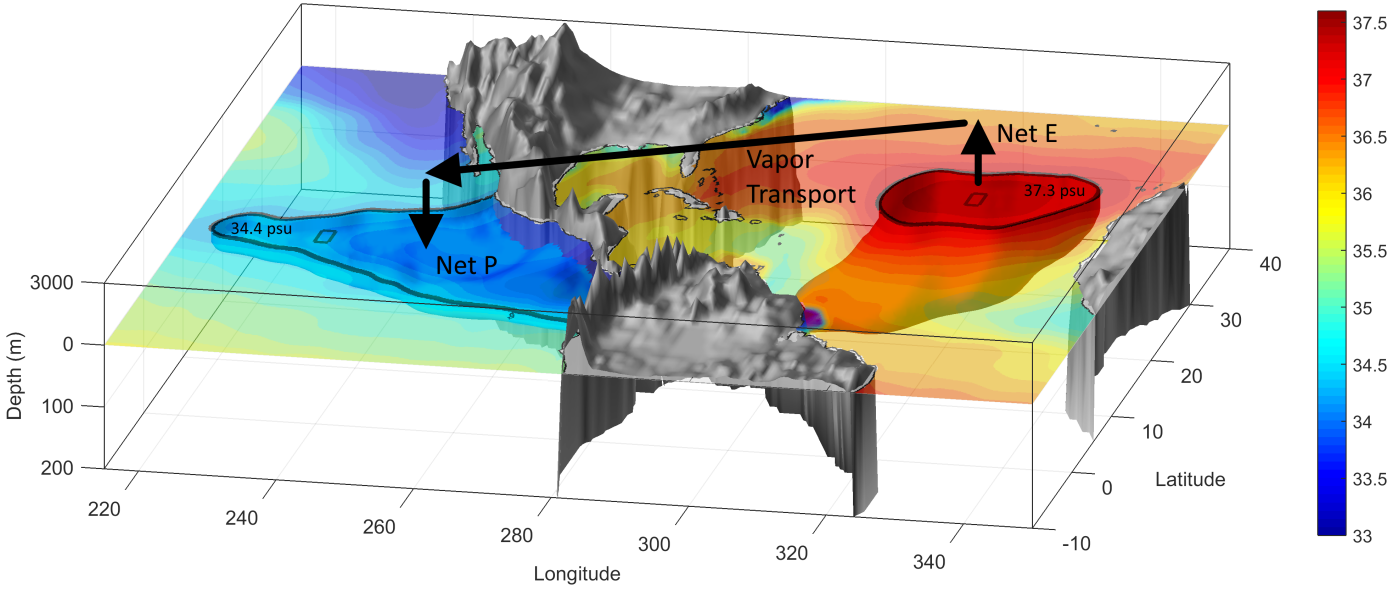
# SPURS-2 Plans


## Frederick Bingham

UNC - Wilmington

## Tom Farrar

Woods Hole Oceanographic Institution

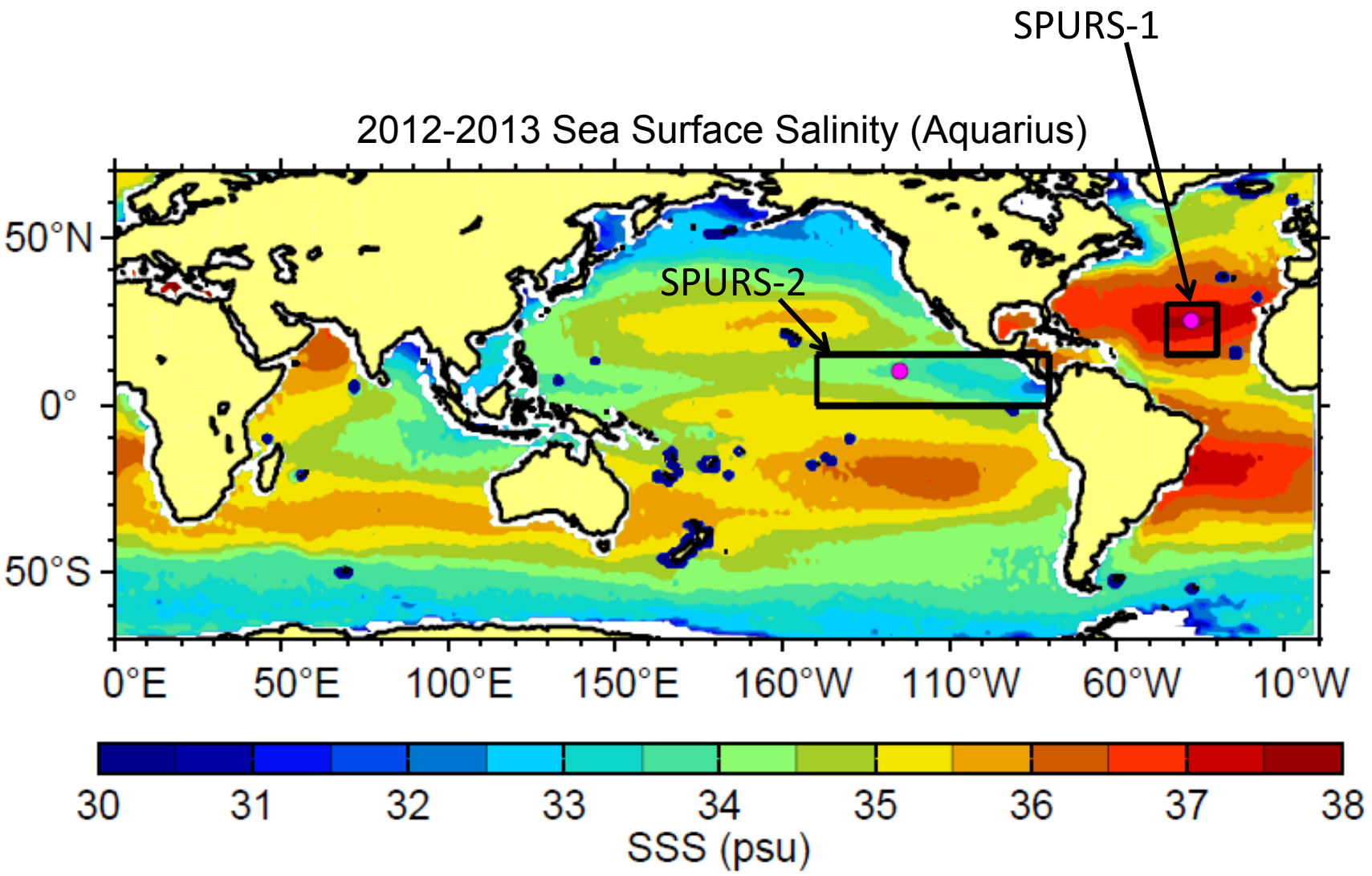

US CLIVAR Meeting, Aug. 2015, POS/PSMI Panel

# SPURS-2

- Location: 10°N, 125°W in the eastern tropical Pacific near the northernmost extent of the ITCZ
- Stage: pre-field planning. Field program to start spring/summer 2016
- Sponsoring agencies: NASA, NSF, NOAA
- Organizing committee: T. Farrar, A. Jessup and L. Rainville. Plus PIs on next slide
- Embedded within current TPOS
- White paper published in Oceanography, March 2015, SPURS Planning Group

