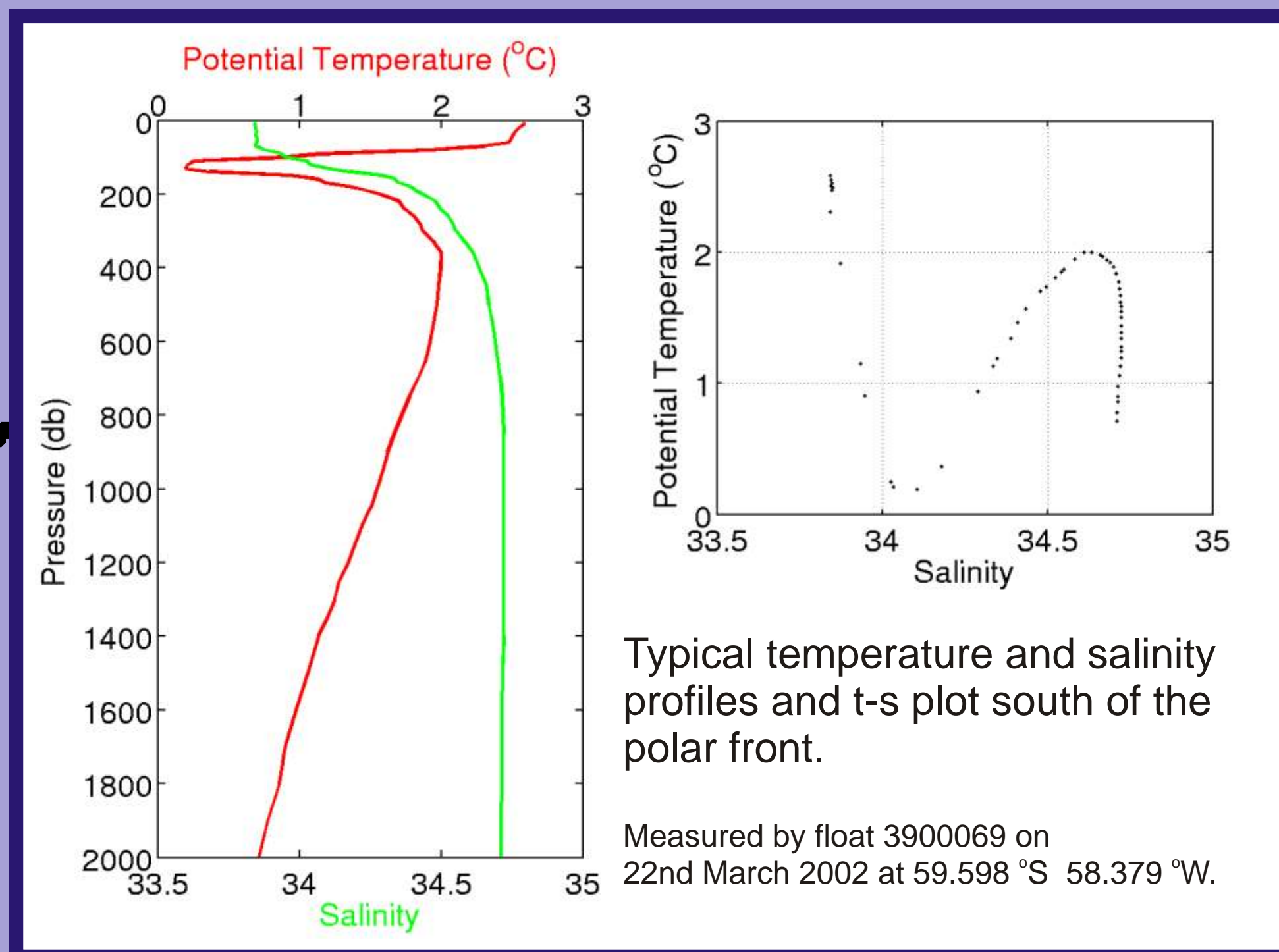




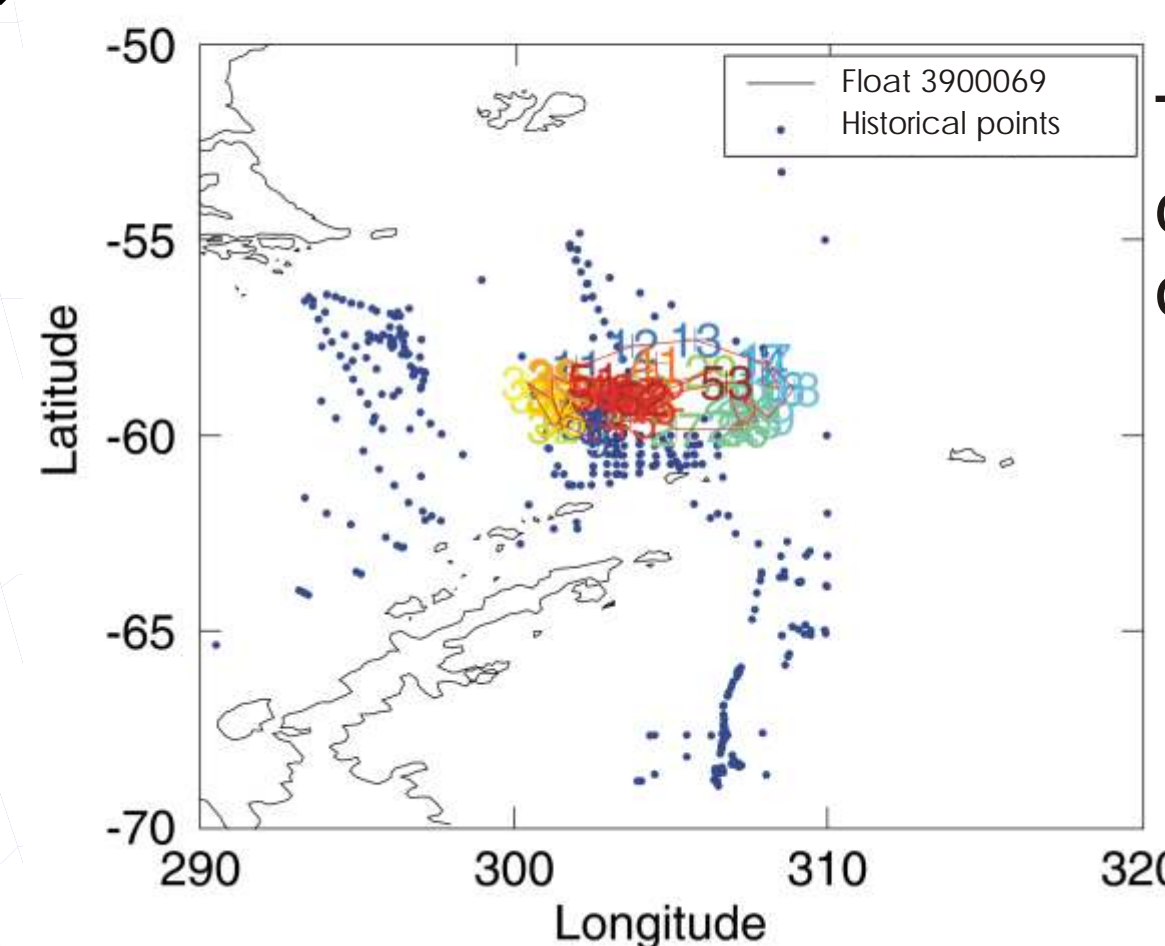
Delayed-mode QC of Argo float salinity in the Southern Ocean

