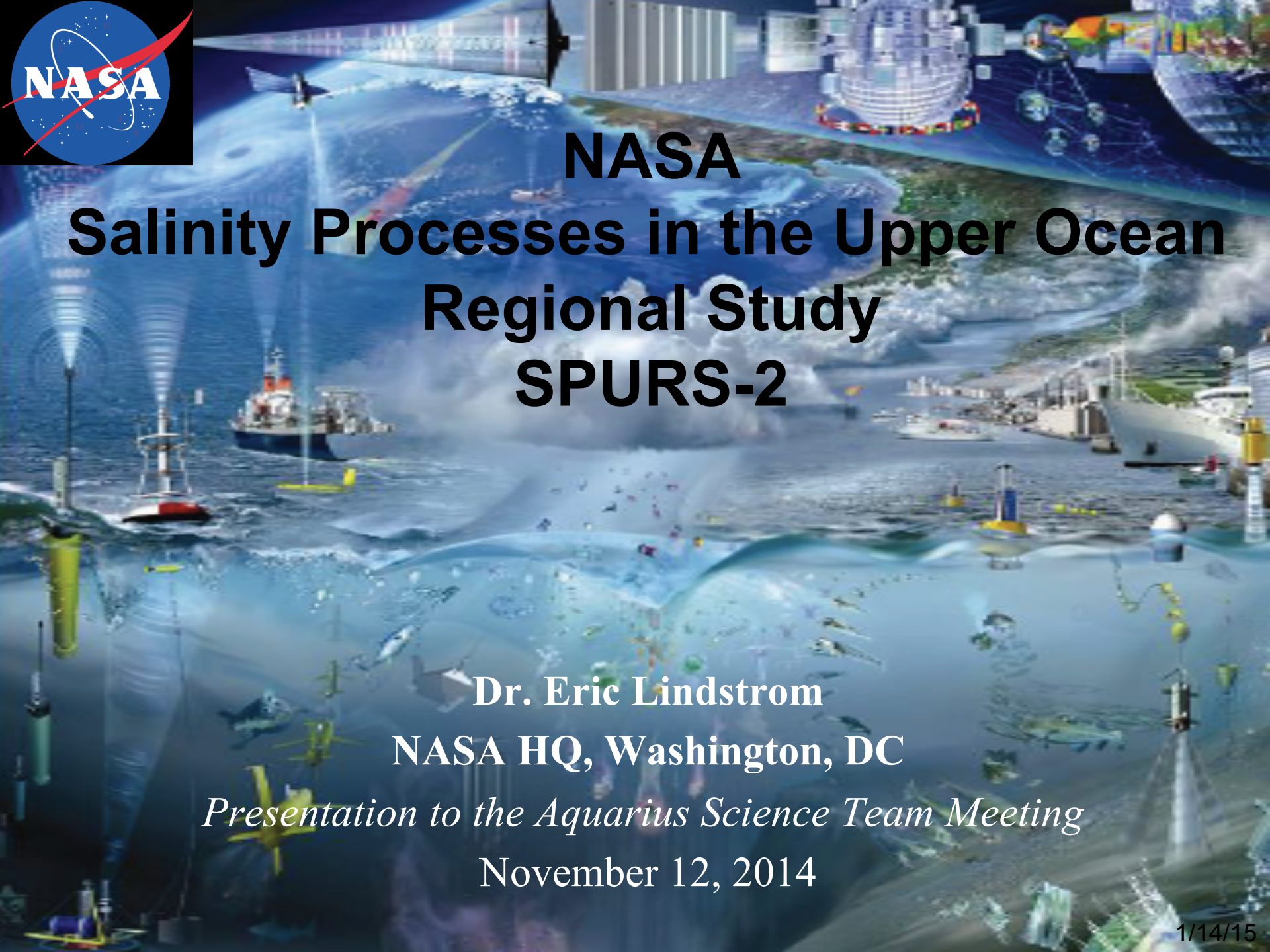


NASA
Salinity Processes in the Upper Ocean Regional Study
SPURS-2

Dr. Eric Lindstrom

NASA HQ, Washington, DC

Presentation to the Aquarius Science Team Meeting

November 12, 2014

Salinity Processes in the Upper ocean Regional Study (SPURS)

