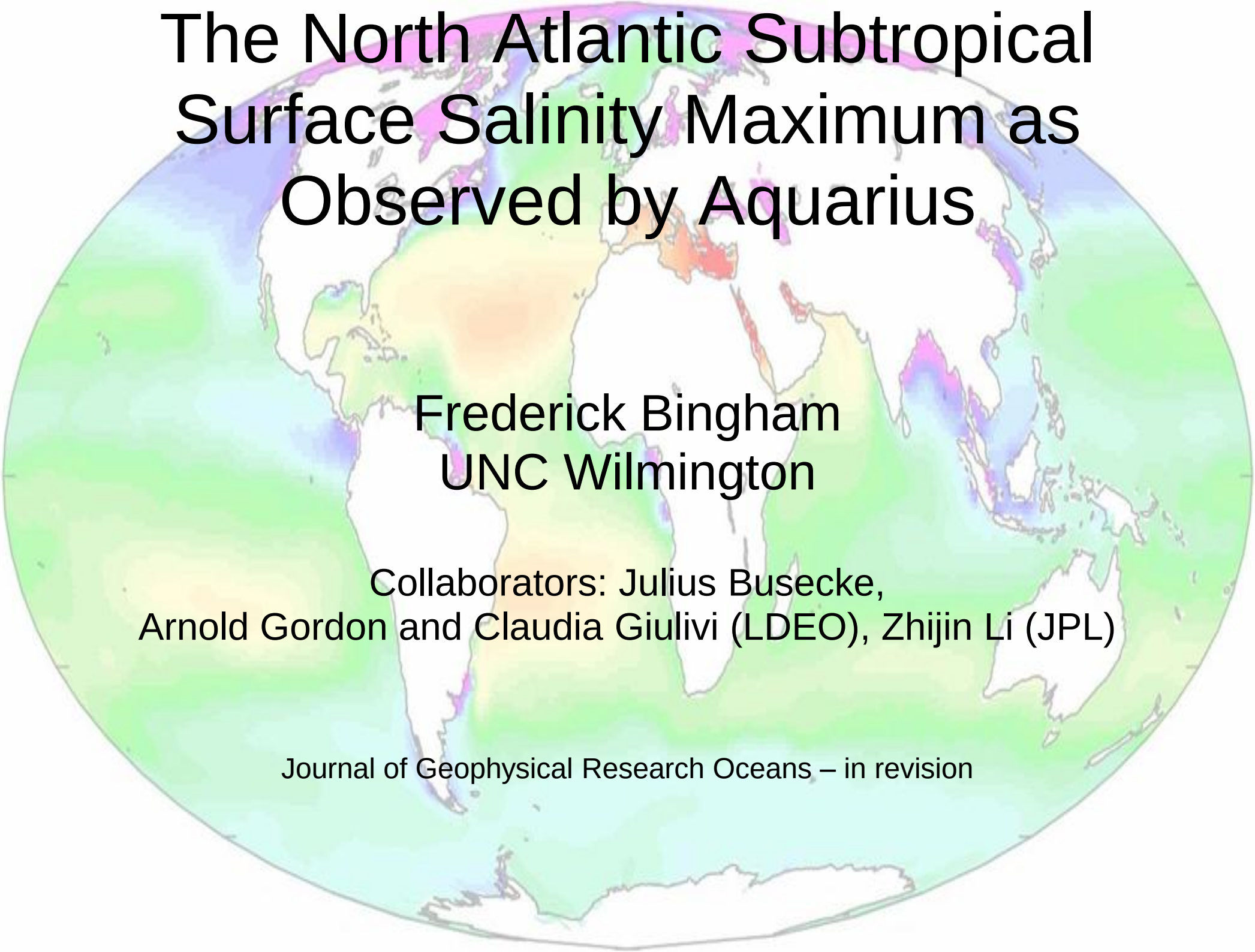
The North Atlantic Subtropical Surface Salinity Maximum as Observed by Aquarius



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Arnold Gordon and Claudia Giulivi (LDEO), Zhijin Li (JPL)

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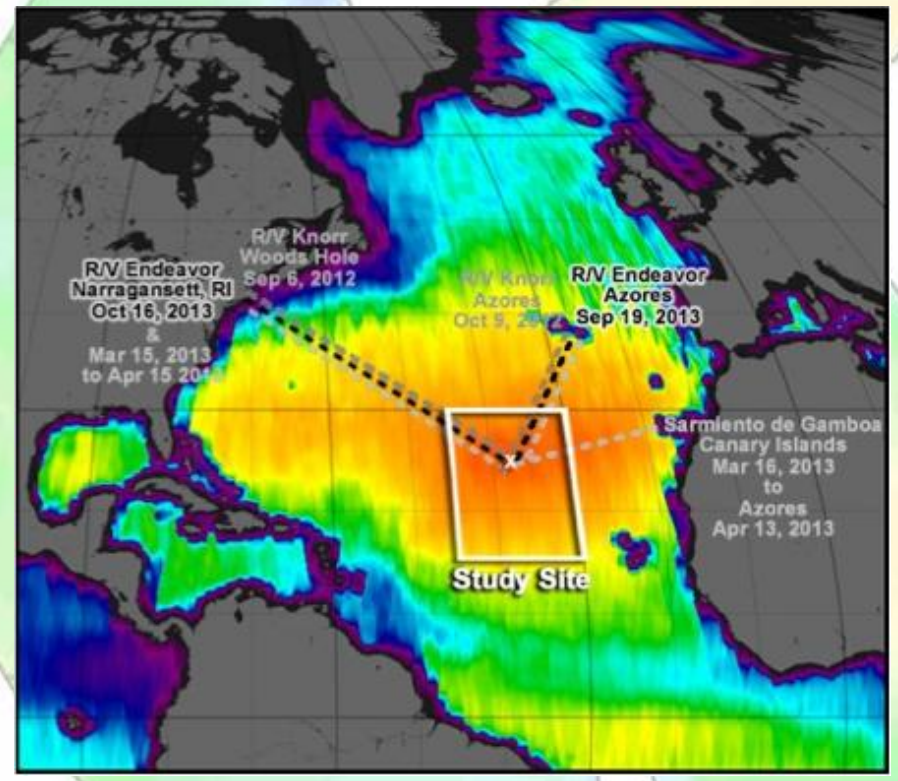
The SPURS Experiment