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To ensure the quality of salinity data from Argo floats it is necessary to have a method that compares float salinities with an external reference. One such method has been developed by Wong et al. (2003) for detecting salinity offsets and drifts. Float salinities on standard potential temperature (θ) levels are compared with objectively mapped historical data. However, in the Southern Ocean, south of the Polar Front, the subsurface temperature maximum leads to multiple occurrences of levels. We report on some problems with the present method. Furthermore, in some regions there is a very limited availability of good historical data.

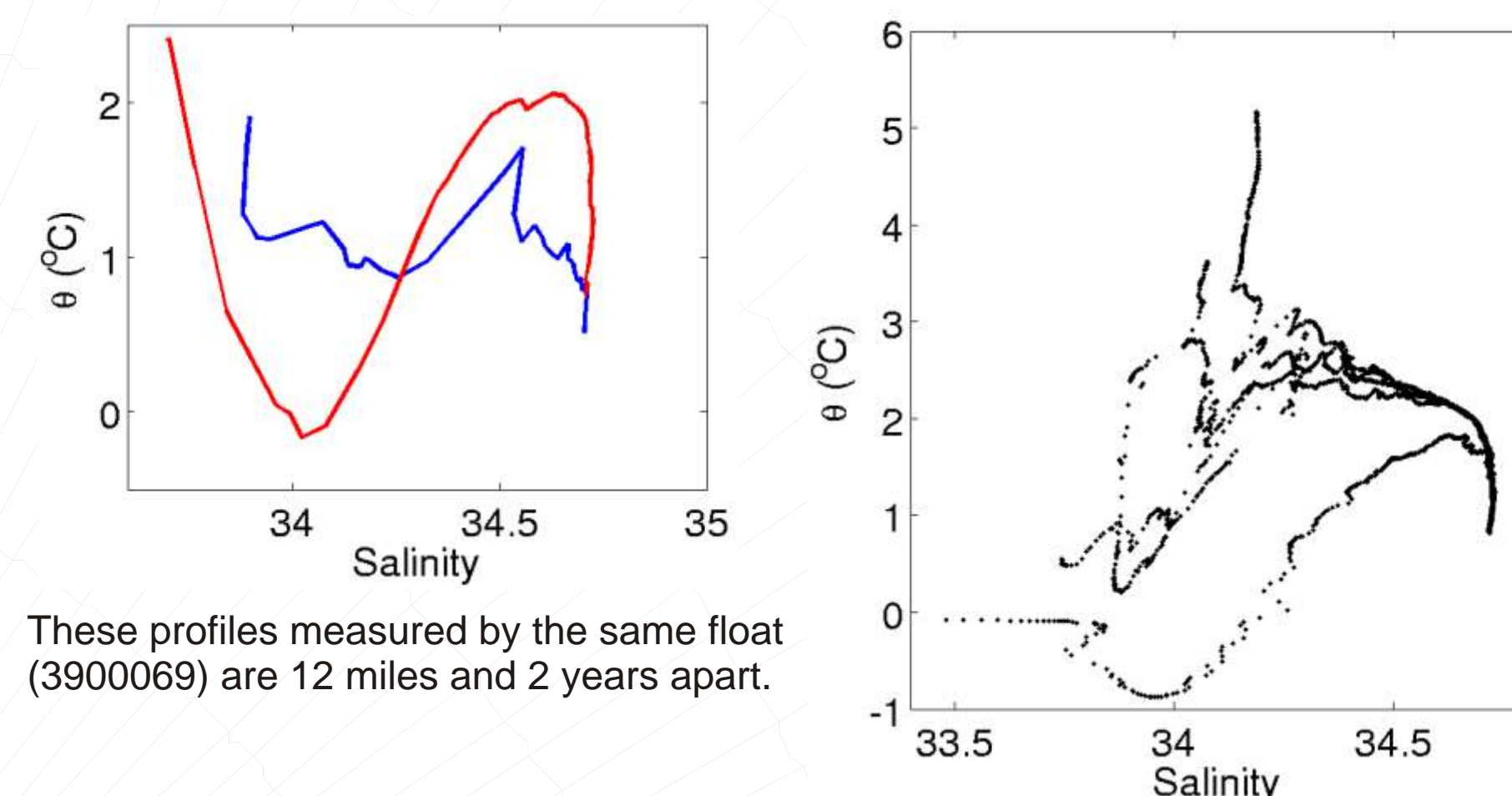


Using the Wong et al. (2003) software



The amount of good quality data is sparse compared with other regions of the world.