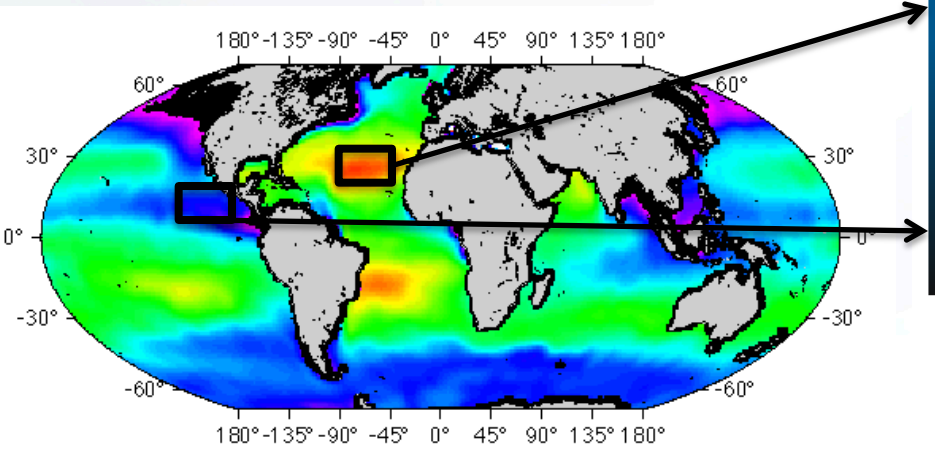
http://spurs.jpl.nasa.gov

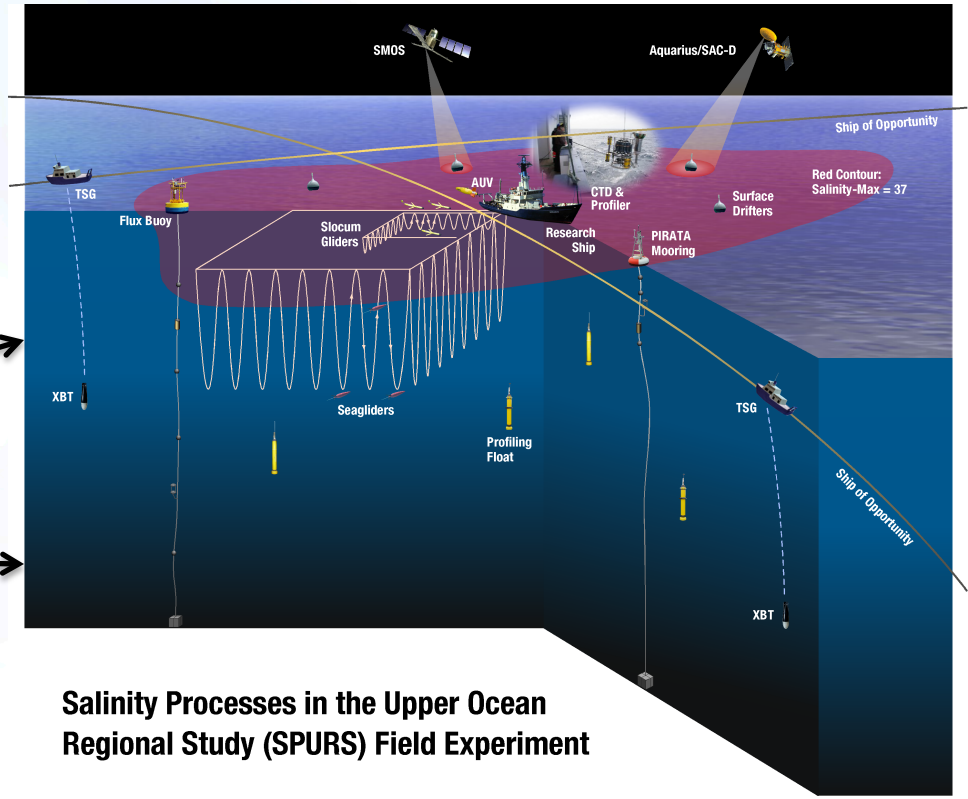
What is controlling the upper ocean salinity?

This question is addressed with interagency/international collaboration of measurements from satellites, ships, drifting surface buoys & profiling floats, gliders, AUVs and theoretical & numerical model simulations.

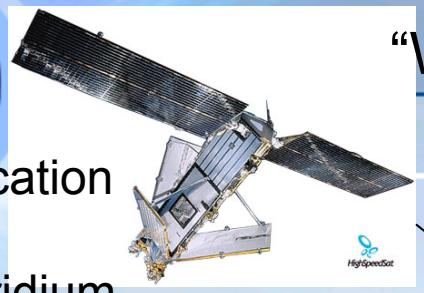
Motivation

Launch of the Aquarius/SAC-D satellite motivates plans for field campaigns in the salinity maximum and minimum region of the North Atlantic and Eastern Tropical Pacific.





Salinity Processes in the Upper Ocean Regional Study (SPURS) Field Experiment



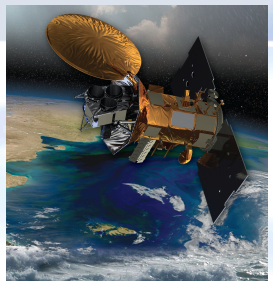
“Wet Side”

“Dry Side”

Communication Satellite Argos or iridium

WMO Global Telecomm System

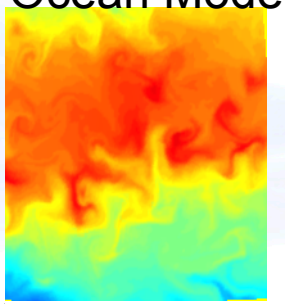
Individual Lab Servers



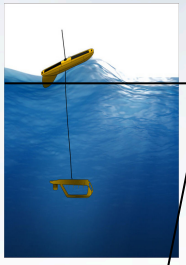
Aquarius and other satellite data (SST, ASCAT, etc.)

