

SBE41(Cp) Data Quality

Delayed-mode experience from

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At the float workshop in Seattle in September 2017, it was discussed that about 10% of the Argo fleet experienced salty salinity drifts.

SIO, in particular, had seen increased occurrence of rapid and gradual salty drift in floats deployed in 2014/2015 (Sbe41Cp).

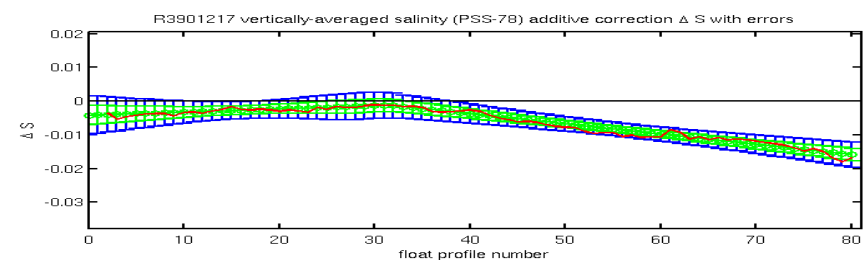
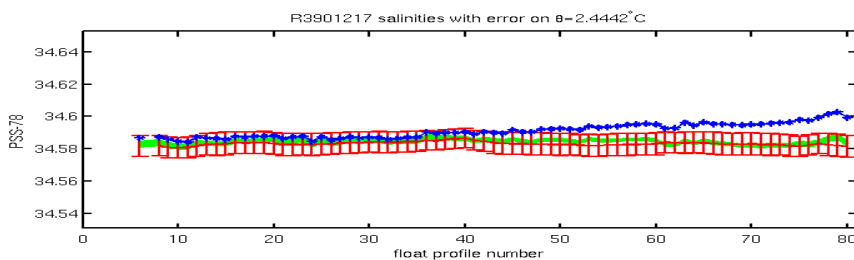
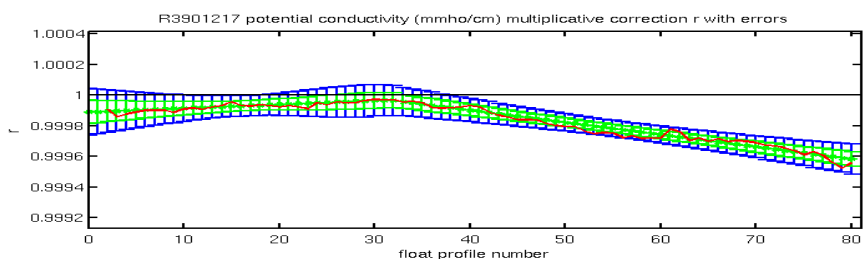
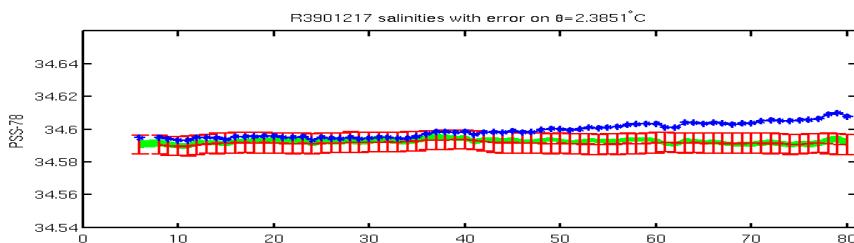
Post-workshop analysis of UW Argos floats that used the Sbe41 (not complete) showed that there had been a dramatic increase of salty drift since 2011 (>50%).

Prevalence of PSAL Drift in SIO SOLO/SOLOII

(Analysis done September 2017; % salty drift from 2014/2015 expected to grow)