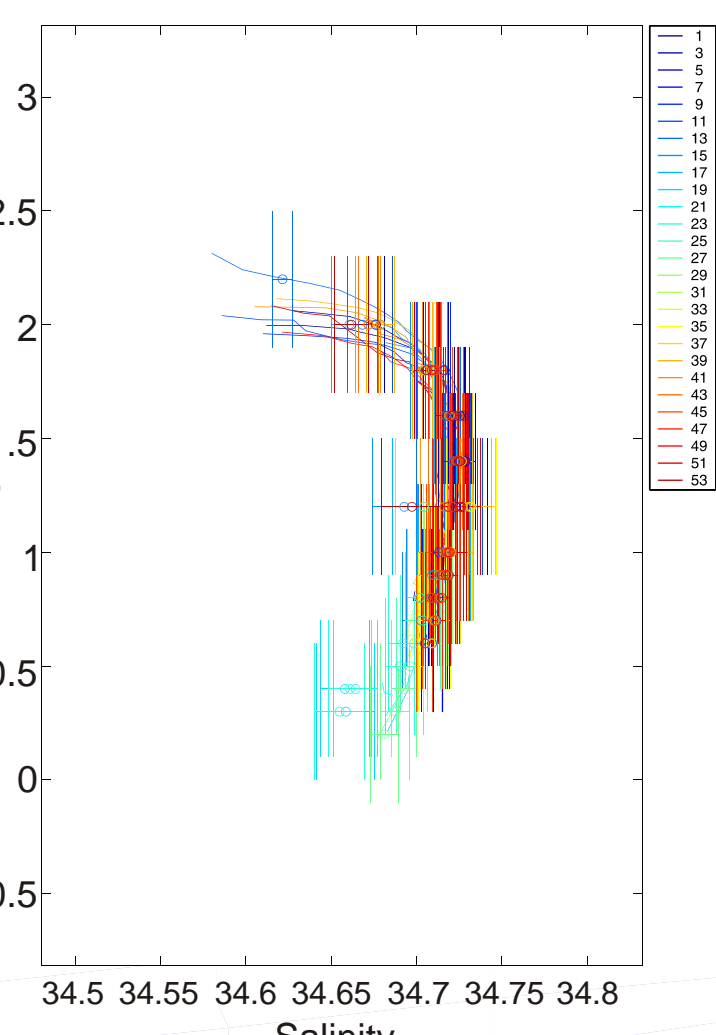
There is large spatial variability.



These profiles measured by the same float (3900069) are 12 miles and 2 years apart.

T-S diagrams from 5 consecutive WOCE CTD profiles within a 1° box in the Drake Passage.

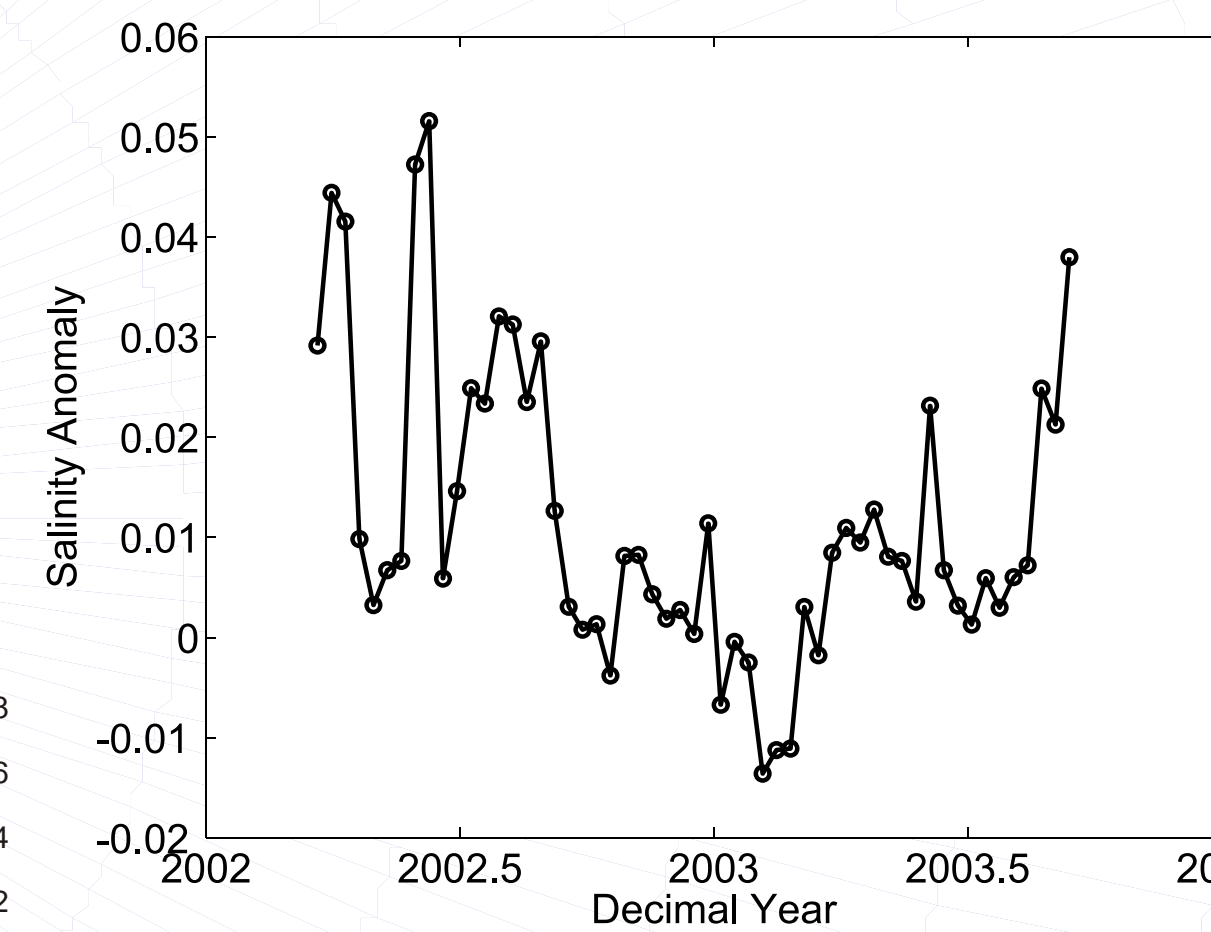
Addressing the multiple salinities problem



The profiles are truncated to remove all data shallower than the deepest temperature inversion. This concentrates the calibration procedure to the deepest, most stable part of the water column.

