NASA Physical Oceanography Program

Overview
of Salinity Continuity Program
18 September 2017
OSST Meeting

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NASA HQ
Washington, DC

9/15/17

NASA Physical Oceanography Program

1) Support missions on orbit: Jason-2 & Jason-3 (Altimetry), QuikSCAT(Winds), SMAP (Sea Surface Salinity), MODIS and VIIRS (SST), OMG (EVS-2/sub-orbital)

2) **Support missions in development:** Surface Water and Ocean Topography (SWOT) LRD-4/2021, Jason-CS/Sentinel-6A&B (Altimetry) 2020/2025

3) Support Science Teams: Altimetry (OSTST), SST (GHRSST&US team), SSS (OSST), Winds (OVWST), Sea Level Change (N-SLCT), SWOT (SWOT ST), Atlantic Meridional Overturning Circulation (AMOC)

4) Support Climate Focus Area/Ocean Observing: US CLIVAR, USGCRP, GOOS, GCOS, GODAE OceanView, NOAA COSC, IOOC, CEOS, ….

5) Process Studies related to NASA missions: Salinity Processes in the Upper Ocean (SPURS-1, 2011-2015) (SPURS-2 2015-2019), TPOS-2020, IIOE-2, SWOT Ocean Cal/Val

“Salinity Continuity Program”

- As Aquarius Phase F concludes at the end of CY2017, NASA has consolidated ongoing support for salinity remote sensing and research under a single new budget line. The total support is approximately $7.8M/year. This will support both directed and competed funding.

Elements of Salinity Continuity

- Legacy of Aquarius – post-V5.0 products
- Ongoing Cal/Val of salinity sensors/products
- SMAP salinity product
- Salinity Process Studies – SPURS-2 etc
- Ocean Salinity Science Team – ROSES
- Support R&D for next generation mission

Legacy of Aquarius

- Phase-F of Aquarius is completed by end December 2017 (under no cost extension from end FY17)
- Primary scientific objective is to achieve V5.0 of surface salinity product and documentation
- Salinity Continuity program is prepared to support reprocessing of Aquarius data in future to ensure a seamless Climate Data Record with SMAP salinity.

Ongoing Cal/Val of salinity sensors/products

- Aquarius has supported a robust cal/val activity at GSFC and JPL. “The Tuesday Telecom Group” has been integral to the steady improvement of salinity product.
- Salinity Continuity will support, through direct funding, a continuation of this activity.

SMAP salinity product

- The Aquarius salinity product has involved algorithm work at RSS, product generation at GSFC, and product distribution through PODAAC.
- SMAP salinity product will be regularized through a new partnership between RSS (algorithm and production) and PODAAC (distribution), effective 1/1/18.

Salinity Process Studies

- Scientific interpretation of surface salinity products has been supported by a science team (Ocean Salinity Science Team) and process studies (Salinity Processes in Upper-ocean Regional Studies/SPURS).
- Salinity Continuity program will support the synthesis phase of SPURS-2 and enable the planning and execution of the next process study.

Ocean Salinity Science Team

- The Ocean Salinity Science Team has been supported in the past by a combination of research funding under NASA's ESSP Program (the budgetary home of Aquarius) and by support from the core Physical Oceanography research program.
- OSST support is now entirely under Salinity Continuity program and is planned to support an annual ROSES call of $1M/yr and field program investigation as required.

R&D for next generation mission

- An integral part of NASA research enterprise is to promote concepts for next generation missions.
- NASA PO is currently helping support development of L/P band radiometer and antenna (under testing at UNH).
- Salinity Continuity is focused on having a community prepared and engaged for next generation salinity mission.

Salinity Continuity Program by the Numbers

- $7.8M/yr (~25% of Physical Oceanography Program)
- ~40% directed funding, ~60% competed (flexible)
- 2 NASA Centers & >10 Universities
- OSST ~Standing stock of 24-32 research projects
- ROSES call OSST - ~24-32 proposal per year/selecting ~8
- Salinity Process Study ~ one per five-year period support by separate ROSES call (SPURS-1 2011-15, SPURS-2 2015-2019, ”SPURS-3” 2019-23)
- Separate ROSES call for SPURS (8-10 PI who also become part of OSST)

What to expect

- CY17 – Finish Aquarius Phase-F
- Aug-Sept 2018 – Receive OSST proposal. Planned for end-August due date annually.
- Oct-Dec 2018 – Begin transition from Aquarius to Salinity Continuity for directed activities. Initiating: RSS-JPL agreement, GSFC cal/val team support, ESR match-up DB, DeCharon outreach.