| List of Task | Activity Title | Proposal No. | PI Name | PI Institution |
|---|---|---|---|---|
| | Understanding the Formation and Evolution of Near Surface Salinity Gradients Produced by Rain | 14-OSFC14-0002 | Asher, William | University of Washington |
| | The SPURS-2 Information System (SPURS-IS) | 14-OSFC14-0013 | Bingham, Frederick | UNC - Wilmington |
| | Studies of Near-Surface Salinity with Surface Lagrangian Drifters in support of SPURS-2 | 14-OSFC14-0006 | Centurioni, Luca | Scripps Institution of Oceanography |
| | Ship-based Quantification of Evaporation, Precipitation, and Surface Fluxes in SPURS-2 | 14-OSFC14-0017 | Clayson, Carol Anne | Woods Hole Oceanographic Institution |
| | Moored Measurements for SPURS-2: Salinity, Precipitation, Evaporation and Other Quantities | 14-OSFC14-0018 | Farrar, J | Woods Hole Oceanographic Institution |
| | Autonomous Surveys in the SPURS Freshwater Region | 14-OSFC14-0009 | Hodges, Benjamin | Woods Hole Oceanographic Institution |
| | Development and Implementation of an Aquarius/SAC-D Soil Moisture Product | 13-OSST13-0005 | Jackson, Thomas | USDA ARS |
| | Multi-Scale Data Assimilation, Forecasting and Modeling in Support of SPURS-2 | 14-OSFC14-0007 | Li, Zhijin | Jet Propulsion Laboratory |
| | An Annual Cycle of Upper Ocean Salinity in a Rainfall-Dominated Region Captured by High-Resolution Glider Surveys | 14-OSFC14-0003 | Rainville, Luc | University of Washington |
| | Ship time for SPURS-2 (Lady Amber) | | Rainville, Luc | University of Washington |
| | Observing the Fresh Water Cycle Near the Sea Surface in SPURS-2 Using Profiling Floats | 14-OSFC14-0001 | Riser, Stephen | University of Washington |
| | Very-near Surface Salinity Measurements during the SPURS-2 Field Campaign | 14-OSFC14-0024 | Schanze, Julian | Earth and Space Research |
| | High-resolution Lagrangian measurements of ocean boundary layer shear and stratification during SPURS-2 | 14-OSFC14-0004 | Shcherbina, Andrey | University of Washington |
| | Understanding Regional Scale Upper Ocean Variability in the Eastern Tropical Pacific | 14-OSFC14-0005 | Sprintall, Janet | Scripps Institution of |

