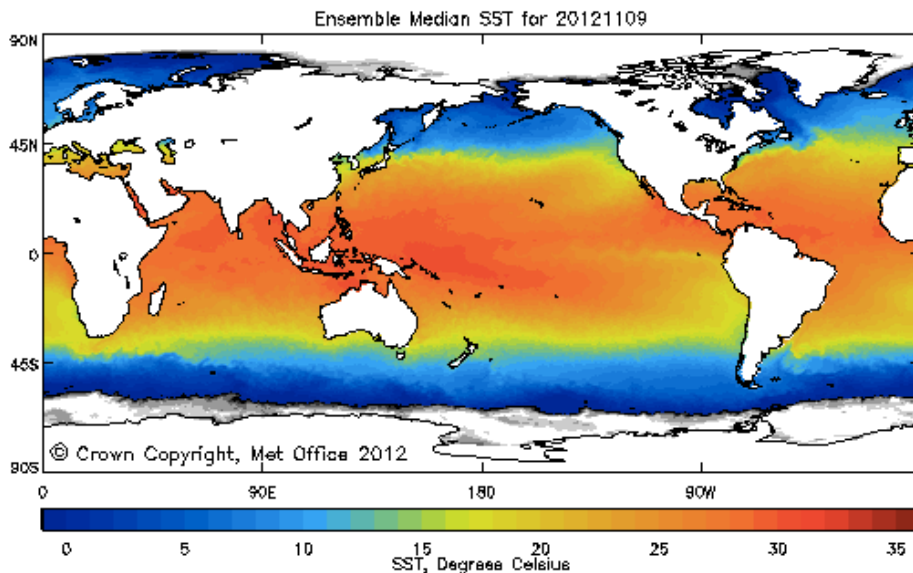
Example 2: Sea Surface Temperature (SST)



# Group on High Resolution SST (GHRSSST) Data Products

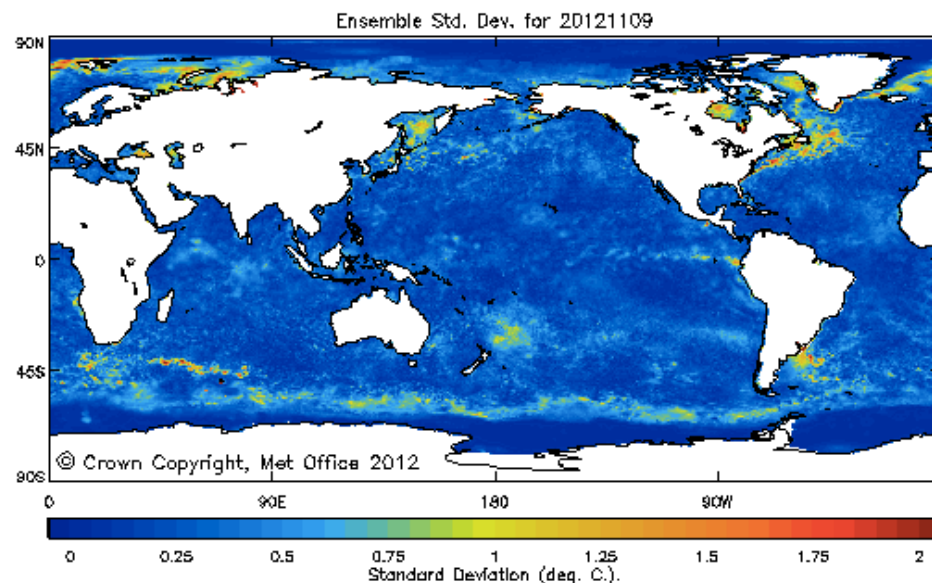
## GHRSSST Data Providers

- Met Office [UK]
- NCEP [US]
- NAVOCEANO [US]
- JMA [Japan]
- RSS-1 [US]
- RSS-2 [US]
- FNMOG [US]
- MERSEA [France]
- NOAA [US]
- CMC [Canada]
- BMRC [Australia]