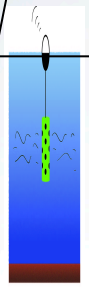
Satellite Data Server At JPL

Ocean Model



WaveGlider





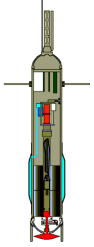
Flux Mooring

Prawler Mooring

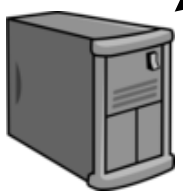
Ship-based instruments

Surface Drifter

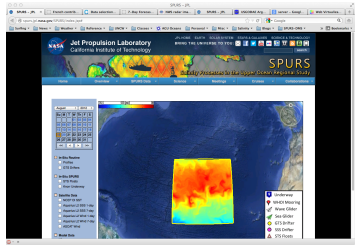
Argo Float



SeaGlider

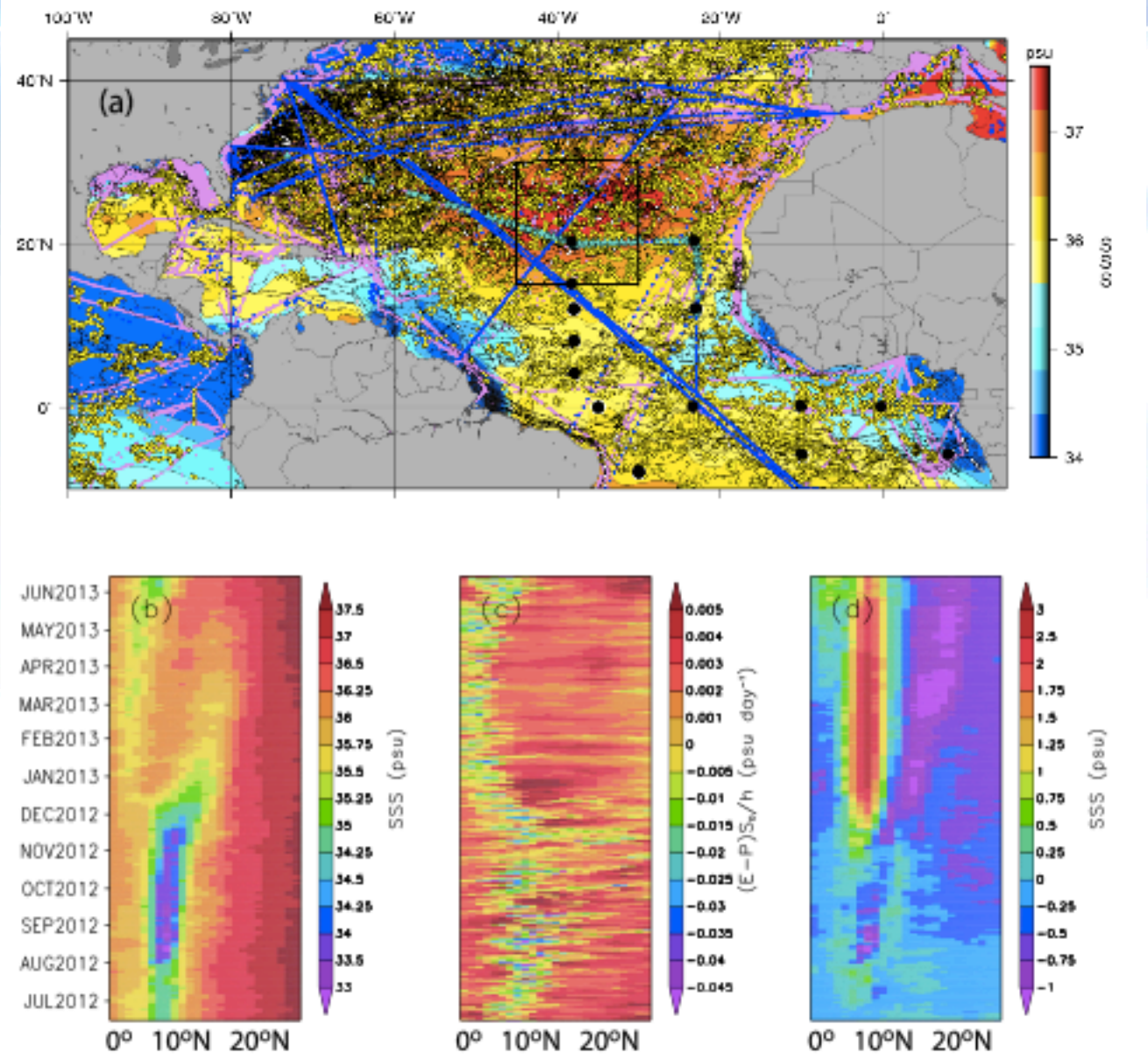


SPURS Data Server



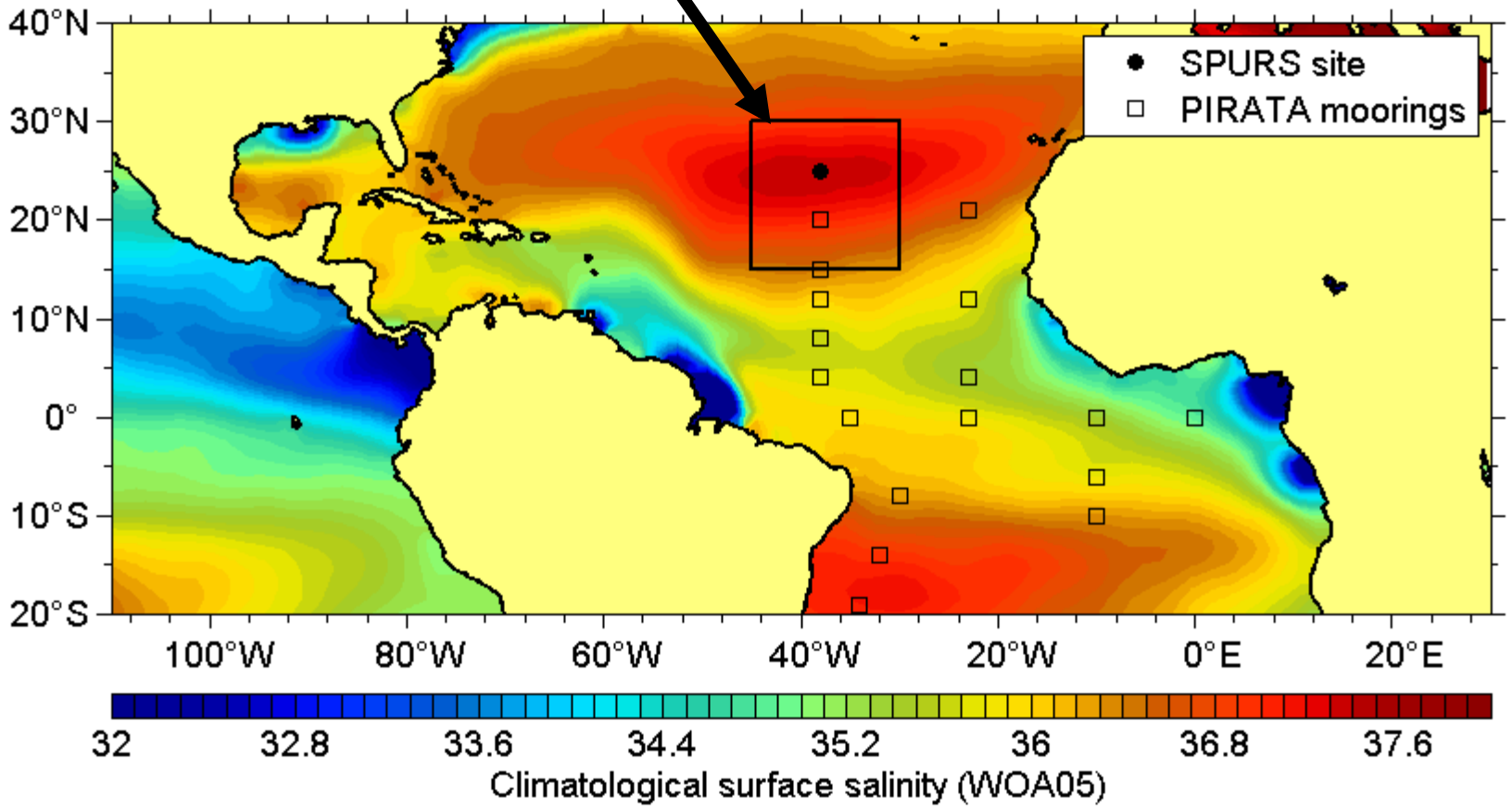
SPURS Web page

Embedding a process study in the basin scale observations



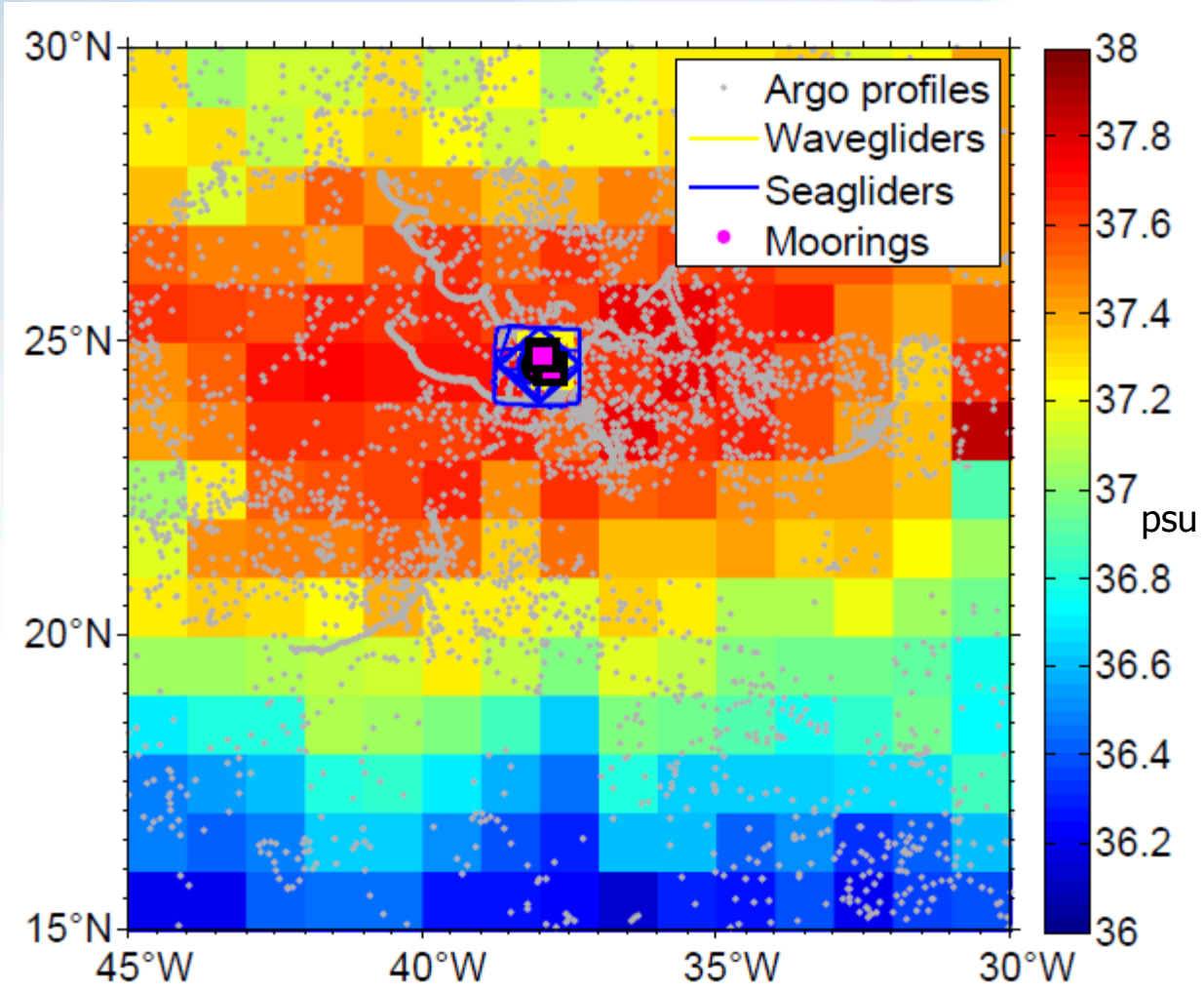
Salinity Processes Upper-ocean Regional Study (SPURS-1)