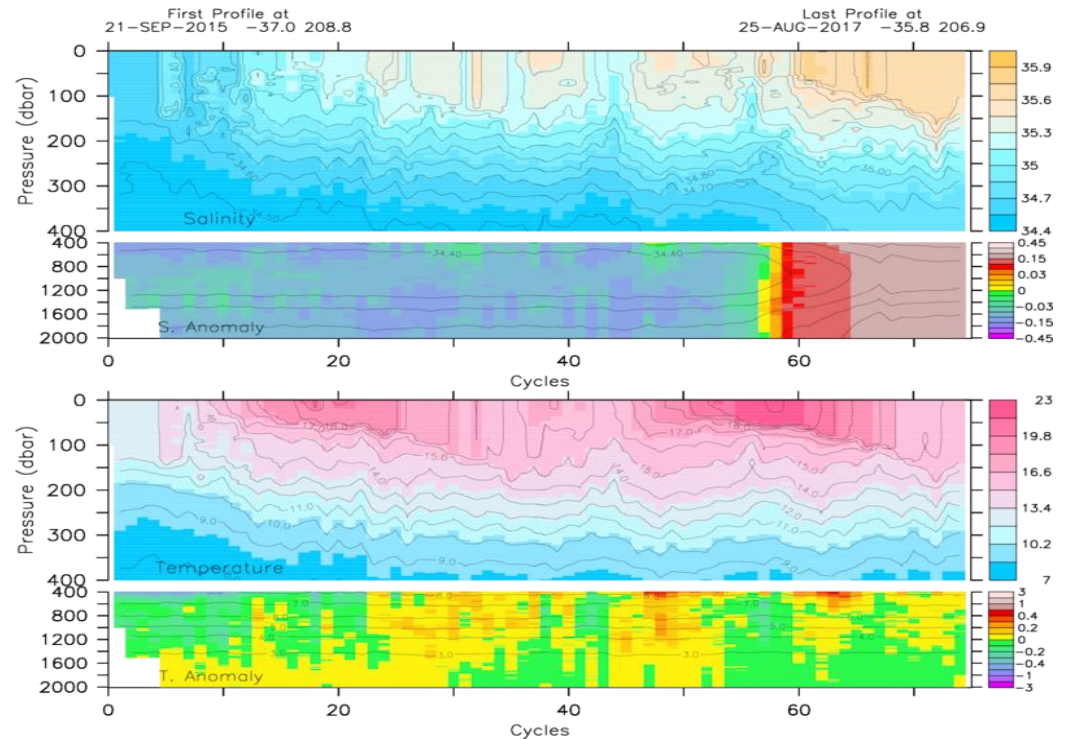
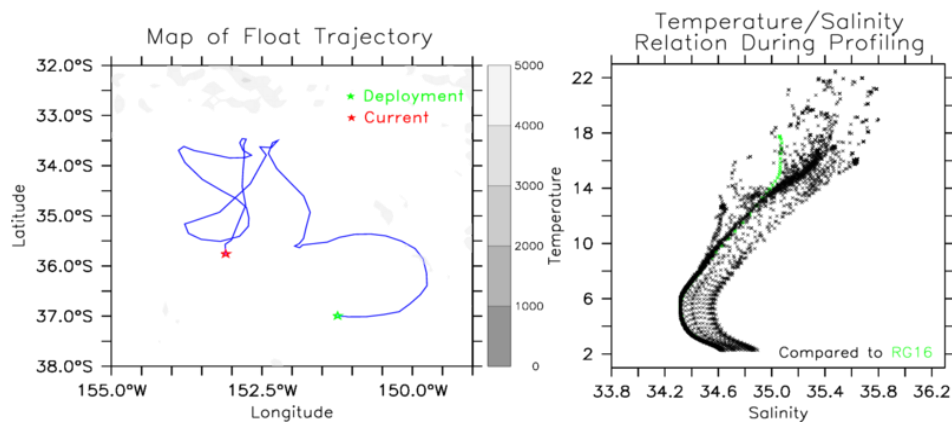
Year	Type	Floats	%/Count Drifting	%/Count Drifting Salty
2004-2007	SOLO		~30% (2013)	
2008-2010	SOLO		~6% (2013)	
2011	SOLOII	73	4.1% / 3	1.4% / 1
2012	SOLOII	78	5.1% / 4	0 / 0
2013	SOLOII	78	3.8% / 3	2.6% / 2
2014	SOLOII	103	17.5% / 18	14.6% / 15
2015	SOLOII	121	13.2% / 16	10.7% / 13

SOLO/SOLOII equipped with SBE41CP



Increased occurrence of rapid salinity drift in SIO floats

IDG SN	WMO SN	Deployment Date	Ship	CTD SN	Pressure SN	Pressure Manuf.	CTD version
8359	7900299	18May2015	Palmer	5801	3797230	Druck	3.0c
8378	3901216	26May2015	Palmer	6766*	4219013	Druck	3.0c
8381	4901639	21Nov2015	Oceanus	6775*	4200889	Druck	3.0c
8383	5902398	21Sep2015	Kaharoa	6776*	4200897	Druck	3.0c
8393	5902406	27Sep2015	Kaharoa	6783*	4268758	Druck	3.0c
8394	5902407	27Sep2015	Kaharoa	6777*	4214868	Druck	3.0c