There is more than one salinity value for the same level. Temperatures warmer than the sub-surface maximum can be associated with a wide range of salinities which interferes with the calibration.

Addressing the variability problem



Salinity anomaly at 2000 m from float 3900069 using historical data within a 2.5° grid around the profile location.

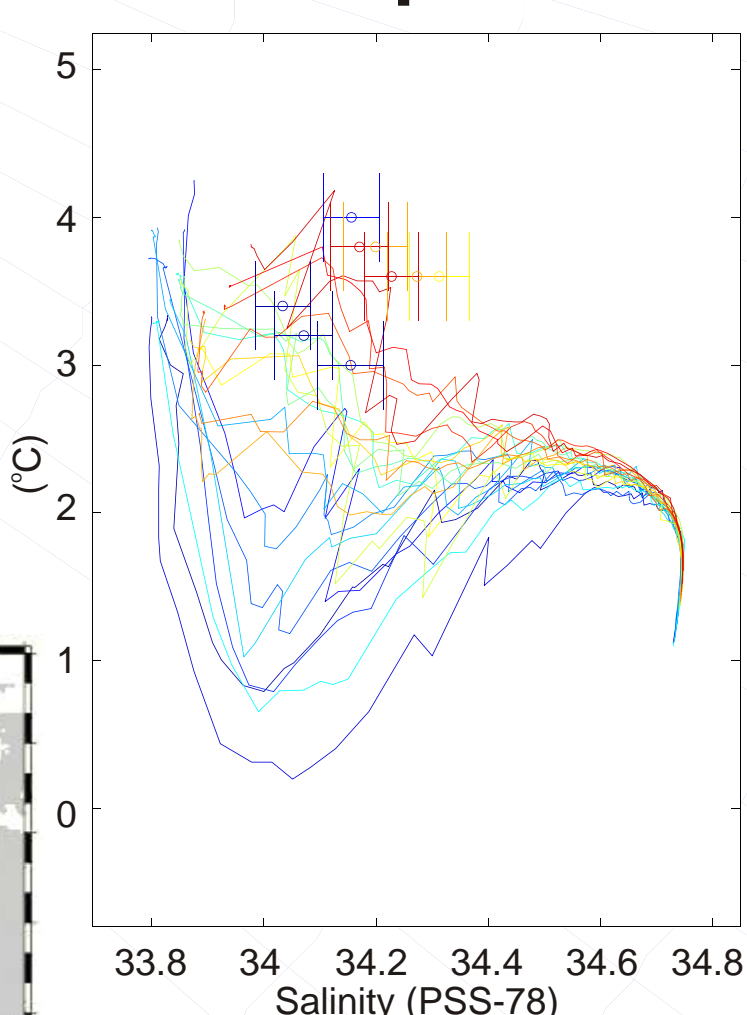
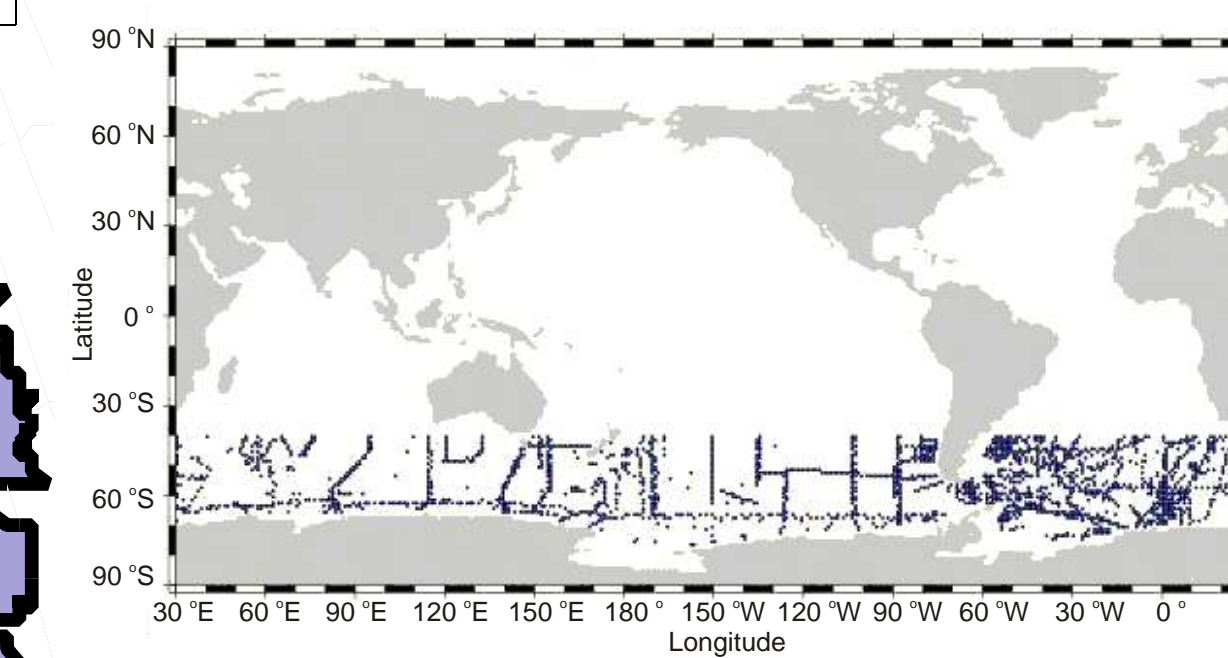
Comparing the deepest salinity against the historical data at this depth within a 2.5° grid around the profile should help reduce the variability if the water mass at 2000 m is stable.

However, the variability even at this depth is still too great to enable correction of the float salinity to the desired +/- 0.01.

How widespread are these problems?

The temperature inversion problem occurs everywhere south of the Polar Front.

Example from the Indian sector.



Float 5900276 uncalibrated data (-) and mapped salinity (o) with objective errors.