Median

9 Nov 2012

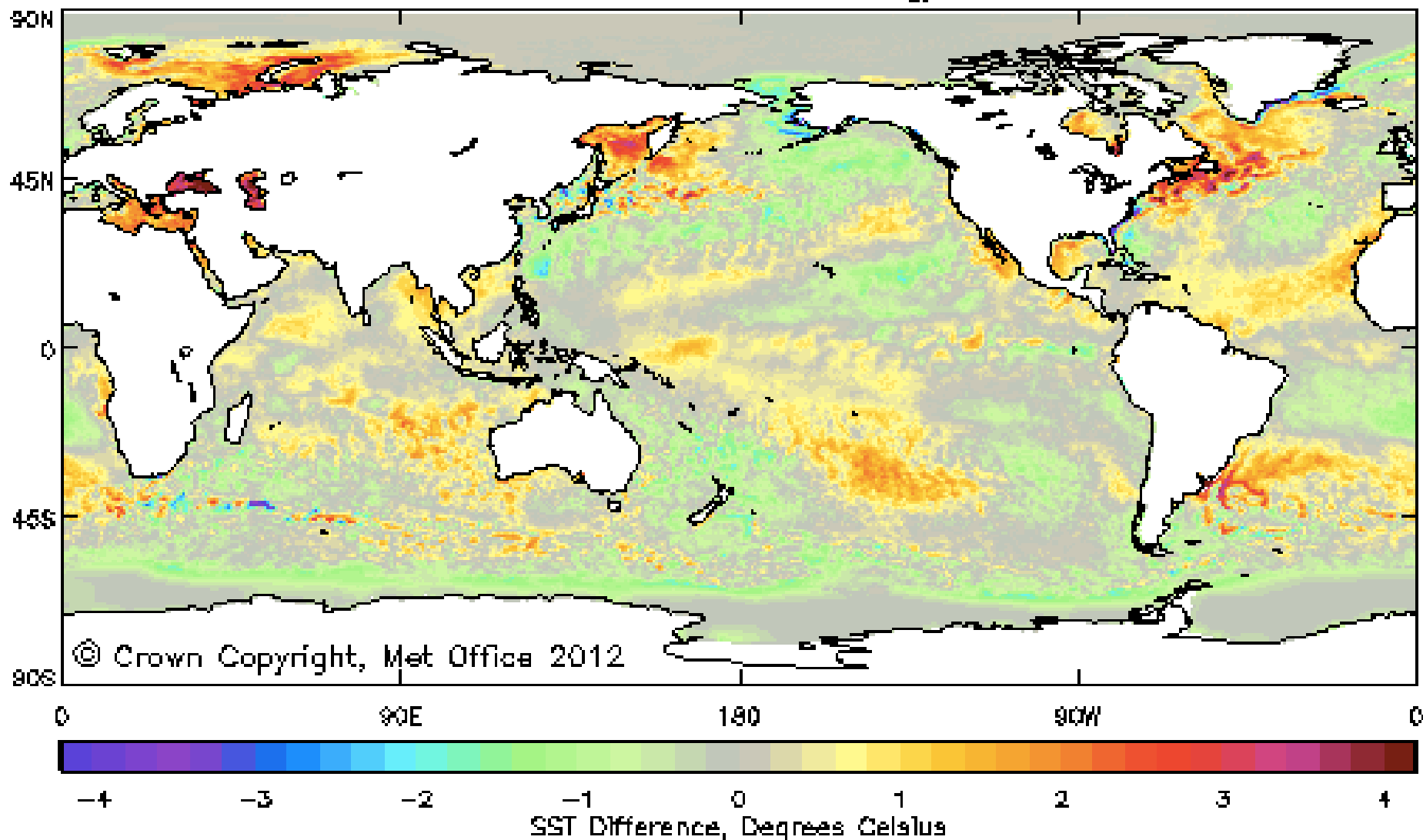


Std Dev



# GHR SST Ensemble Median - NCEP

Ensemble Median minus NCEP Clv2 climatology SST for 20121109







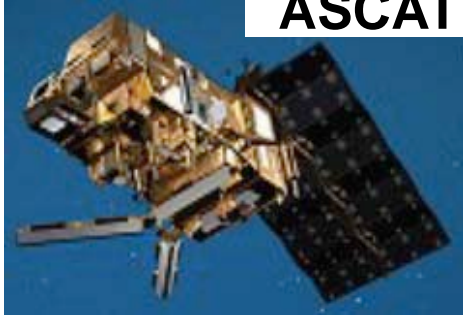
# Multiple Data Products of Same Observation

Example 3: Ocean Surface Vector Wind (OSVW)



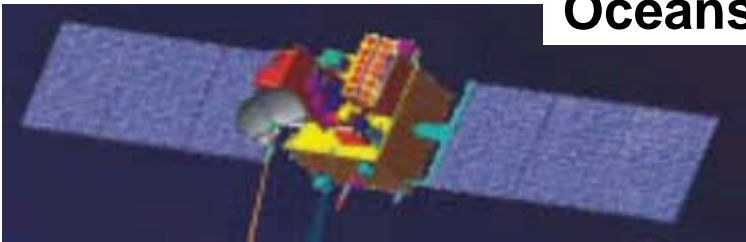
# Current OSVW Data Products

## ASCAT / Metop-A: Oct 2006 [C-band]



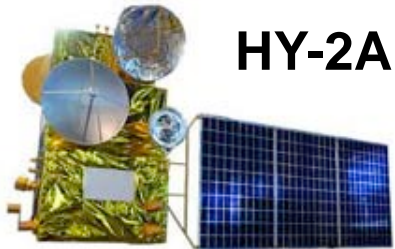
1B: EUMETSAT  
2B: COAPS, KNMI, NOAA, RSS