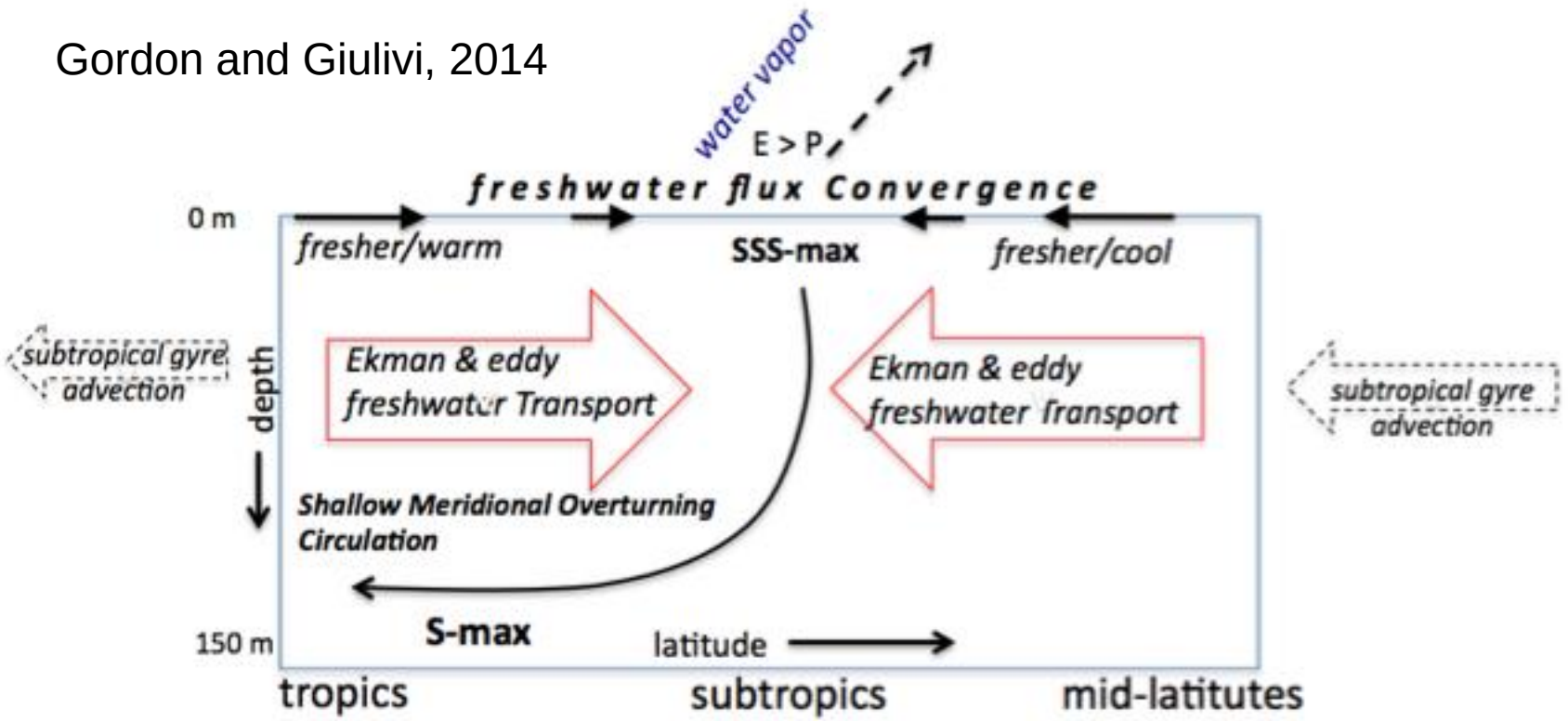


Surface salinity maximum and formation site of subtropical underwater (STUW)