NASA PO in ROSES 18

- Physical Oceanography R&A (29 June 2018)
- Salinity (31 Aug 2018)
- (NOI due 30 days ahead for all these)

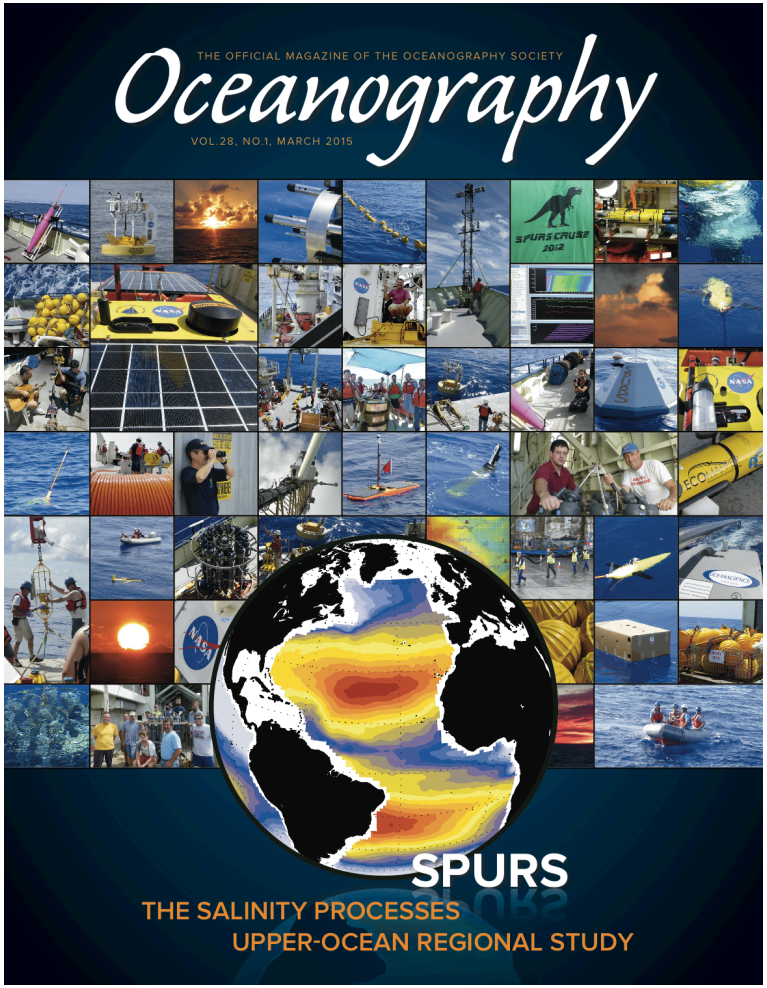
ROSES is issued annually around Valentine's Day (14 Feb)