CTD stations in the World Ocean Database that have measurements at least as deep as 1500 m

As floats begin to report from sparsely sampled areas in the Southern Ocean the problem of having good historical data becomes more pronounced. CTD stations from float deployment cruises will be of critical value.

What does this mean for Argo and the wider community?

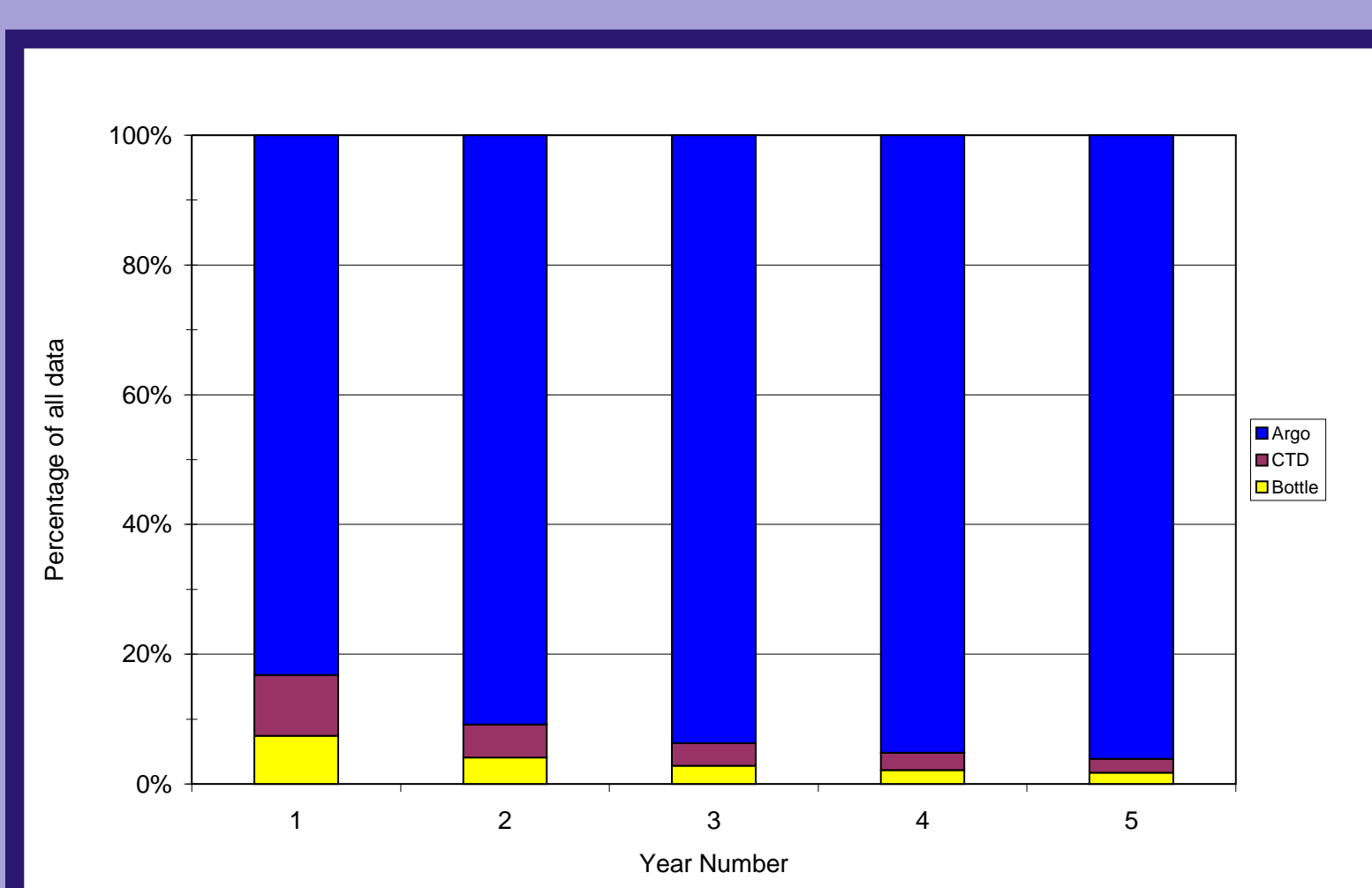
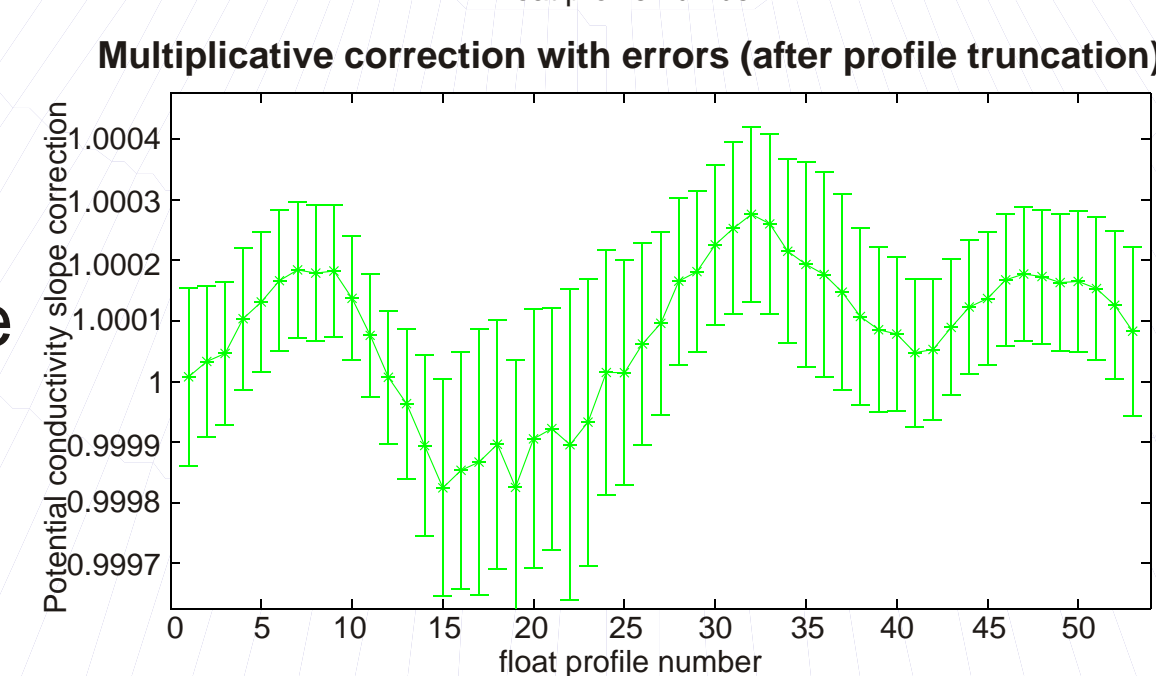
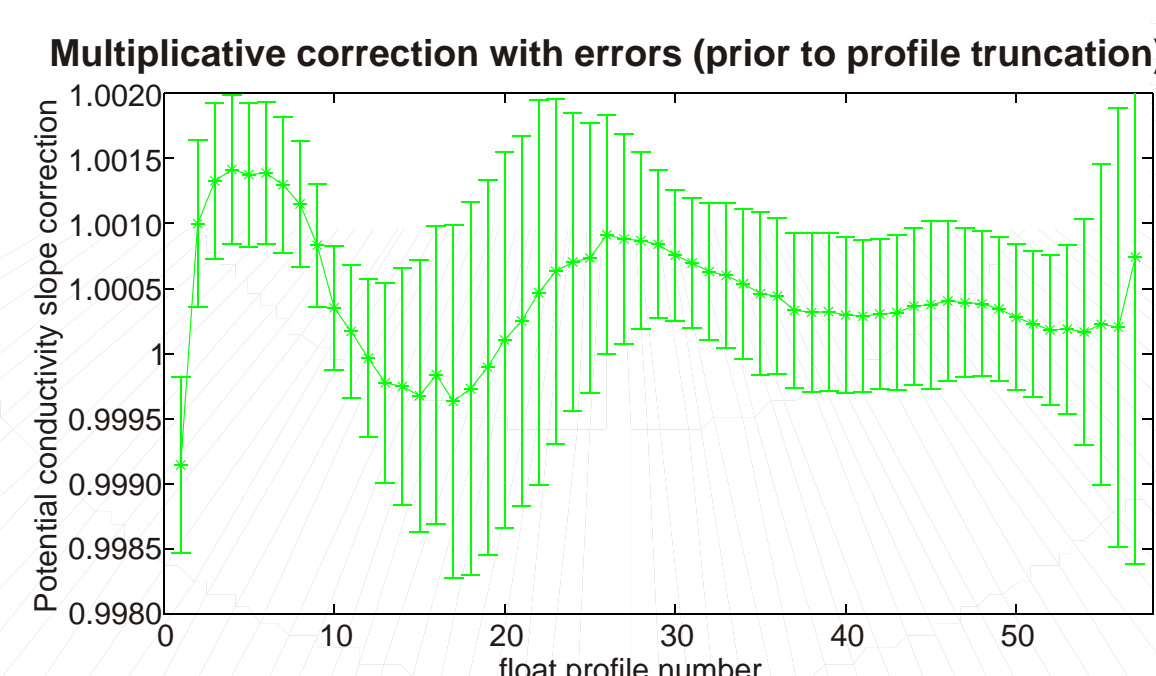
When the full 3000 float array is realised ~1000 floats will be south of 40 °S. The Argo Programme must address the problem of assessing accurately the data from 1/3 of the float array.