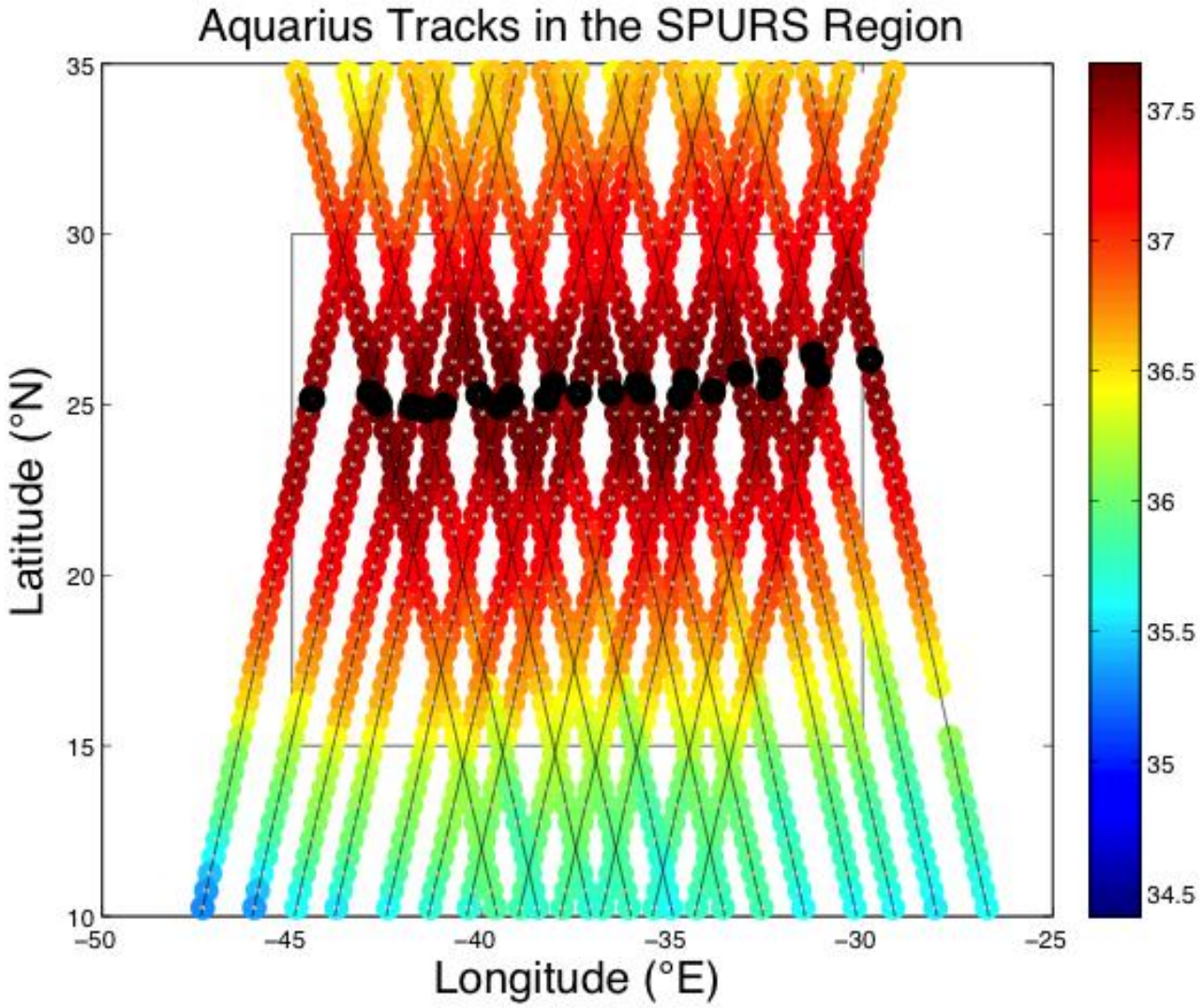
O'Connor et al., (2005)