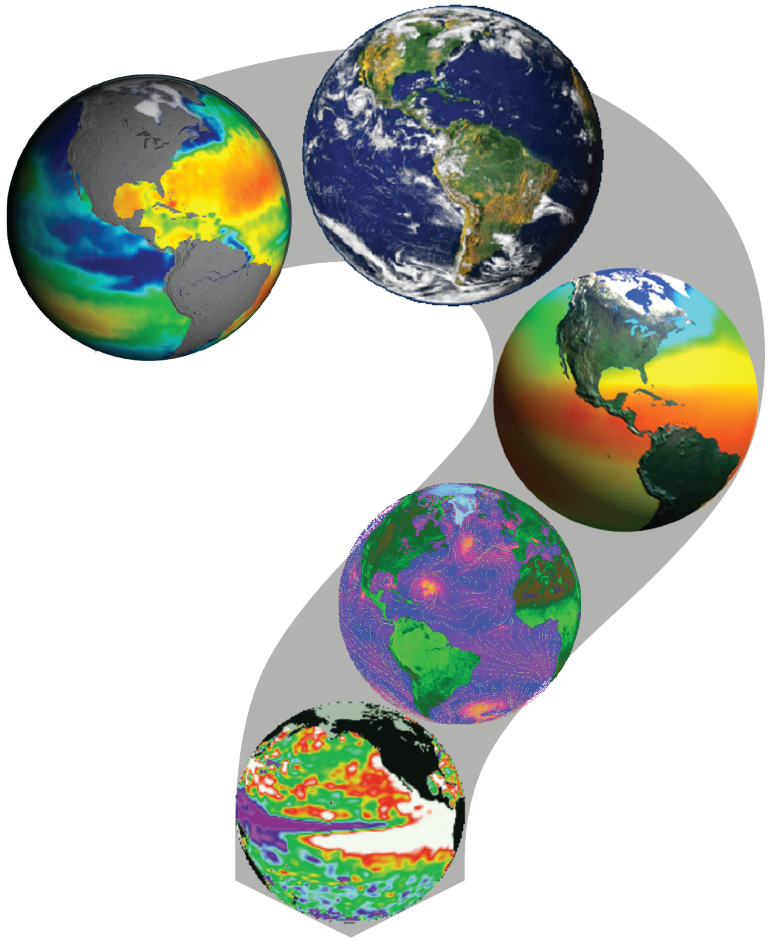
Rose of Galaxies from Hubble

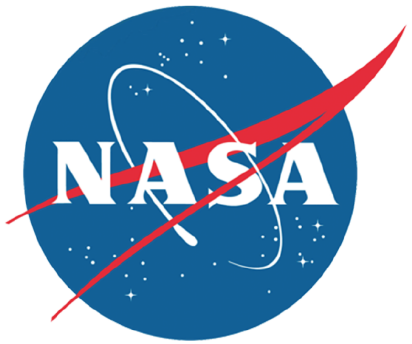
http://solicitation.nasaprs.com/

Program Highlight 2015-2019

- SPURS-2 in 2015-19
- Field work in tropical eastern Pacific Ocean (near 10N, 125W) from August 2016 – November 2017.
- Synthesis of results in 2018.
- Special issue of Oceanography March 2019 devoted to SPURS-2.







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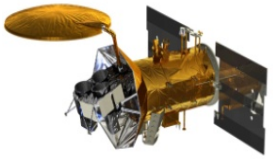
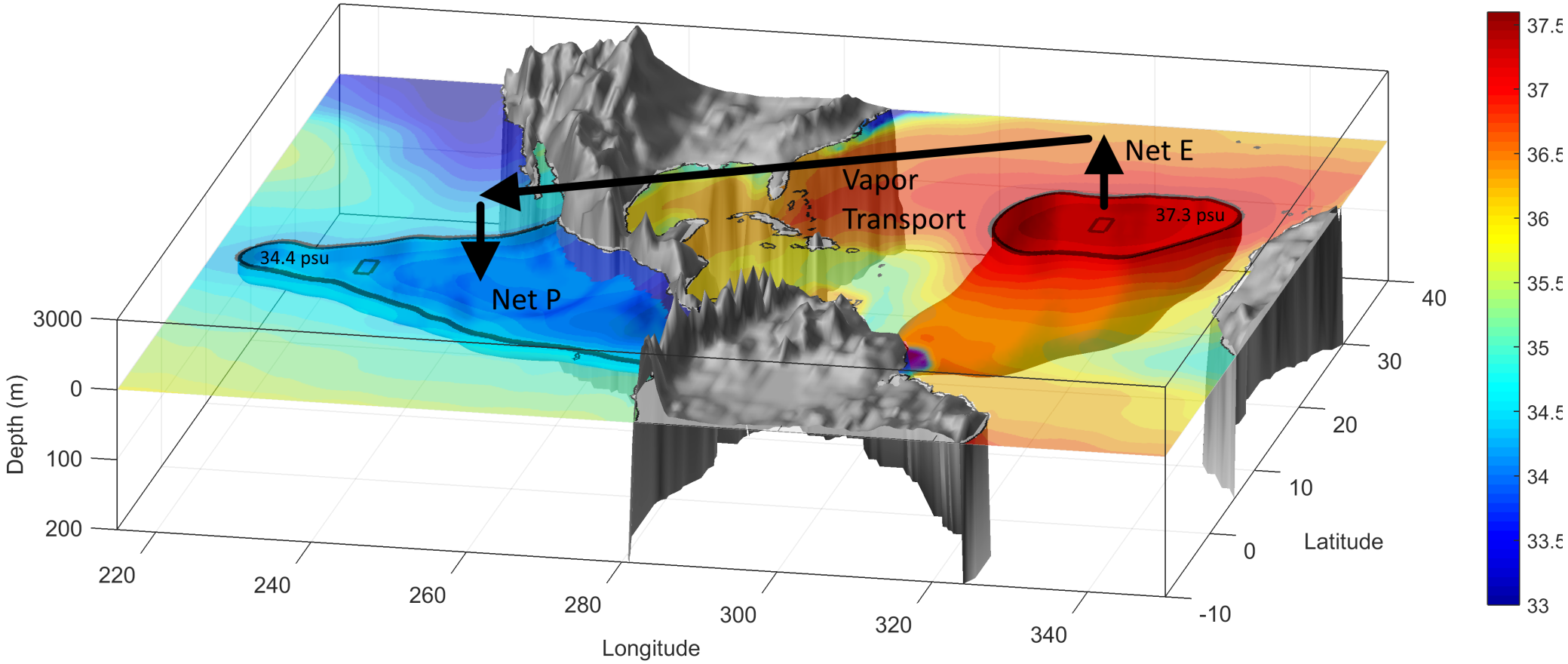
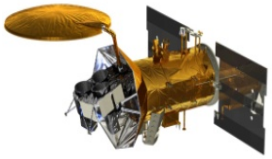
The Ocean's Role in the Global Water Cycle