Salty drift of between 0.07psu to 0.3psu
 Rapid onset of drift between cycles 40-70
 DMQC :

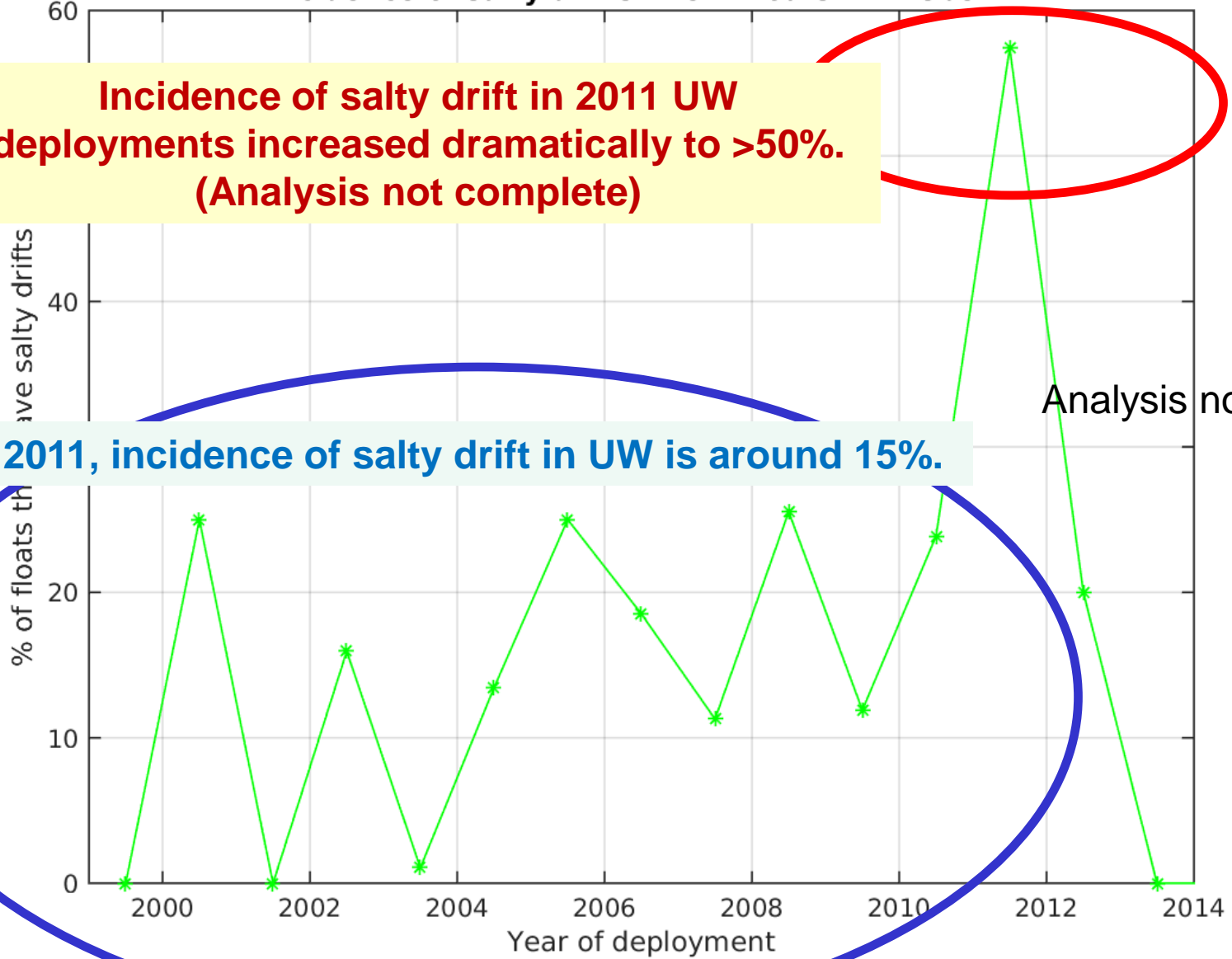
PSAL data QC'd as bad if drift > 0.1psu
 *Date of Manufacture Dec2014