Formation of STUW

Gordon and Giulivi, 2014

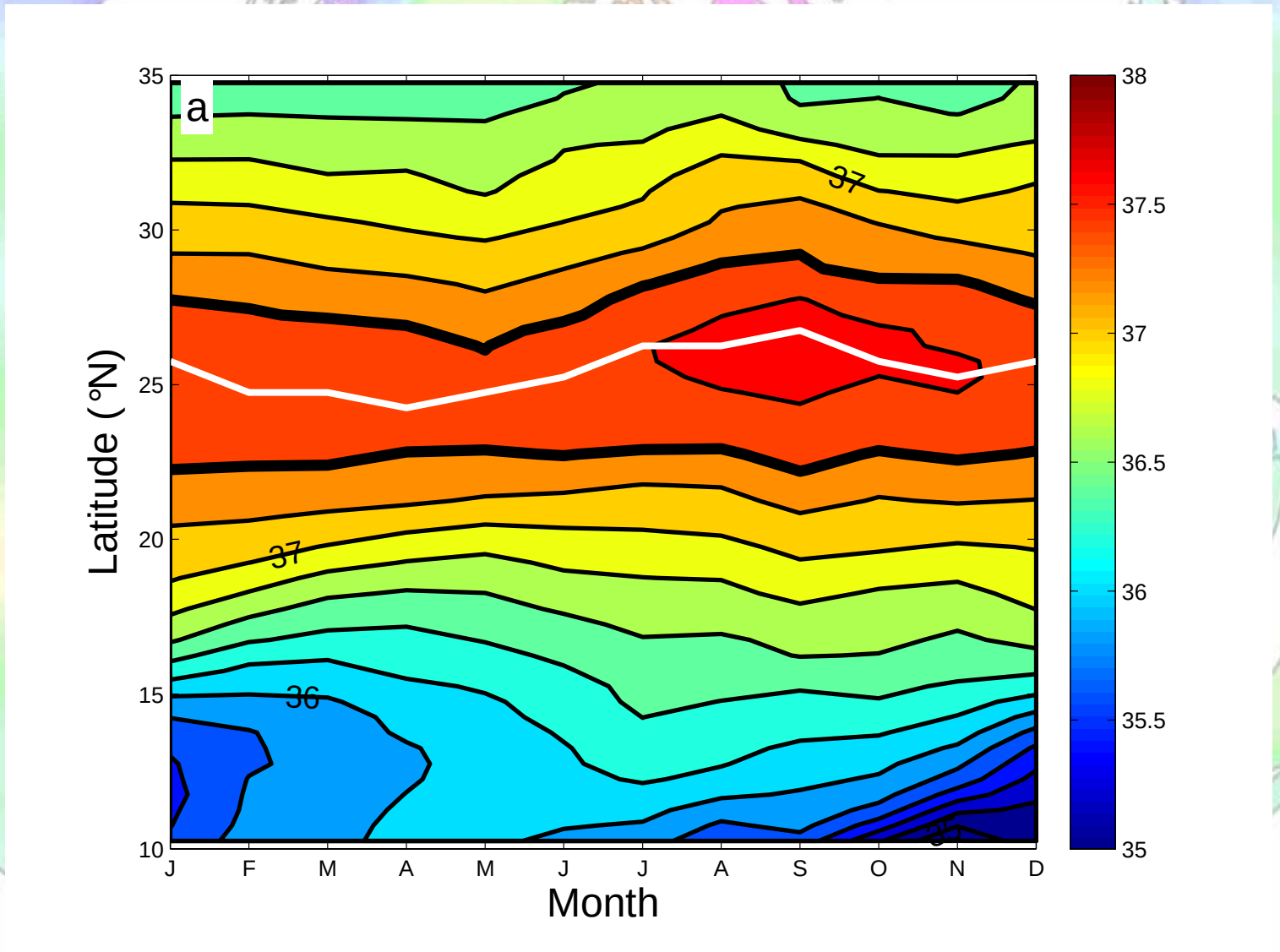


Mean SSS in SPURS region from Aquarius

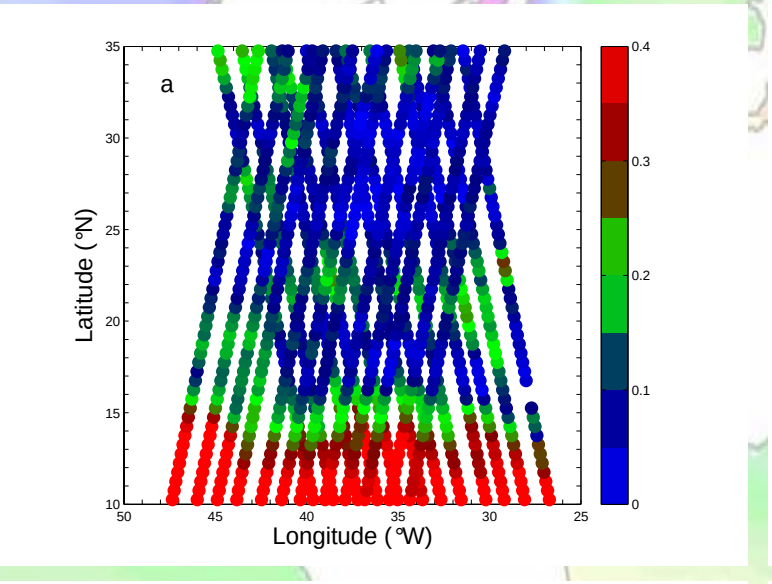


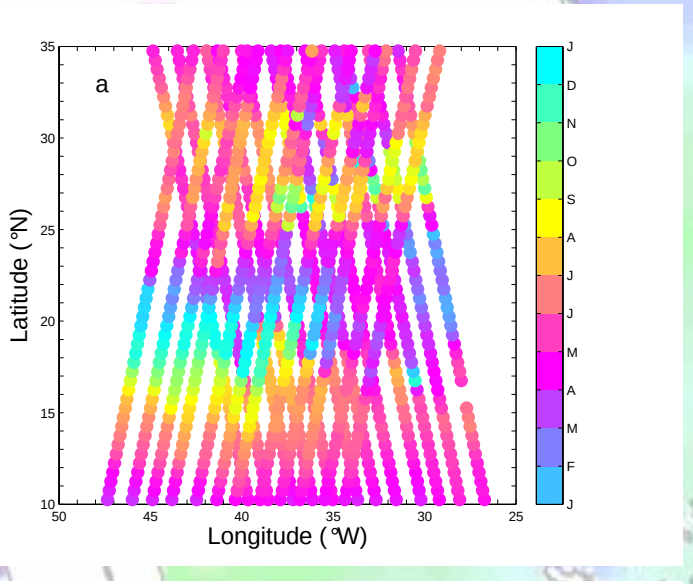
Aquarius L2 V2.5.1 data averaged into 0.5˚ along-track bins. Aug. 2011 – Sept. 2013