The SPURS-1 "mesoscale box"



The SPURS-1 Mesoscale Array

Aquarius salinity, March 2012

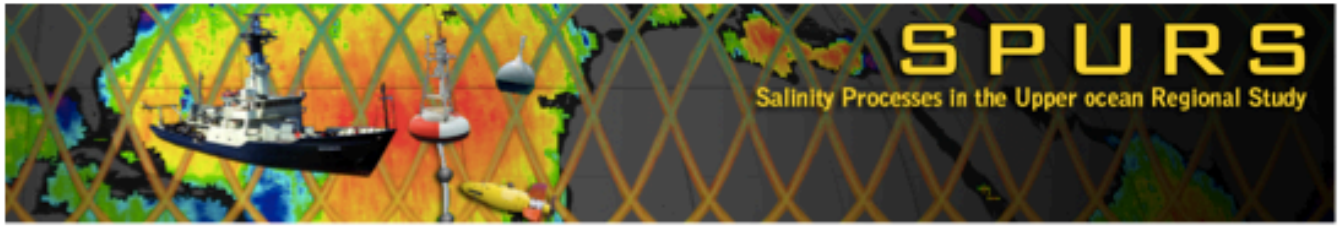


SPURS-1 Synthesis Phase (2014-2015)

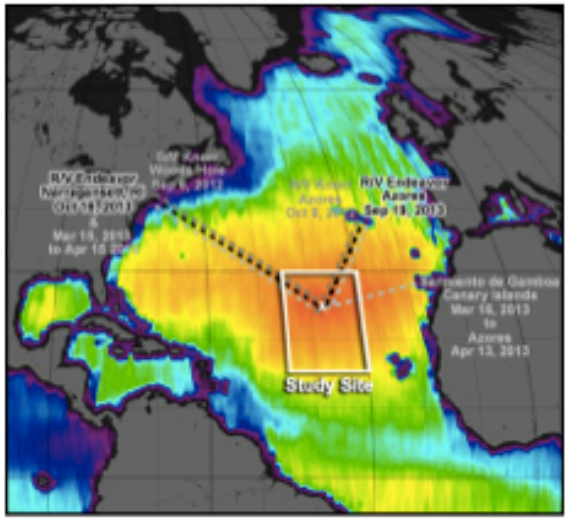
- Special funding by NASA in 2014-15 to assemble all the pieces of SPURS-1 into a coherent analysis.
- Assembly of a legacy “SPURS-1 data set” including relevant in situ and satellite data sets.
- Upper ocean salinity budgets spanning broad time and space scales (turbulence to basin scale)
- Presentation of SPURS-1 results at community conferences (EGU, AGU…)
- A suite of publications describing initial results from SPURS,
- Lessons learned for SPURS-2