Incidence of salty drifts in UW floats with Sbe41

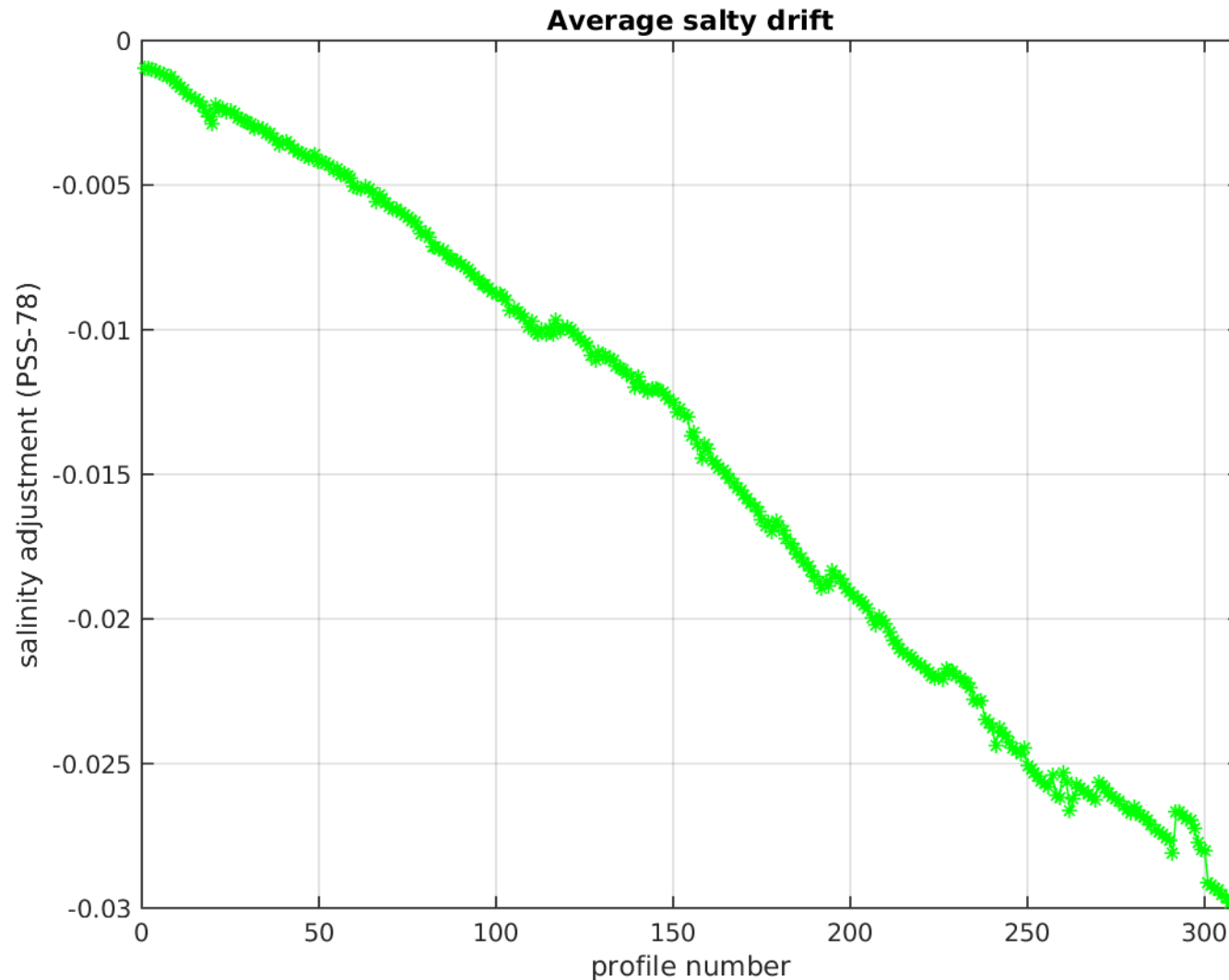
Incidence of salty drift in 2011 UW deployments increased dramatically to >50%. (Analysis not complete)

Before 2011, incidence of salty drift in UW is around 15%.