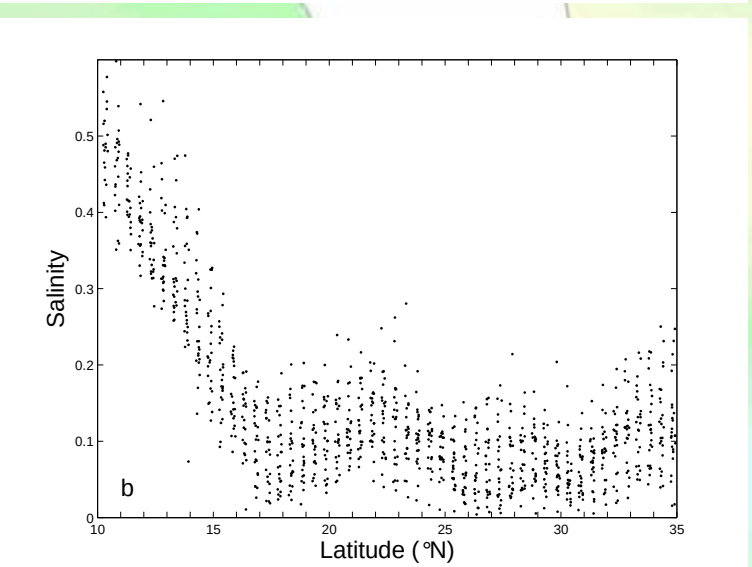
Seasonal SSS in SPURS Region

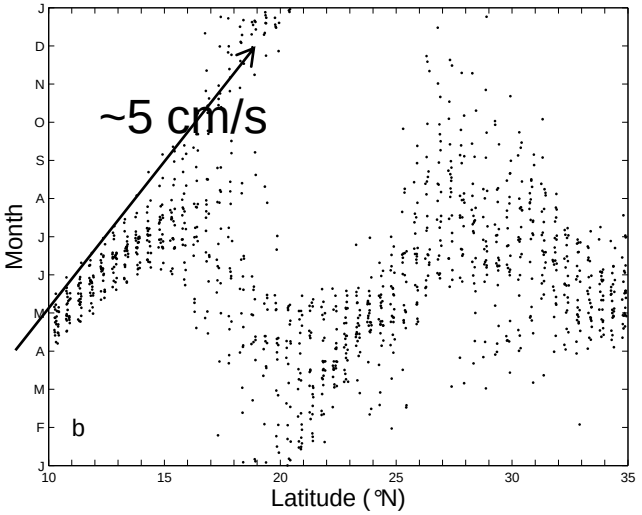


Harmonic Analysis of SSS







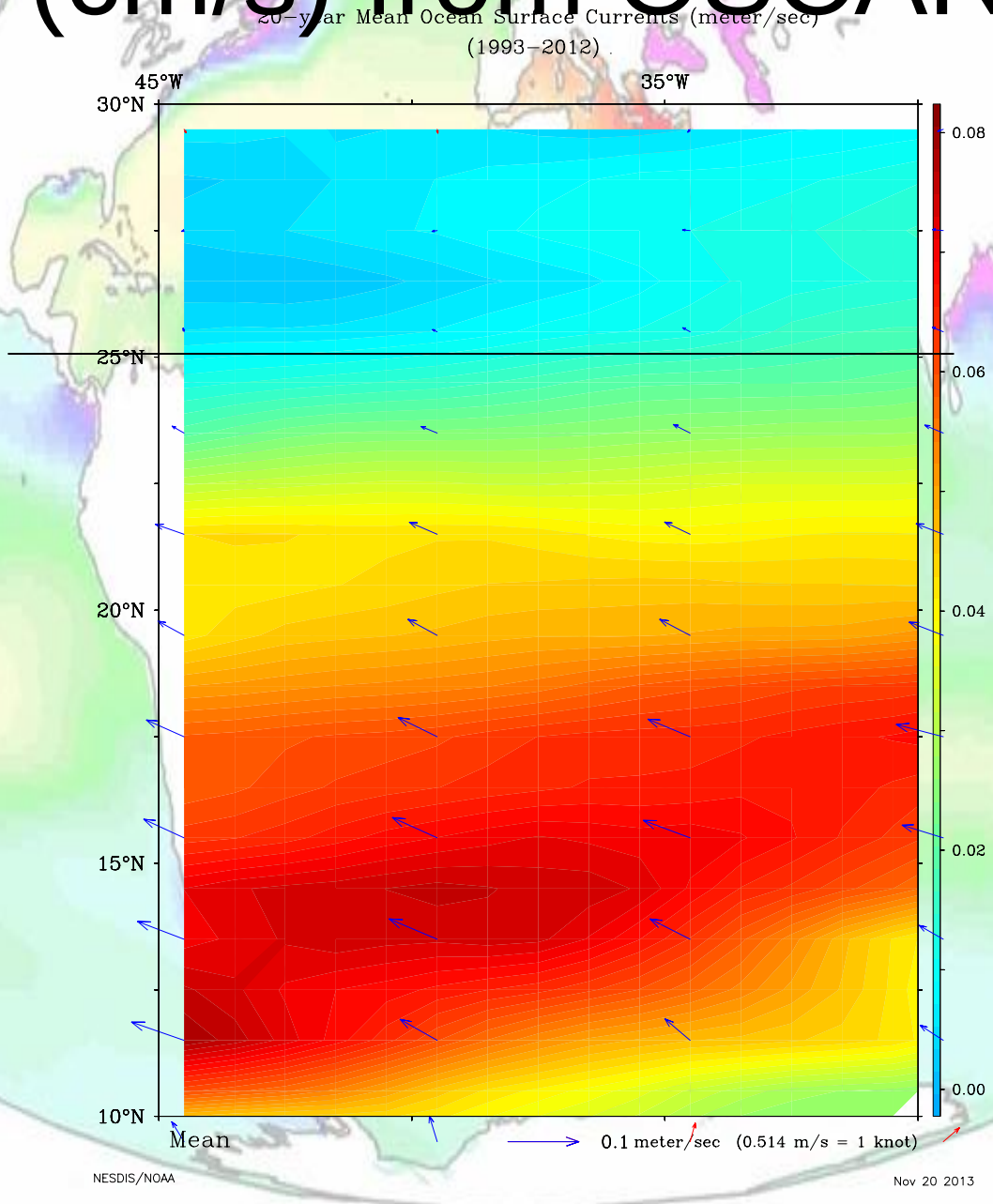