# SPURS-2

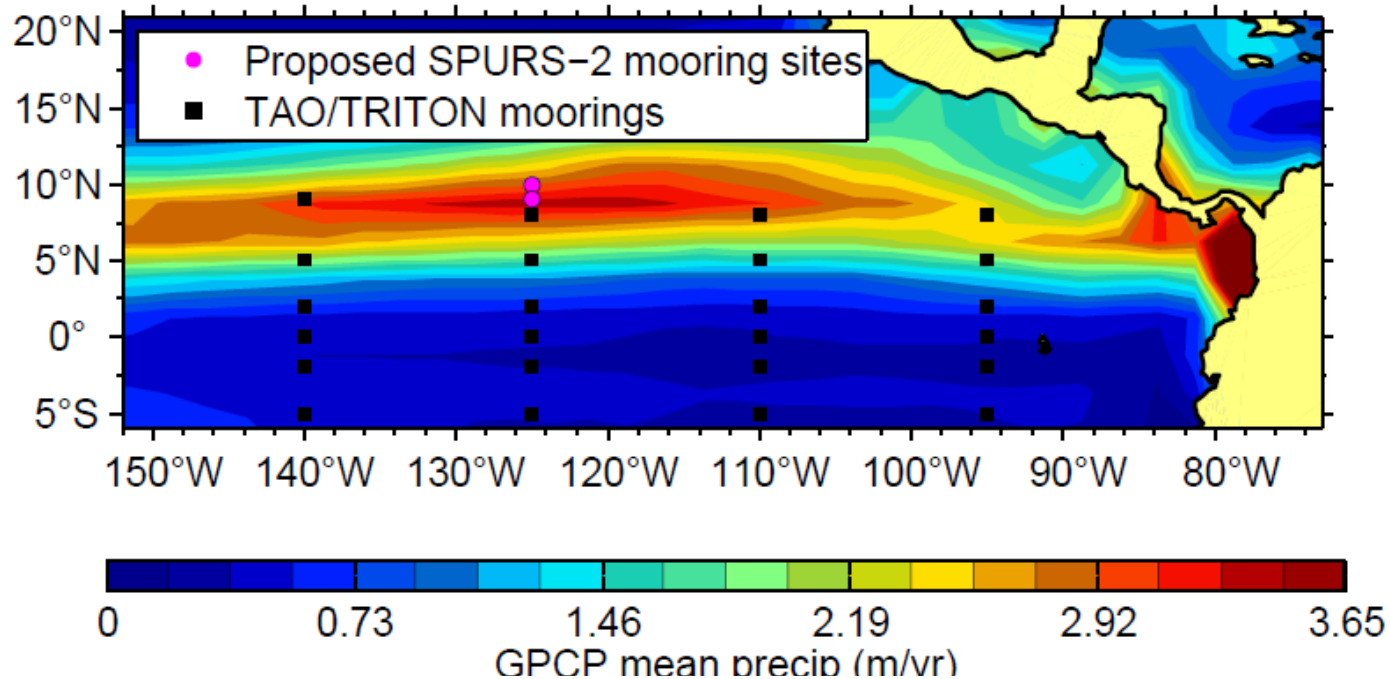

SPURS-1
2012-2013 Sea Surface Salinity (Aquarius)
SPURS-2
50°N
0°
50°S
0°E
50°E
100°E
150°E
160°W
110°W
60°W
10°W
30
31
32
33
34
35
36
37
38
SSS (psu)