Argo will contribute a significant amount of data in a largely inaccessible region and has the potential to increase the number of temperature and salinity profiles by about 25 times within 5 years.

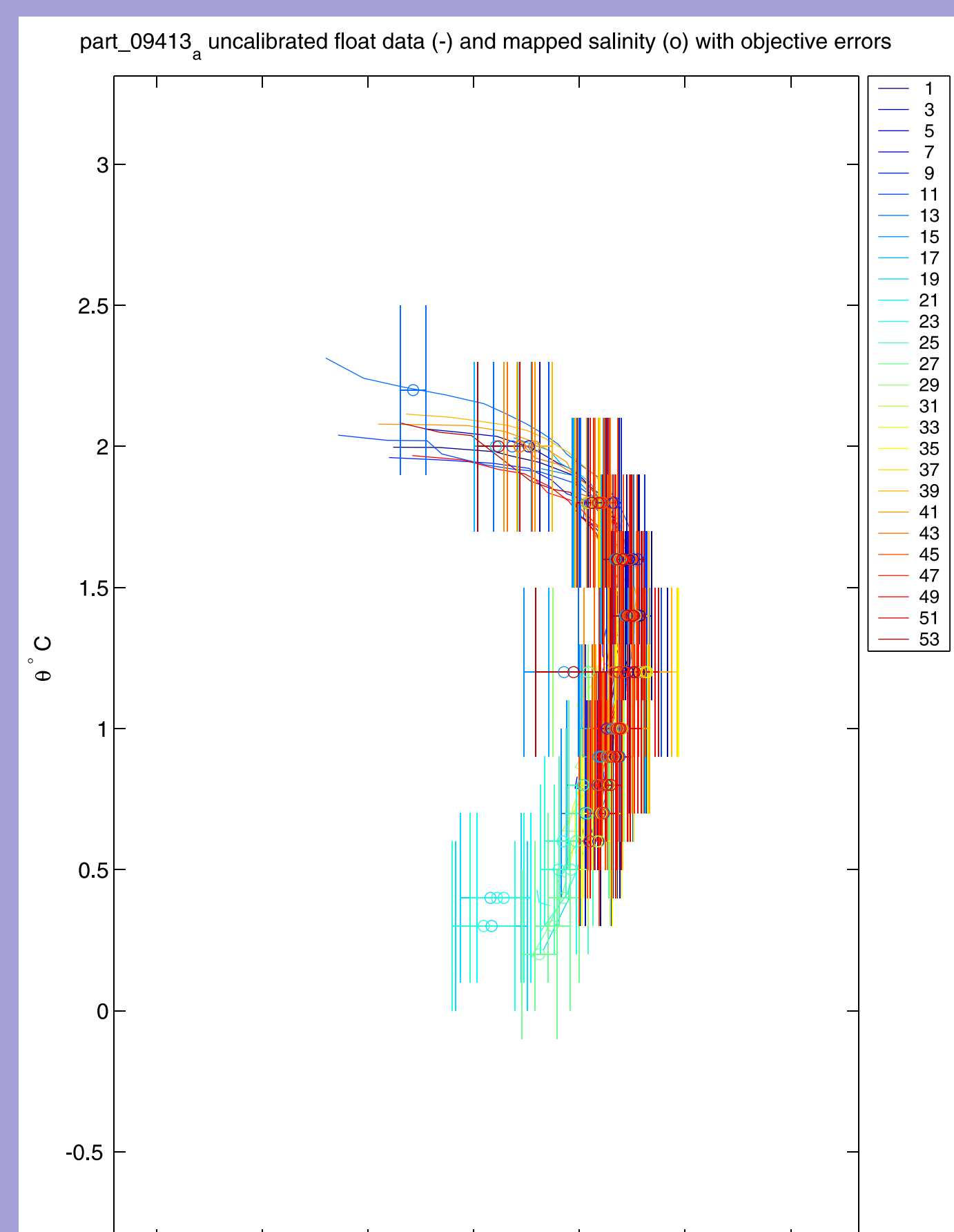
Consequently the number of Argo profiles will exceed the historical data. Therefore it is important to ensure that the data are correct.