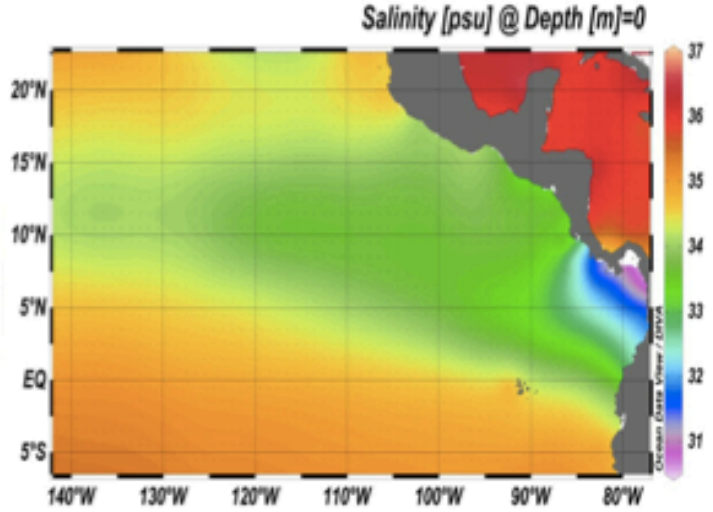
Oceanography Special Issue – March 2015

Sequence	POC/Lead Author	Co-Authors	Title
1	**Frank Bryan**	Ray Schmitt and Eric Lindstrom	**Introduction to the SPURS Special Issue**
2	**Durack, Paul**		**Ocean Salinity and the Global Water Cycle**
3	**Schmitt, Ray**	Austin Blair	**A River of Salt**
4	**Gordon, Arnold**	Guilivi, Bingham, Busecke	**Variability within the salty subtropical oceanic regions**
5	**Shenfu Dong**	Gustavo Goni, Denis Volkov	**Seasonal to Interannual variability of salinity budget components in the SPURS region and their link to the large scale dynamics**
6	**Farrar, J. Thomas**	Luc Rainville	**Surface and subsurface salt fluxes in the SPURS campaign**
7	**Dohan, Kathleen**	H-Y. Kao and Gary Lagerloef	**A trial freshwater balance over the North Atlantic SPURS domain using Aquarius satellite salinity, OSCAR satellite surface currents and some simplified approaches**
8	**Centurioni, Luca**	V. Hormann, Y. Chao, G. Reverdin, J. Font and D.K. Lee	**Sea Surface Salinity Observations with Lagrangian Drifters in the Tropical North Atlantic during SPURS: Circulation, Fluxes and Comparisons with Remote Sensed Salinity from Aquarius**
9	**Reverdin, Giles**	& many co-authors	**Meso-scales, filaments and mixing in the stratified surface ocean during the STRASSE/SPURS summer 2012 cruise**
10	**Yang, Jie**	Stephen Riser, Jeffrey Nystuen, William E. Asher, and Andrew T. Jessup	**Regional rainfall measurements using Passive Aquatic Listener during SPURS field campaign**
11	**Riser, Stephen**	Shcherbina, Anderson, and D'Asaro	**Variability in salinity from hours to years near the sea surface**
12	**Shcherbina, Andrey**	Eric D'Asaro, Steve Riser	**Variability and interleaving of upper-ocean water masses surrounding North Atlantic Salinity Maximum**
13	**Bingham, Fred**	Peggy Li, Gene Li, Yi Chao, Quoc Vu	**Data Management and Modeling Support for the SPURS Atlantic Field Campaign**
14	**Soloviev, Alexander**	Silvia Matt and Atsushi Fujimura	**3D Dynamics of Freshwater Lenses in the Near-Surface Layer of the Ocean**
15	**Schmitt, Ray**	& SPURS Team	**SPURS-2 "What's next for salinity"**
Special Section	**DeCharon, Annette**	Carla Companion, Ryan Cope, and Lisa Taylor	**Sharing the Importance of Ocean Salinity Beyond the Scientific Community**



From Salty to Fresh





SPURS-1 examined the salt balance in the North Atlantic Salinity Maximum, and we now want to explore the physics of a fresh oceanic regime in SPURS-2. Come and help us plan the next experiment at the:

SPURS Spring Meeting for Synthesis and Planning
Pasadena, CA, April 16-18, 2014

About SPURS-2

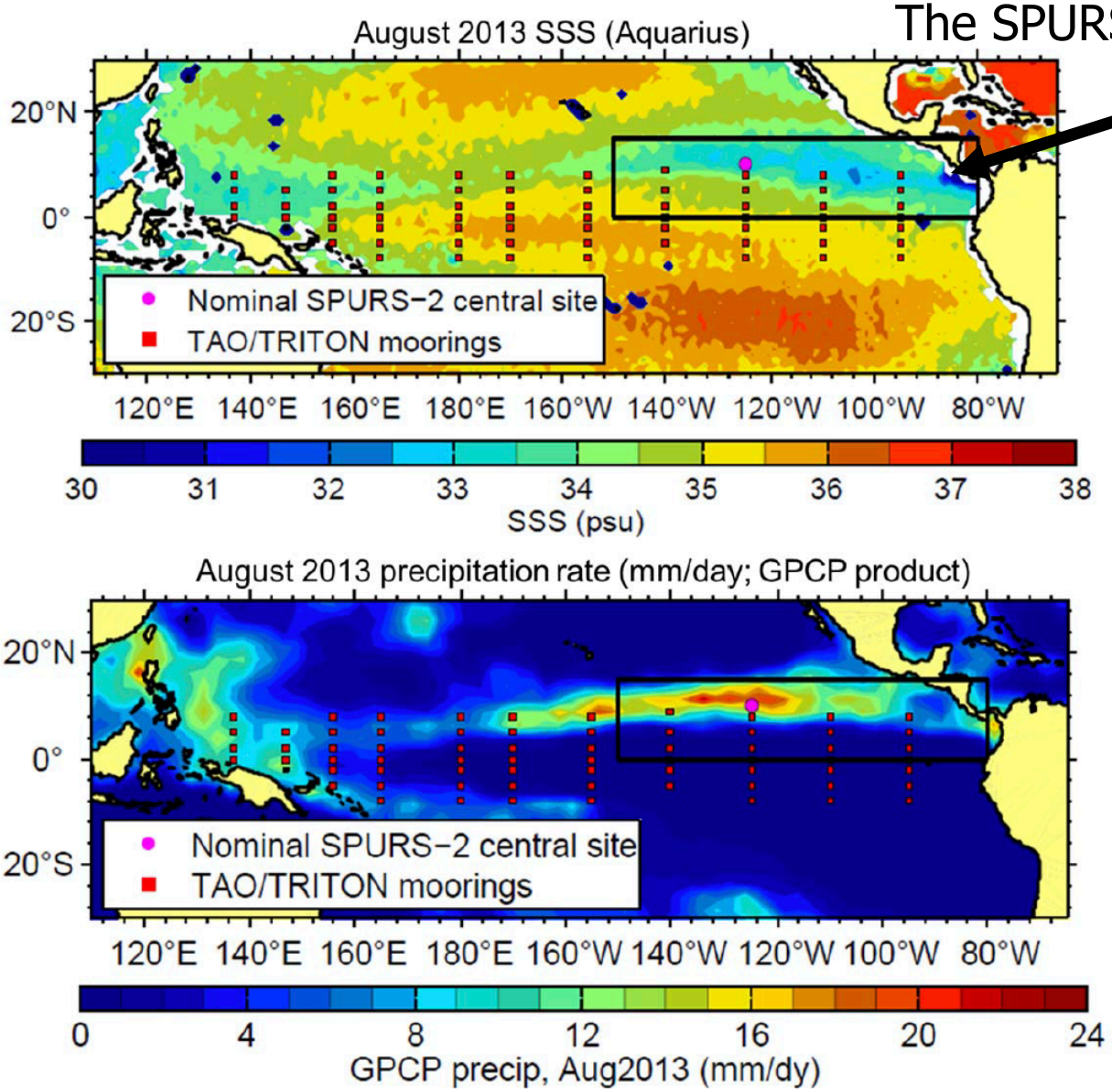
- Salinity Processes in the Upper-ocean Regional Study (SPURS) consists of a set of nested experiments, with investigations sponsored by multiple U.S. agencies and with international contributions, designed to sample the characteristics of the salinity minimum region on large scales (2000 km or larger) and scales associated with eddy variability (~200 km and smaller) during the 2016-2017 observational period. It also supports a robust modeling component and data management activity.