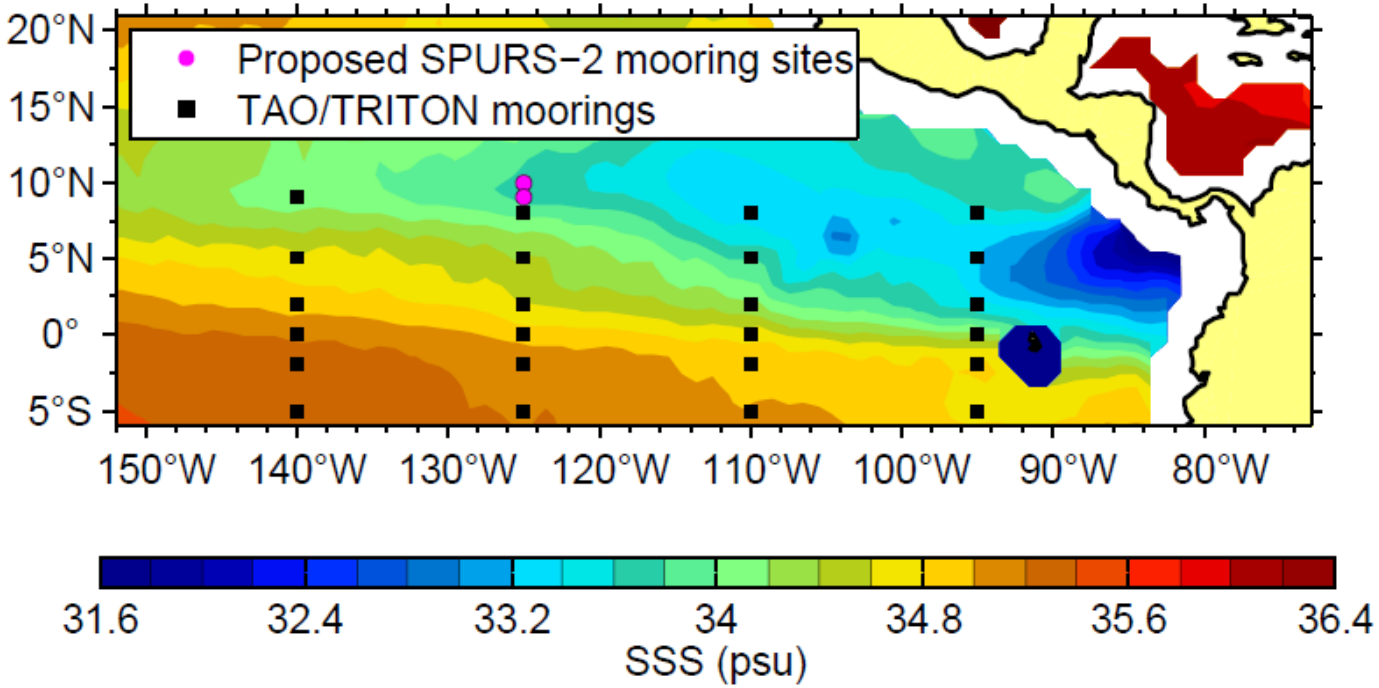
# SPURS-2 Science Questions

- What governs the structure and variability of upper-ocean salinity near the ITCZ?

- Where does the fresh water go, and how does the ocean distribute it from the small scales of the input (atmospheric mesoscale) to the regional scale of the east Pacific fresh pool?

- What local and non-local effect does the freshwater flux have on the ocean and what are the feedbacks on the atmosphere?