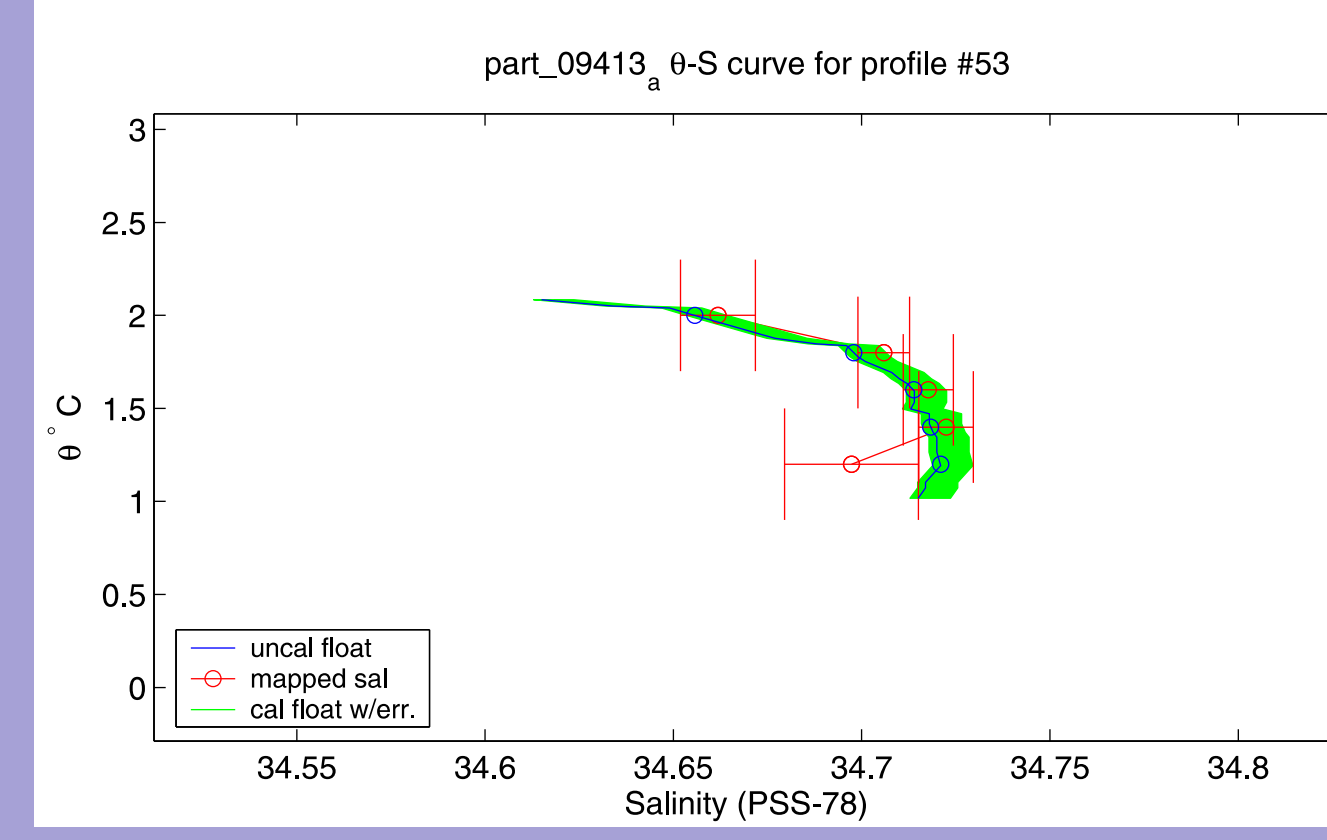
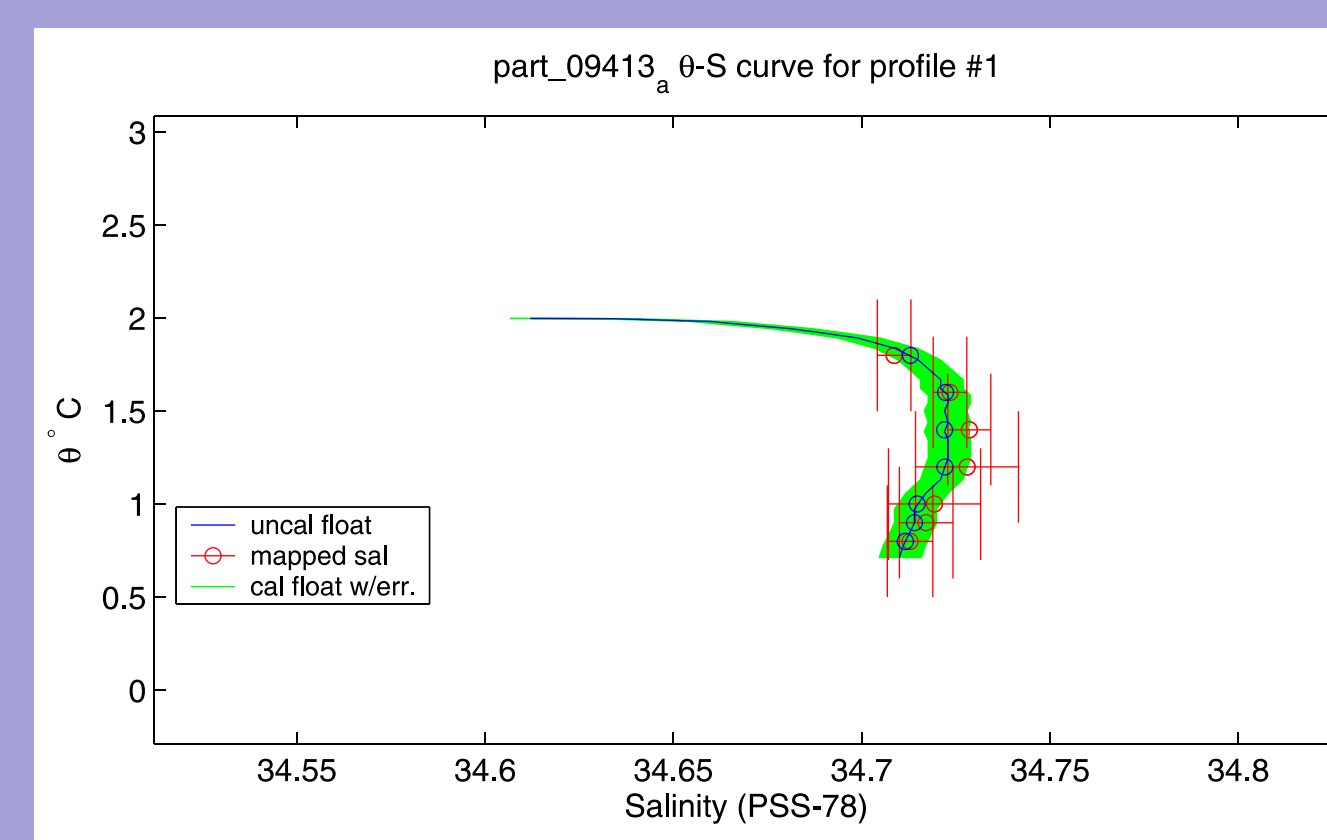
A correction factor for conductivity is suggested. In this case the correction deduced from complete float profiles has large uncertainty and is erroneous. A satisfactory answer is achieved using the truncated float profiles.