SPURS Research Questions

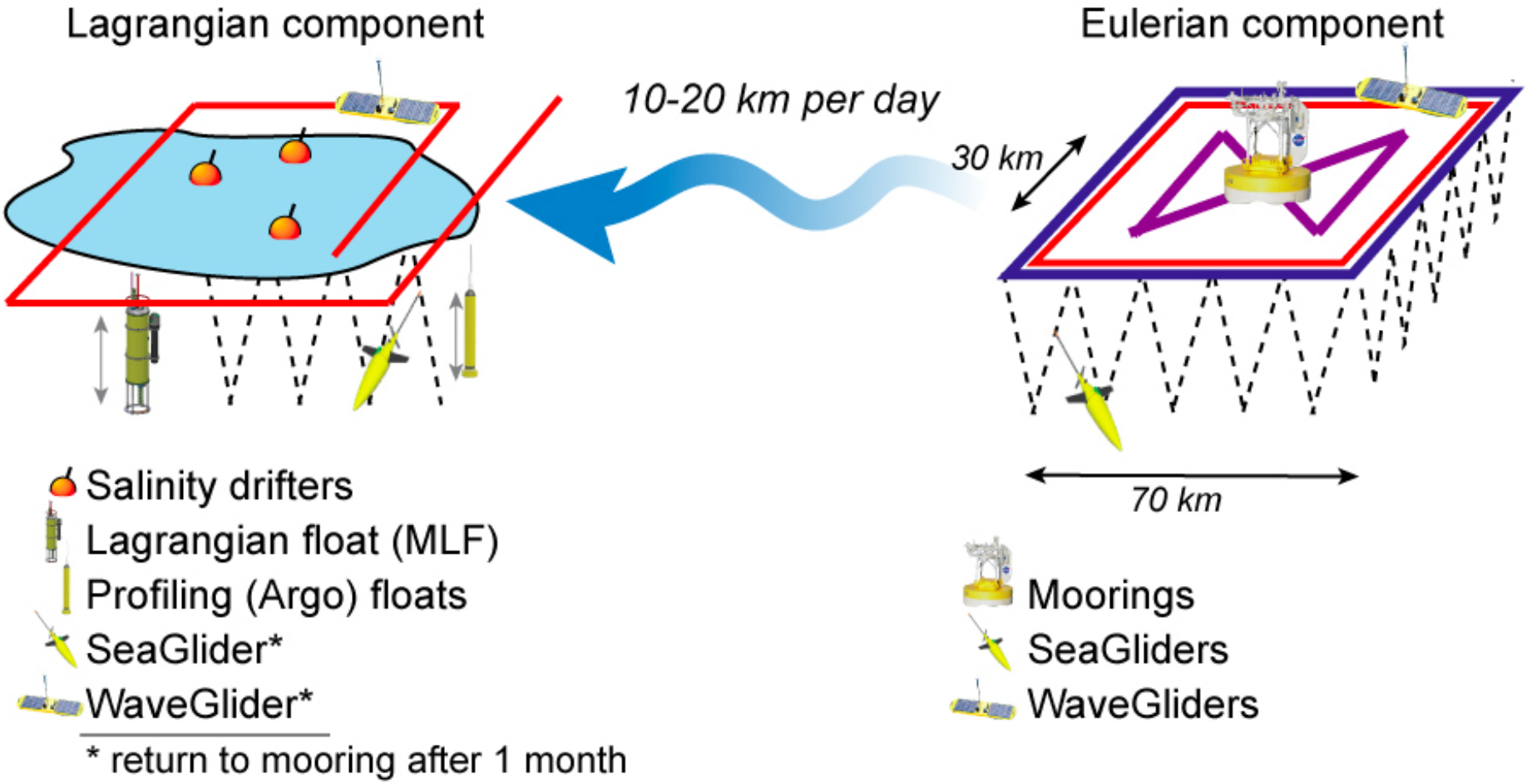
- What are the physical processes responsible for the location, magnitude, and maintenance of the low surface salinity region in the Gulf of Panama?
- How will the ocean respond to changes in thermal and freshwater forcing associated with a changing climate?
- What is the nature of the cascade of salinity variance from the largest (climate) scales down to dissipation scales of a few millimeters?
- What new information must be supplied to ocean models in order for these questions to be adequately examined?