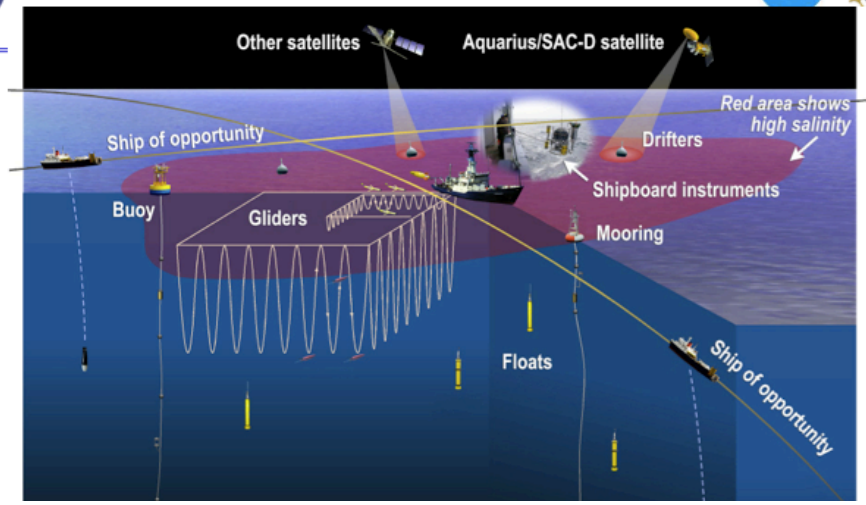




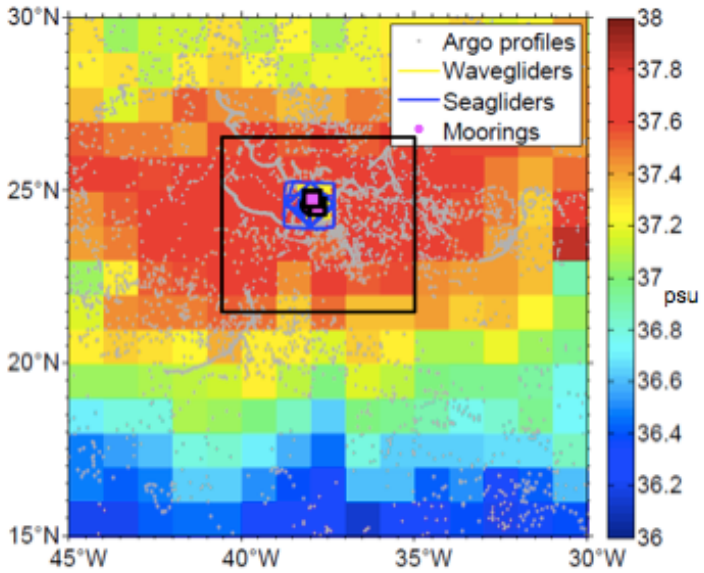
The SPURS Legacy



Nested Sampling Strategy



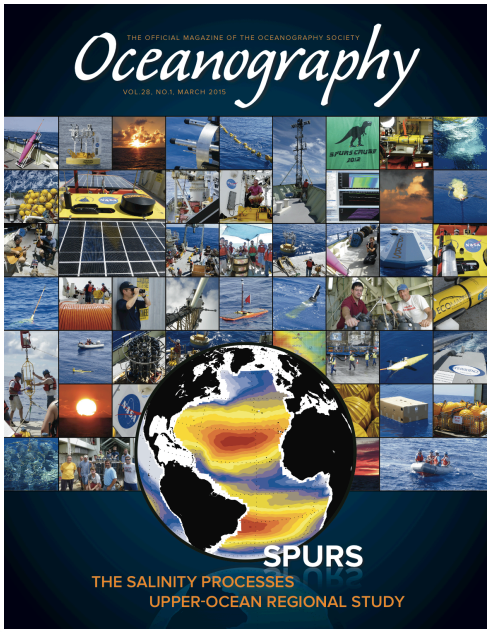
Aquarius salinity, March 2012



R/V *Roger Revelle*

2016 Cruise Plan

Summer/Fall Rainy Season Cruise	
Depart Honolulu:	12 Aug
Arrive 10 N, 125 W:	19 Aug
26 Science days	
Depart site:	14 Sep
Arrive Honolulu:	22 Sep

Activity

- Installation of 3 moorings
- Deployment of Lagrangian assets
  - Seagliders
  - Wavegliders
  - Mixed Layer Floats
  - Drifters
- Hydrographic Survey
- Ship-based sampling of rain events
  - Surface Fluxes
  - Near-surface salinity and turbulence
  - Balloon-based IR camera