In some other cases, variability in the reference data continue to make it difficult to achieve acceptable confidence in the proposed correction.

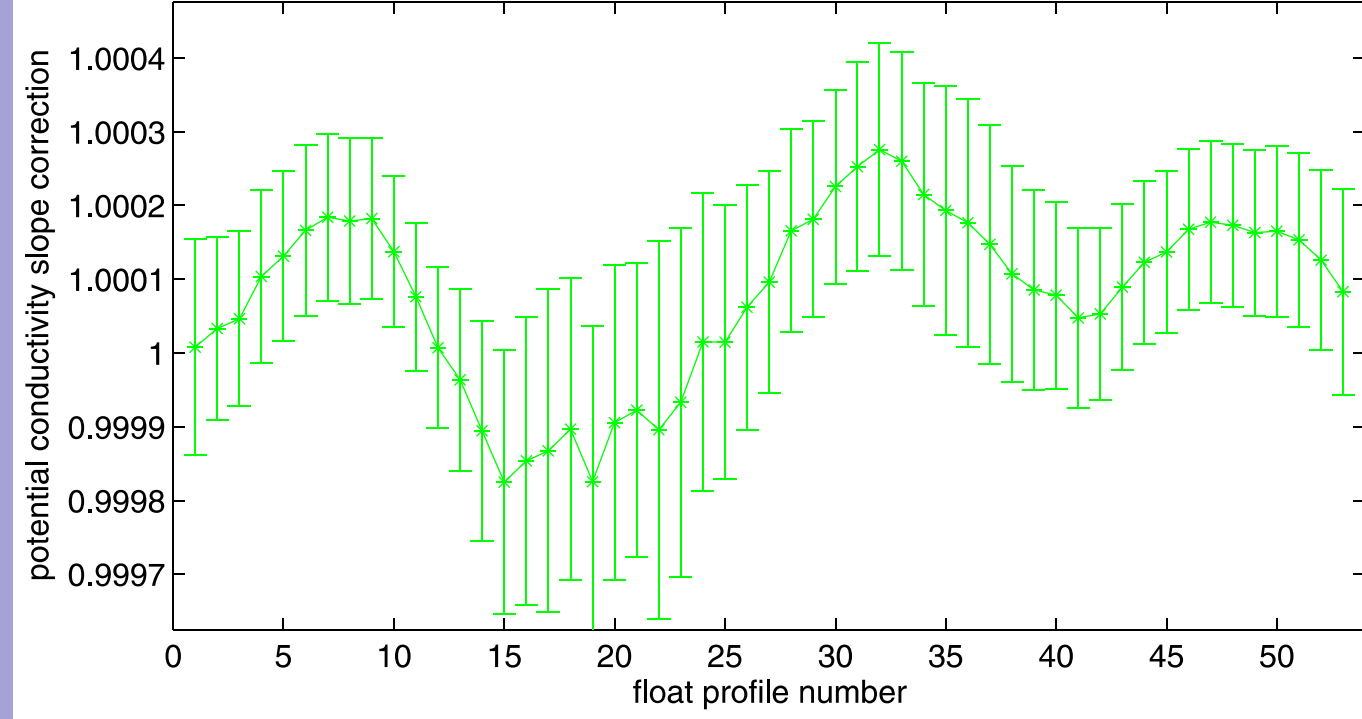


An estimate of the percentage of all the data south of 40 °S over 5 years with 1000 floats profiling every 10 days.





part_09413_a potential conductivity multiplicative (slope) correction with errors



part_09413_b salinities with error on $\theta = 1.6^\circ\text{C}$