Amplitude

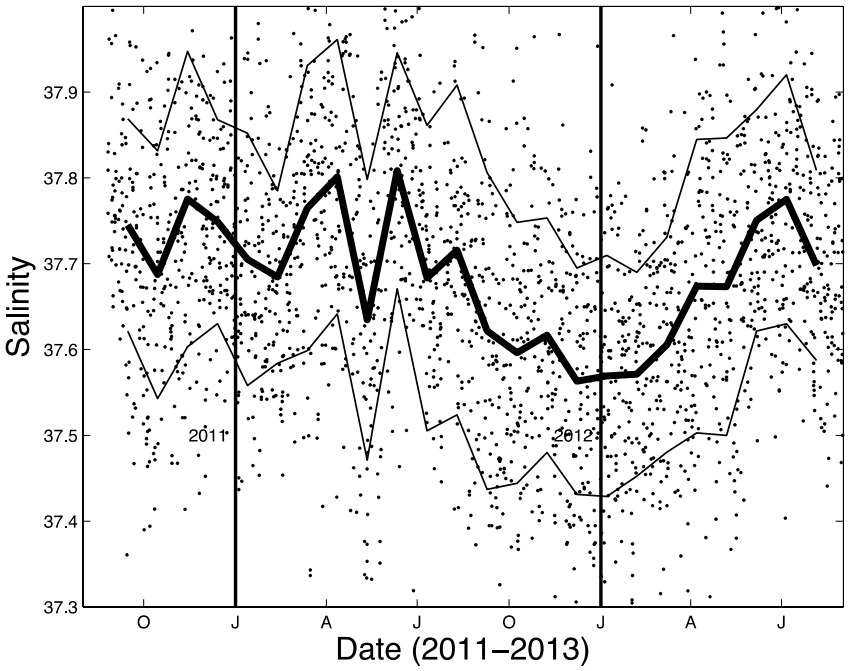
Phase

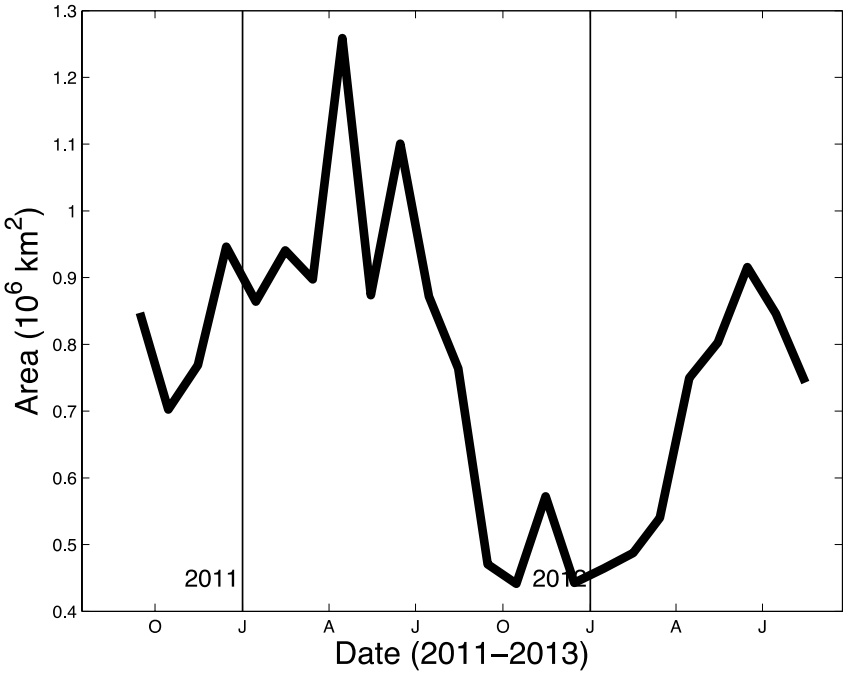
Mean (1993-2013) current speed (cm/s) from OSCAR