Analysis not complete



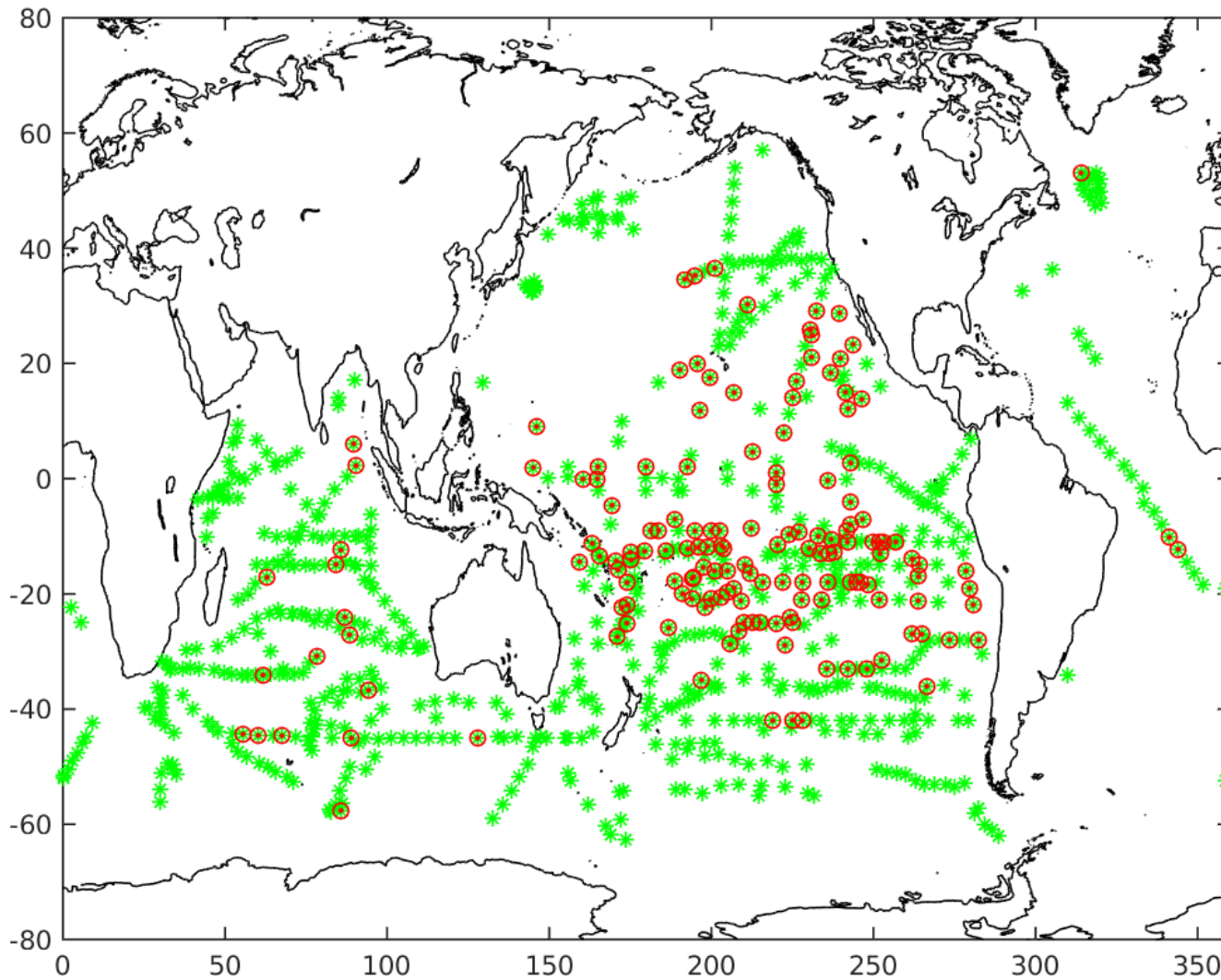
**Average drift rate is about 0.01 PSU over 100 profiles.
Hence difficult to detect with certainty until about cycle 200
(> 5 years).**



**< 0.01 too small
for adjustment**

**> 0.05 too big
for adjustment**

Locations of UW floats with Sbe41 that have salty drifts (analysis not complete)