Salinity Processes Upper-ocean Regional Study (SPURS)

The SPURS "large box"

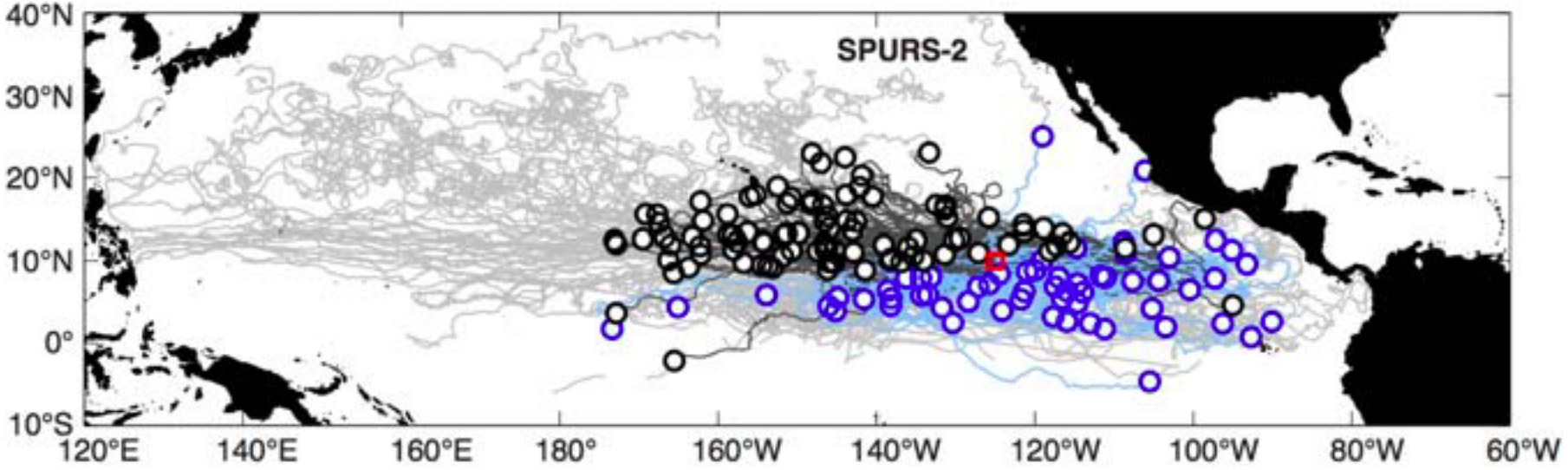


Mesoscale Experiment Design



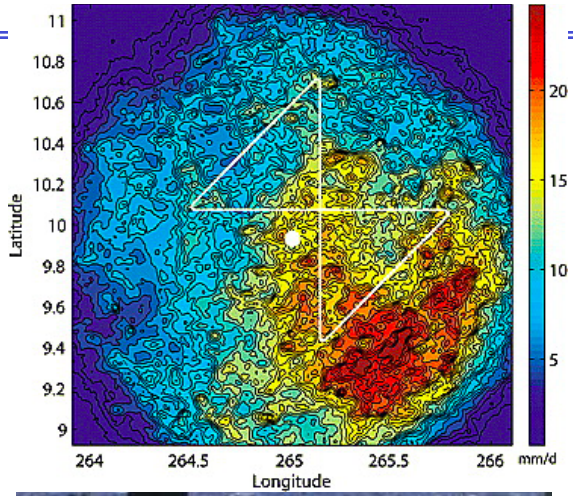
Items yet to be determined

- NSF Proposal(s) for additional Lagrangian and microstructure work, including critical ship time.
- Details of the Lagrangian and Eulerian experiment(s).



Core Principal Investigators for SPURS-2

- Farrar (Moorings), Sprintall (CTD), Shanze (Sea Snake), Asher (SSP/TSG), Clayson (Meteorology)
- Centurioni (Drifters), Hodges (Wavegliders), Shcherbina (ML Lagrangian floats), Rainville (Seagliders), *Riser (Argo)*
- Bingham (DM), Li (Modeling)



SPURS-2 / From Proposals to Reality

- Negotiation of scope and budgets for NASA PI.
- Organization of a planning workshop to lay out the field program. (1st Qtr 2015)
- Assess risks and dependencies based on outstanding uncertainties (proposals).

Thank you
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