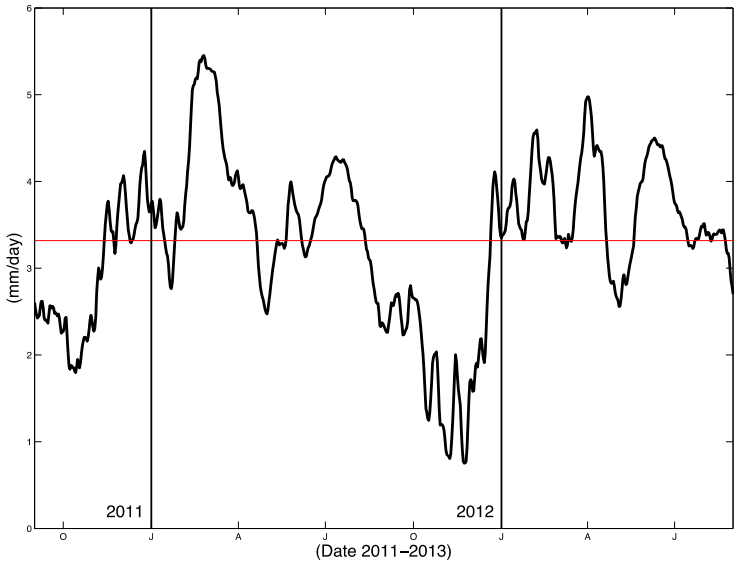
SSS-max



Maximum along-track SSS in the SPURS Region





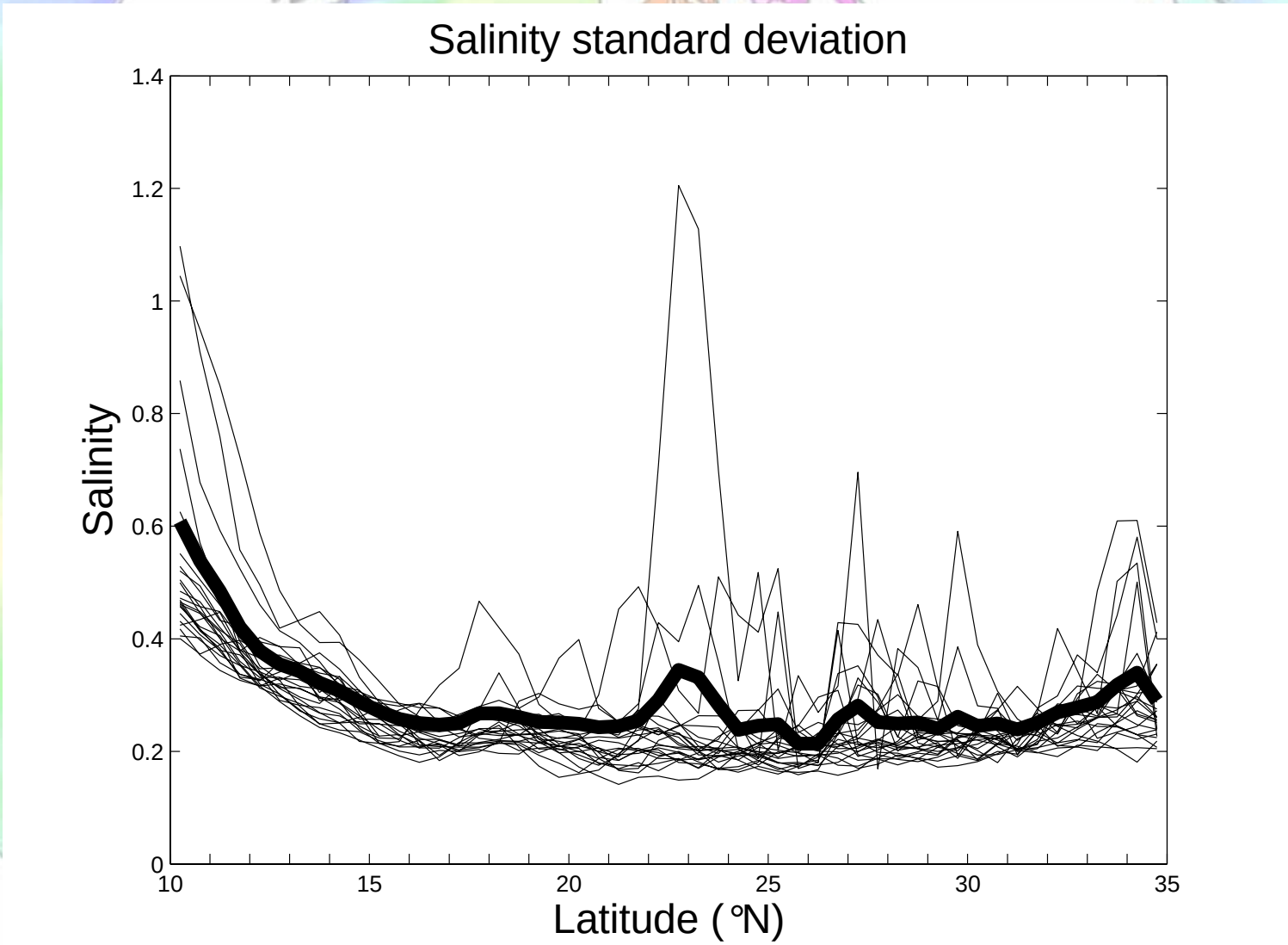


E-P for SPURS Region from ERAI

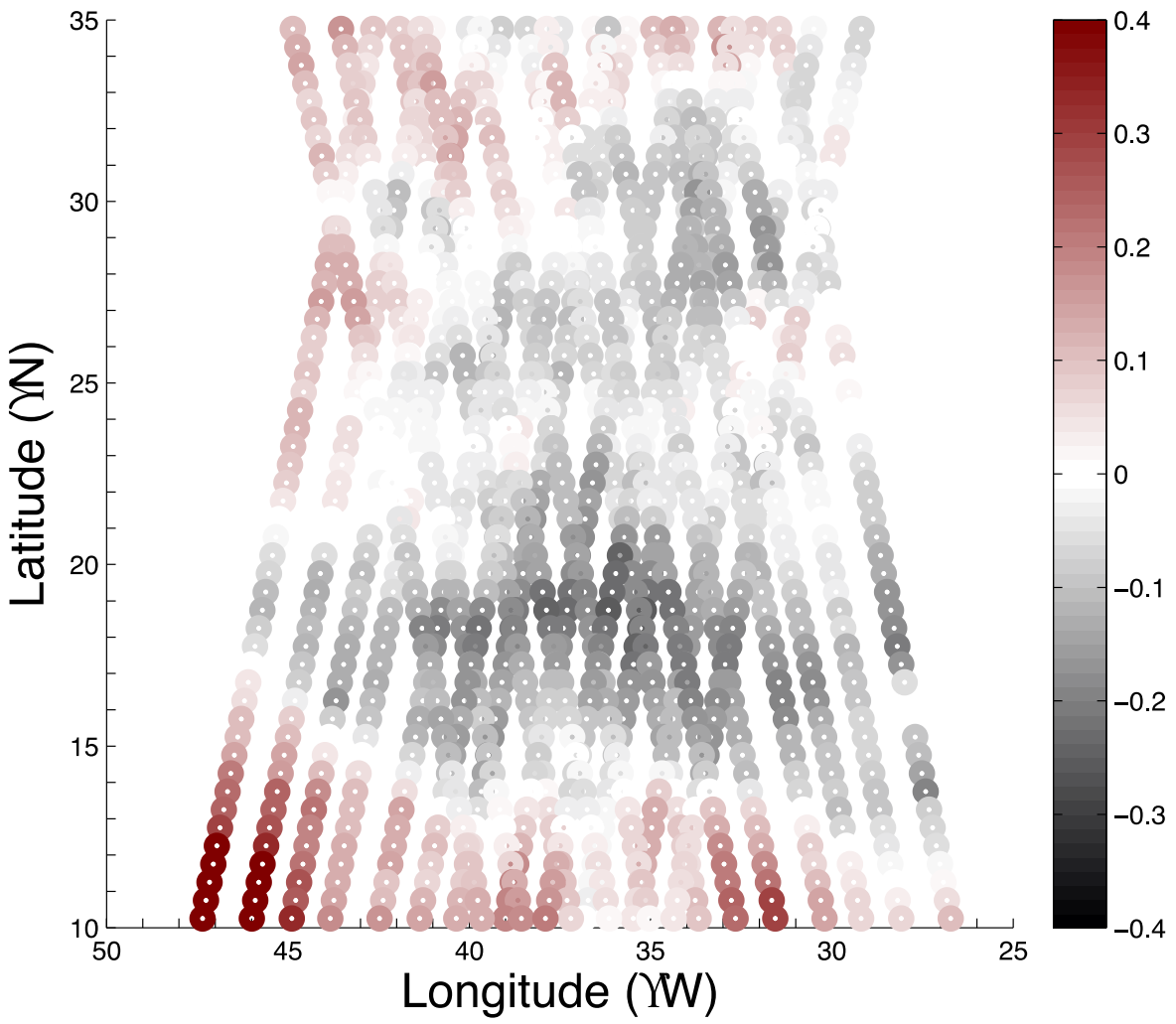
Courtesy: J. D'Addezio

Surface area of 37.4 isohaline

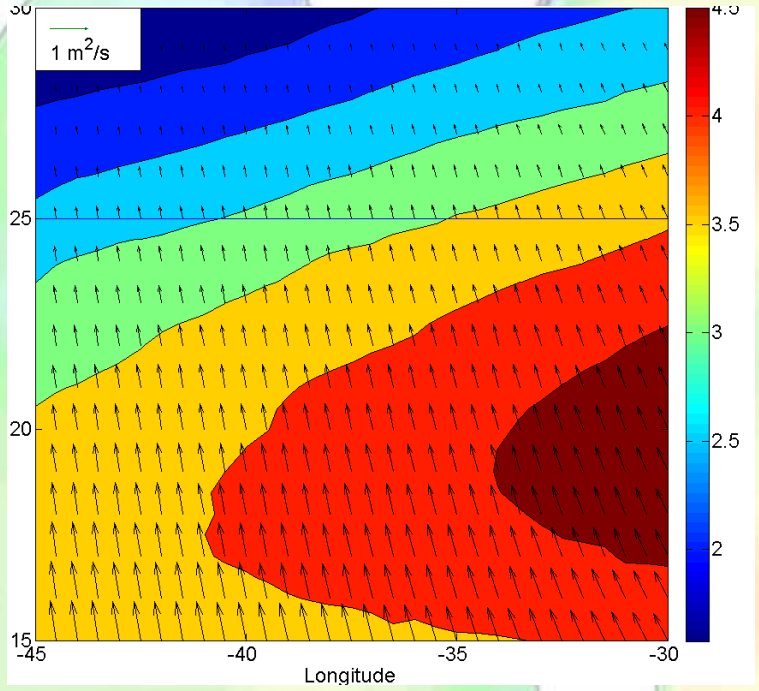
Along-track standard deviation



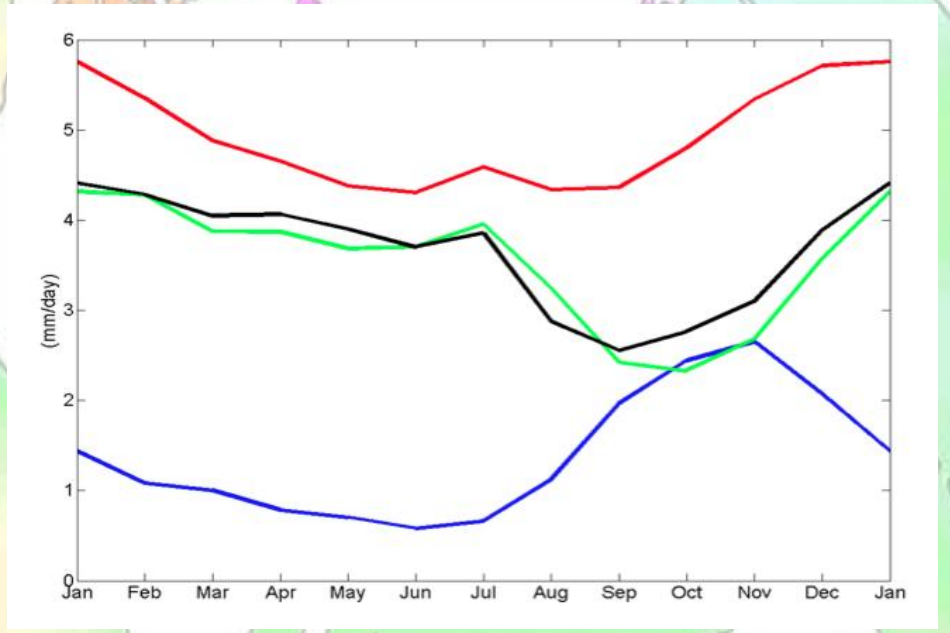
Linear trend Sept. 2011 – Aug. 2013



A Subtropical North Atlantic Regional Atmospheric Moisture Budget*



E-P (mm/day) plus Ekman Transport



Mean E (red), P (blue), E-P (green) and moisture flux divergence (black)

Observed E-P plus Ekman transport gives SSS change of ~0.6 between 15 and 25° N vs. observed of about 1.5

*D'Addezio et al, 2014. Data are from ERAI, averaged over 1979-2013

Summary

- Documented mean structure and variability of the SSS-max using Aquarius data
- The SSS-max has low variability and a small seasonal cycle
- Parts of the SPURS region have gotten fresher at a rate of ~0.2-0.3 psu/yr
- Seasonal variability is consistent with northward transport by Ekman flow and the classic view of SSS-max formation
- The SSS-max shows evidence of frontal structures and fresh intrusions, either advective or from rainfall
- There was a rapid decrease in SSS in the second half of 2012 and a decrease in surface area covered by the SSS-max, possibly related to low E-P (heavy seasonal rainfall)