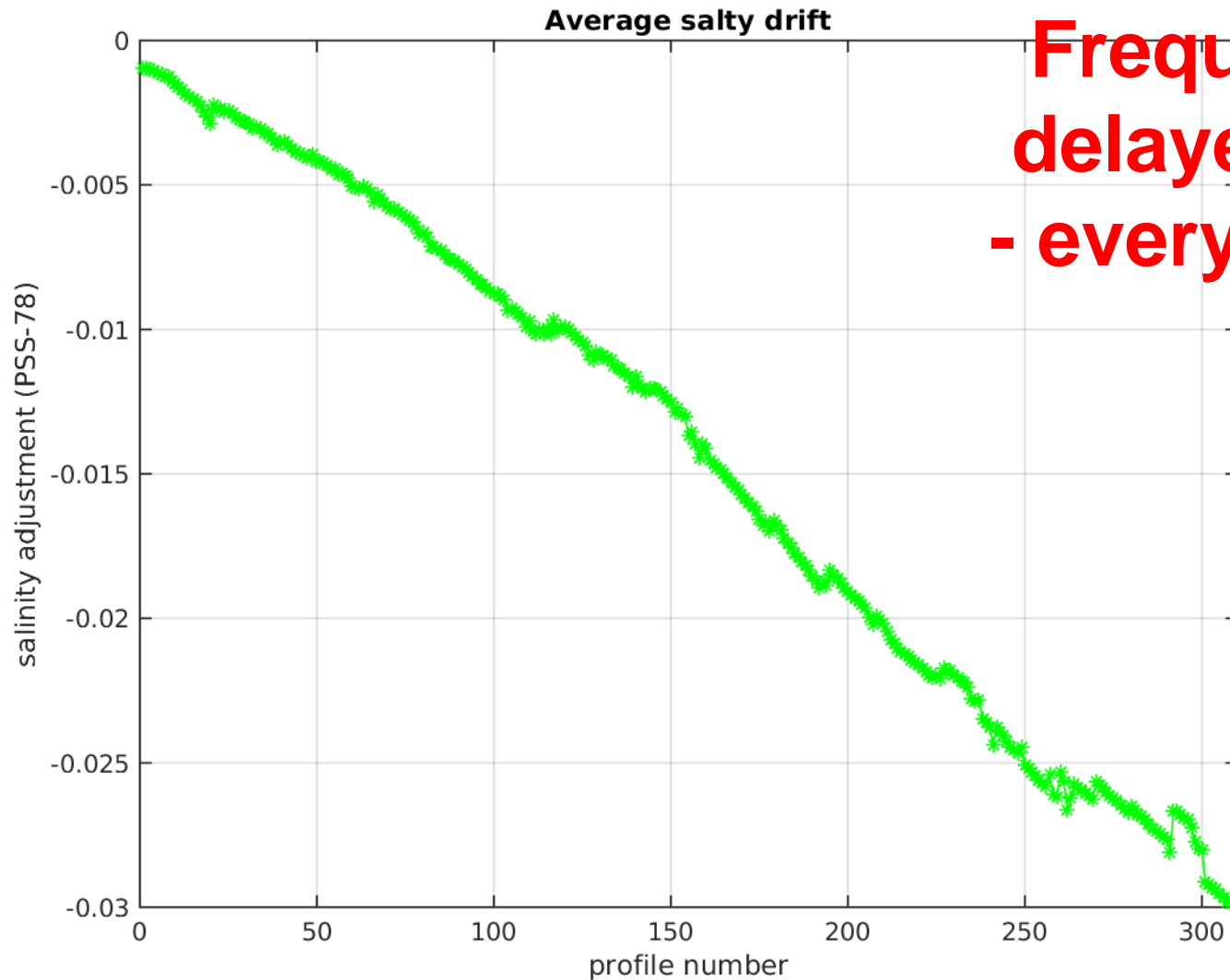


Most of the salty drifts are observed in the subtropical South Pacific. However, I don't believe the geographical bias is related to the hypothesis that warm surface water is a cause of the salty drift. Rather, I believe the observed bias in the subtropical South Pacific is due to the fact that delayed-mode folks can detect such slow and gradual drifts against the background oceanography there easier than in other ocean basins.

The average rate of drift is about 0.01 psu over 100 profiles. So it takes about 5+ years for the drift to manifest itself. In most oceanic regions, the float will have moved across many water masses in 5+ years, making it difficult to separate such slow sensor drift from water mass variability.

The subtropical South Pacific, with its wide basin and small salinity gradients below 1000dbar, is therefore an optimal place to observe these slow salinity drifts.

**Average drift rate is about 0.01 PSU over 100 profiles.
Hence difficult to detect with certainty until about cycle 200
(> 5 years).**



**Frequency of
delayed-mode
- every 2 years?**

Salty drifts have been observed in all ocean basins and at all latitudes.

Both UW and SIO have seen dramatic increases in incidence of salty drifts from their floats that used the Sbe41 and Sbe41Cp. Analysis is ongoing to determine the extent of the salty drifts.

Considering holding a CTD delayed-mode workshop in 2018 to focus on detecting these slow salty drifts.