Proposed SPURS−2 mooring sites
TAO/TRITON moorings
20°N
15°N
10°N
5°N
0°
5°S
150°W
140°W
130°W
120°W
110°W
100°W
90°W
80°W
0
0.73
1.46
2.19
2.92
3.65
GPCP mean precip (m/yr)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20°N
15°N
10°N
5°N
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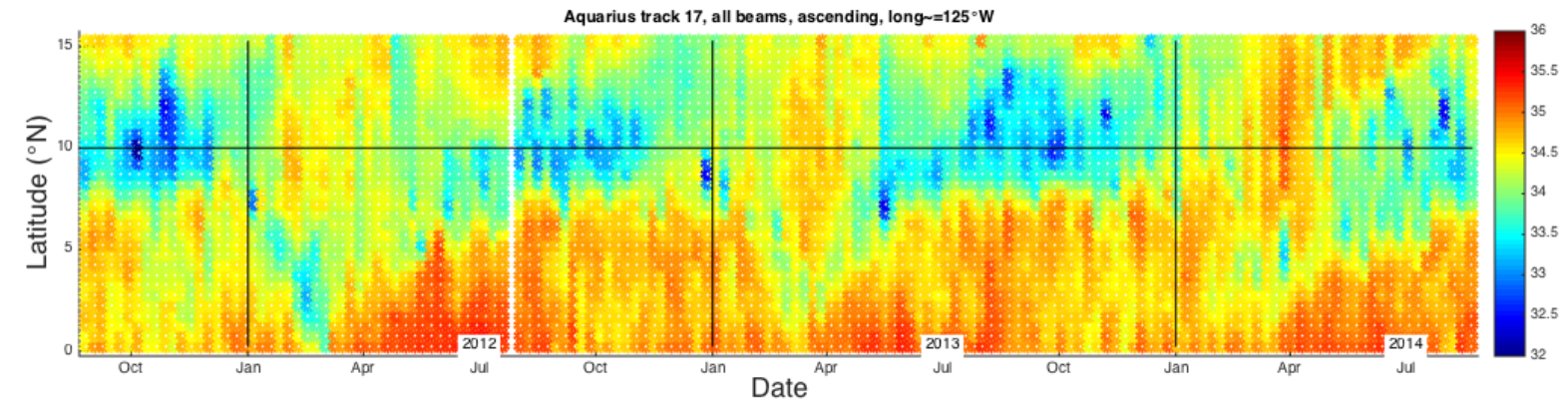
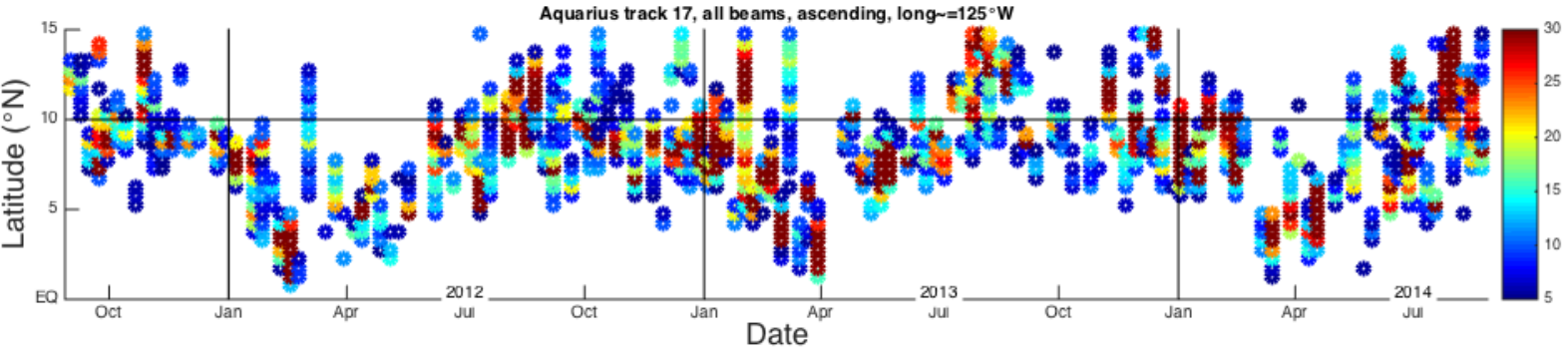
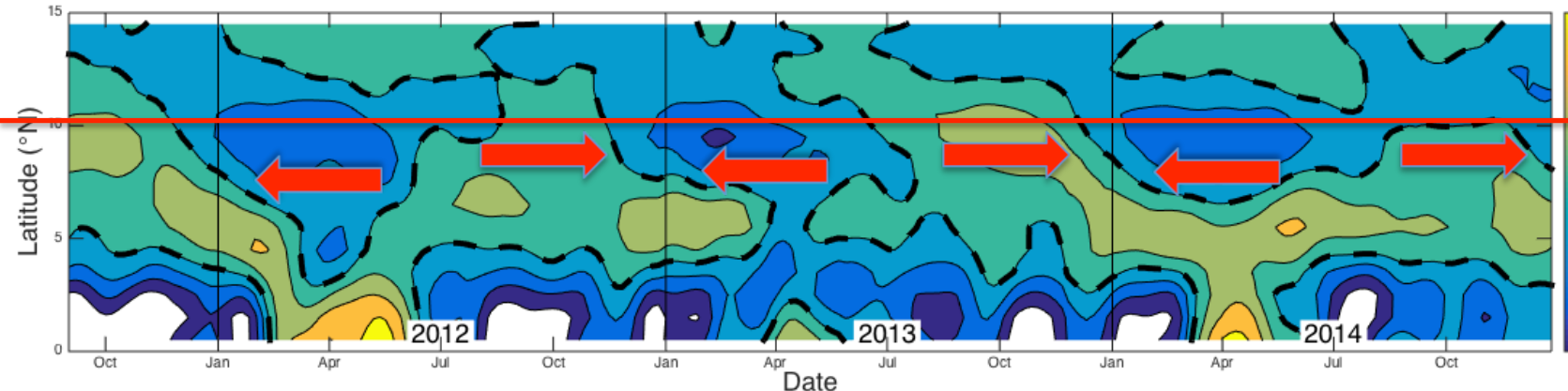
5°S
150°W
140°W
130°W
120°W
110°W
100°W
90°W
80°W
31.6
32.4
33.2
34
34.8
35.6
36.4
SSS (psu)