## Oceansat-2 SCAT: Sep 2009 [Ku-band]



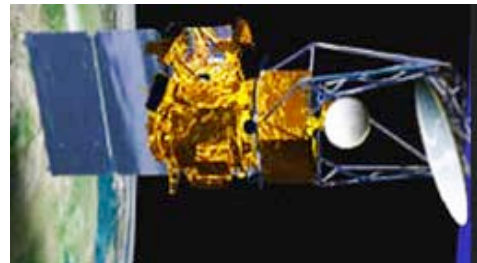
1B: ISRO  
2B: ISRO, KNMI, NOAA, JPL

## HY-2A SCAT: Aug 2011 [Ku-band]



1B: NSOAS  
2B: NSOAS

## WindSat / Coriolis: Jan 2003 [polarimetric radiometer]



1B: FNMOC  
2B: FNMOC, NOAA, RSS



# Caribbean Marine Atlas (CMA)

## Examples of CMA Products

- Hurricanes
- Earthquakes
- Bathymetry
- Sea surface temperature
- Sea surface salinity
- Chlorophyll-*a*
- Nitrates
- Phosphates
- Dissolved oxygen
- Wind
- Turtle Sightings
- Marine protected areas
- Climate model results
- Cities and towns
- Ports
- Tourism

Roach (2012, pc)

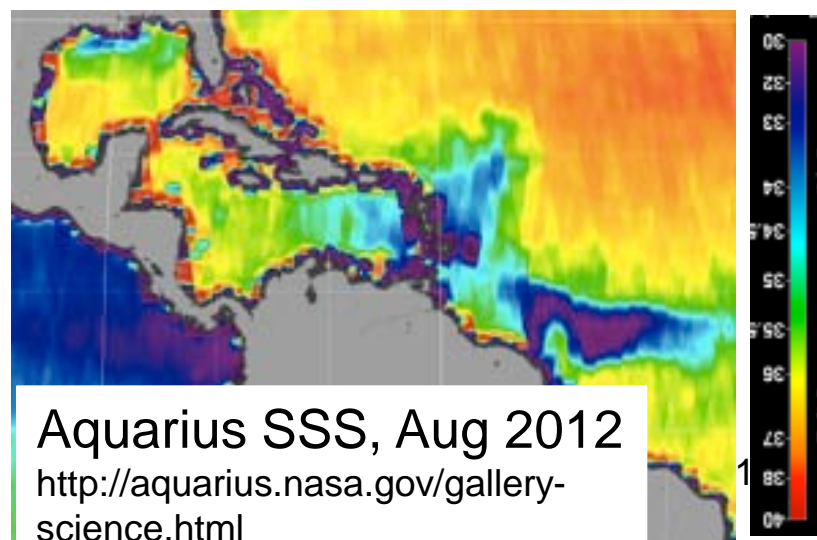
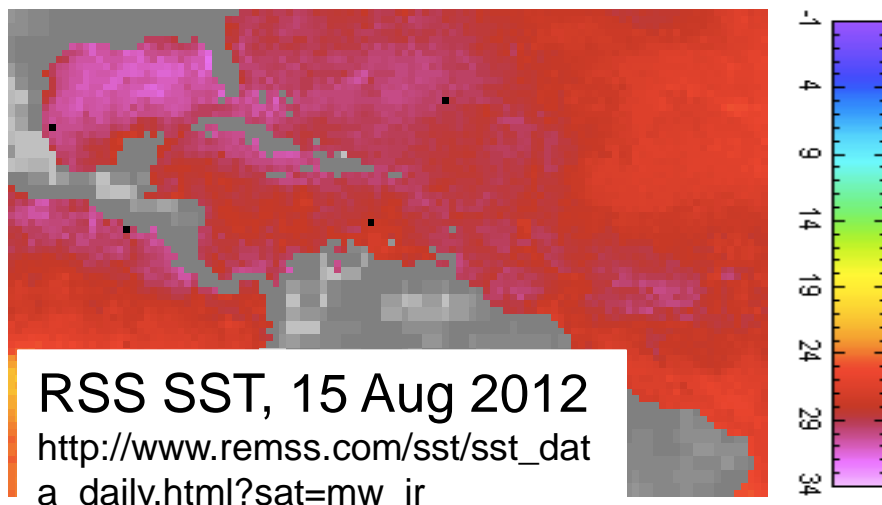
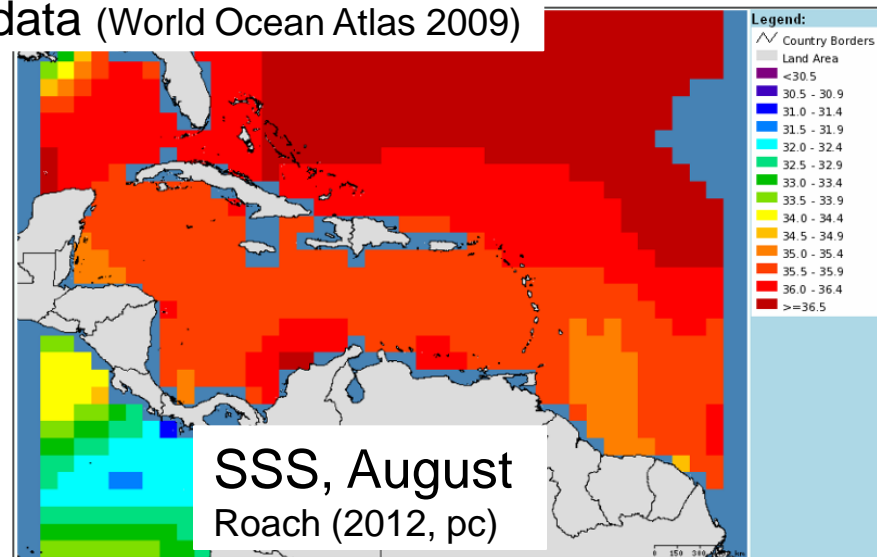
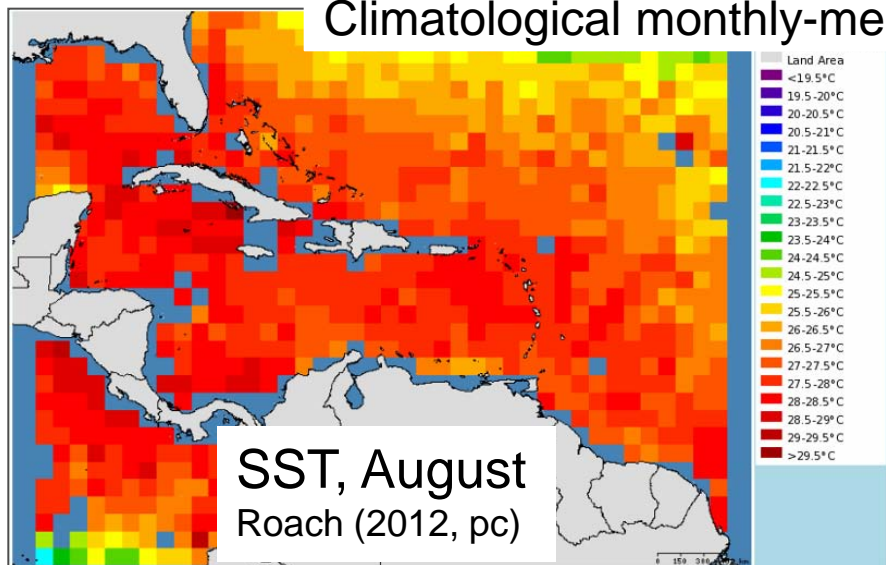