# Surface Salinity along 125°W




Rainfall




Zonal current

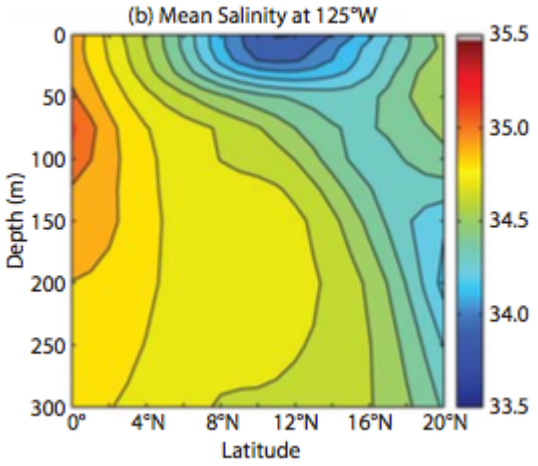
# Specific Phenomena of Interest

- Barrier layers and the role of salinity in upper-ocean stratification
- Surface fluxes
- Ocean/atmosphere Ekman layer coupling
- Salinity fronts and rainfall-induced ‘fresh pools’
- Influence of rain on remote sensing
- See SPURS Planning Group (2015) for more detail

# Ocean/atmosphere Ekman layer coupling

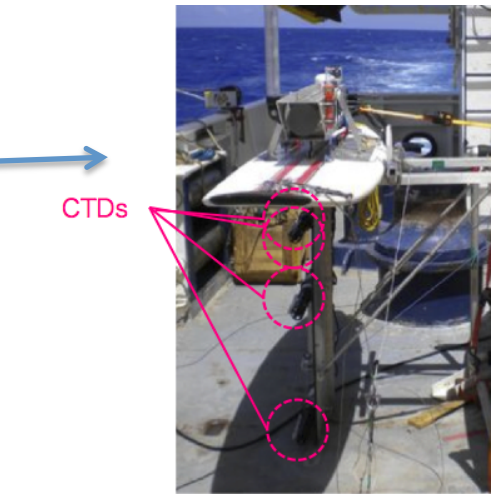
- Atmospheric divergence / oceanic convergence
- => Upwelling and formation of NECC front
- Termination of shallow overturning circulation
- Is low SSS driven by rainfall, advection or both?
- Why is SSS-min displaced from rainfall max?

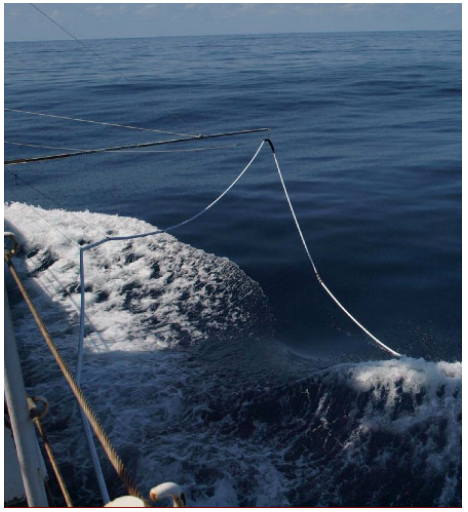
Mean salinity along 125W



# The Field Campaign

- Element (PI):
- Surface salinity profiler (Asher)
- Drifters (Centurioni)
- Shipboard meteorology (Clayson)
- Flux Mooring (Farrar)
- Wavegliders (Hodges)
- Seagliders (Rainville)
- Floats (Riser)
- Sea Snake (Schanze)
- Lagrangian float (Shcherbina)
- Hydrography (Sprintall)
- Balloon-mounted IR camera (Drushka)
- Rain radar (Rutledge)
- Prawler Moorings (Kessler)



# Other Elements

- Element (PI):
- Data management (Bingham)
- Modeling (Li)
- Satellite measurements
- Ship time (Rainville)

Schooner Lady Amber

# Potential Pitfalls

- Strong seasonal variability of SSS and rainfall
  - Continuous sampling by mooring and Lagrangian assets
- Swift currents and rapidly shifting fronts make Lagrangian observations problematic
  - Frequent visits by the Lady Amber
  - Deployment from ships of opportunity
  - Lagrangian frame experiments

# Plan

- Anticipated start summer 2016
- Intensive surveys summer 2016 and 2017
- Frequent repeat visits (~ every 2 months) by the Lady Amber for deploying or repositioning Lagrangian assets
- Regional and local modeling
- Remote sensing
- Data management