- ◆ CMA, an initiative of 9 Caribbean countries (Barbados, Cuba, Dominica, Grenada, Guyana, Jamaica, Saint Lucia, Trinidad and Tobago, and Turks and Caicos Islands), is coordinated by the Intergovernmental Oceanographic Commission (IOC) of UNESCO.
- ◆ The purpose of the CMA is to identify, collect and organize geospatial datasets into an atlas of environmental themes for the Caribbean region as a support service to the sustainable development and integrated management of marine and coastal areas in the region.
- ◆ 2007-2013



# Examples of CMA and Other Data Products

Climatological monthly-mean data (World Ocean Atlas 2009)





# Potential Way Forward

- Vision and Terms of Reference
  - IOC IODE would invite scientists to develop Vision and Terms of Reference for a dynamic international WCR atlas network to share ideas, data, tools, strategies and deliverables of an expanded CMA for research, operational and educational applications
- Principles
  - Provide best quality data products
  - Enhance interoperability, integration, coordination, and collaboration
    - common schemes for location, time, and spatial and temporal resolutions
    - common schemes for estimates of uncertainty, accuracy, and precision
  - Establish distributed system to reduce risk of single-point of failure
    - one institution with expertise in SST produces SST data product and another institution with knowledge on winds produces wind data product
    - no single source of funds and each data product is “locally” funded
  - Select data products through a science advisory board
    - Select data products through research on applicability for WCR
  - Generate climate-quality data products
  - Generate ocean forecasting services
  - Build capacity for utilization



# An Example of Successful Interoperability

Central Pacific RR

Union Pacific RR

W

E



DeNardis (2012)

10 May 1869 Promontory Summit, Utah Territory