

Dissolved Aluminum – all values in nM – labs are anonymous

	<u>SAFe S</u>	<u>SAFe D2</u>	<u>SAFe D1</u>	<u>Blank</u>	<u>Detect. Lim.</u>
Lab A	1.67 ± 0.02	0.99 ± 0.02	0.62 ± 0.05	0.10 ± 0.01	0.03
Lab B	1.74 ± 0.09	0.99 ± 0.03	0.66 ± 0.02	0.17	0.25
Lab C	1.69 ± 0.05	1.01 ± 0.07		0.15 ± 0.05	0.15
Lab D	1.86 ± 0.11	1.19 ± 0.04		0.18 ± 0.03	0.10

SAFe S = 1.74 ± 0.09 nM

SAFe D2 = 1.04 ± 0.10 nM

SAFe D1 = 0.64 ± 0.03 nM

These are considered to be the consensus values for the SAFe Reference Samples at this time. Values are ±1 standard deviation of the averages of the various labs. The data from all the labs was included to arrive at the overall value.

The SAFe D1 value is lower than the SAFe D2 reference sample (the D1 sample was aliquoted from an unacidified tank and then subsequently acidified in the 0.5 L bottles, while the D2 tank was acidified and mixed prior to aliquoting into the 0.5 L bottles).

Only 4 labs submitted data - it would be good to have more participants.

References:

1. Brown, M.T. and K.W. Bruland. An improved flow injection analysis method for the determination of dissolved aluminum in seawater. *Limnology & Oceanography: Methods*, **6**: 87-95 (2008).
2. Sohrin, Y., S. Urushihara, S. Nakatsuka, T. Kono, E. Higo, T. Minami, K. Norisuye, and S. Umetani. Multielemental determination of GEOTRACES key trace metals in seawater by ICP-MS after preconcentration using an ethylenediaminetriacetic acid chelating resin. *Analytical Chemistry*, **80**: 6267-6273 (2008).
3. Zhang, J., H. Xu and J.L. Ren. Fluorimetric determination of dissolved aluminum in natural waters after liquid-liquid extraction into n-hexanol. *Analytica Chimica Acta*, **405**: 31-42 (2000).

Labs participating in the analysis of the SAFe reference samples to determine a consensus value for dissolved Al (listed in random order):

Rob Middag/Hein de Baar (NIOZ, Netherlands):

Flow Injection method using an IDA Toyopearl AF-Chelate resin with fluorometric detection based upon the method published by Brown and Bruland (2008) with only one modification in the chemicals - the use of plain MQ for the rinse instead of the buffer described in the Brown and Bruland (2008) paper.

Matt Brown/Ken Bruland (UCSC, U.S.):

Flow Injection method using an IDA Toyopearl AF-Chelate resin with fluorometric detection - Brown and Bruland (2008). The one modification to the published method is to switch from using the homemade resin columns to Global FIA columns.

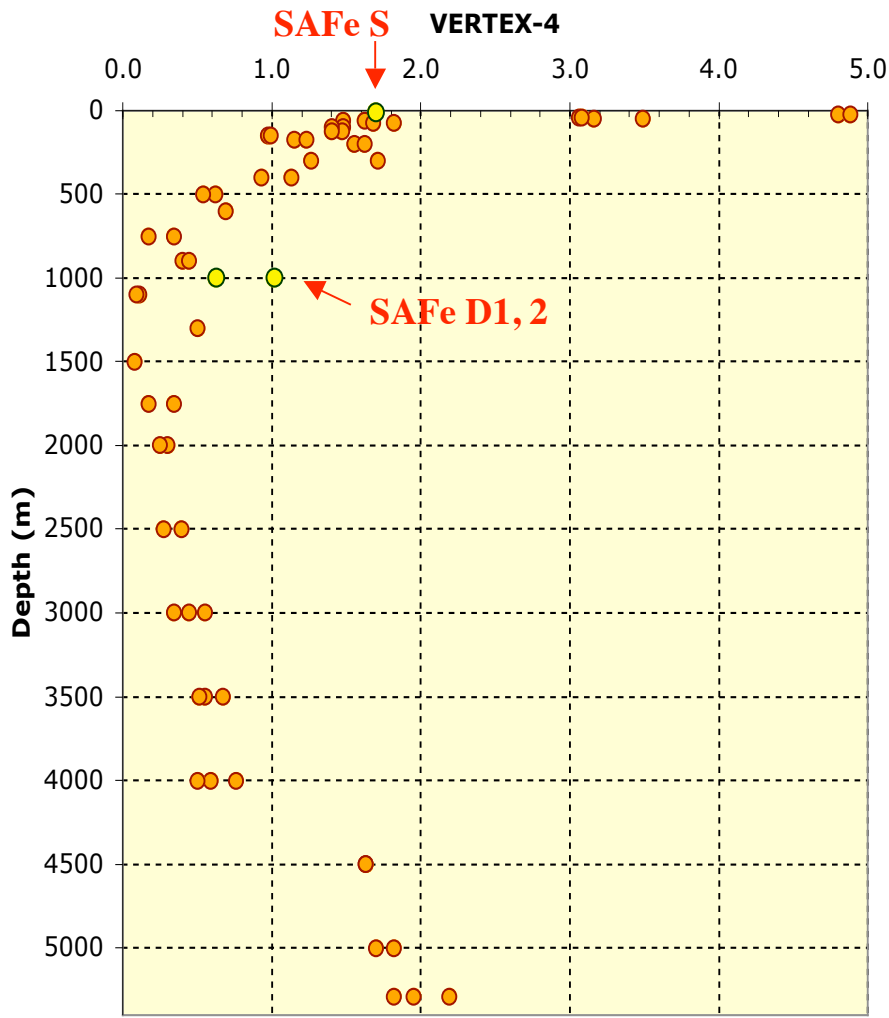
Yoshiki Sohrin (U. Kyoto, Japan):

Off line concentration using an EDTA-type chelating resin with subsequent analyses by ICP-MS using the method of Sohrin et al. (2008).

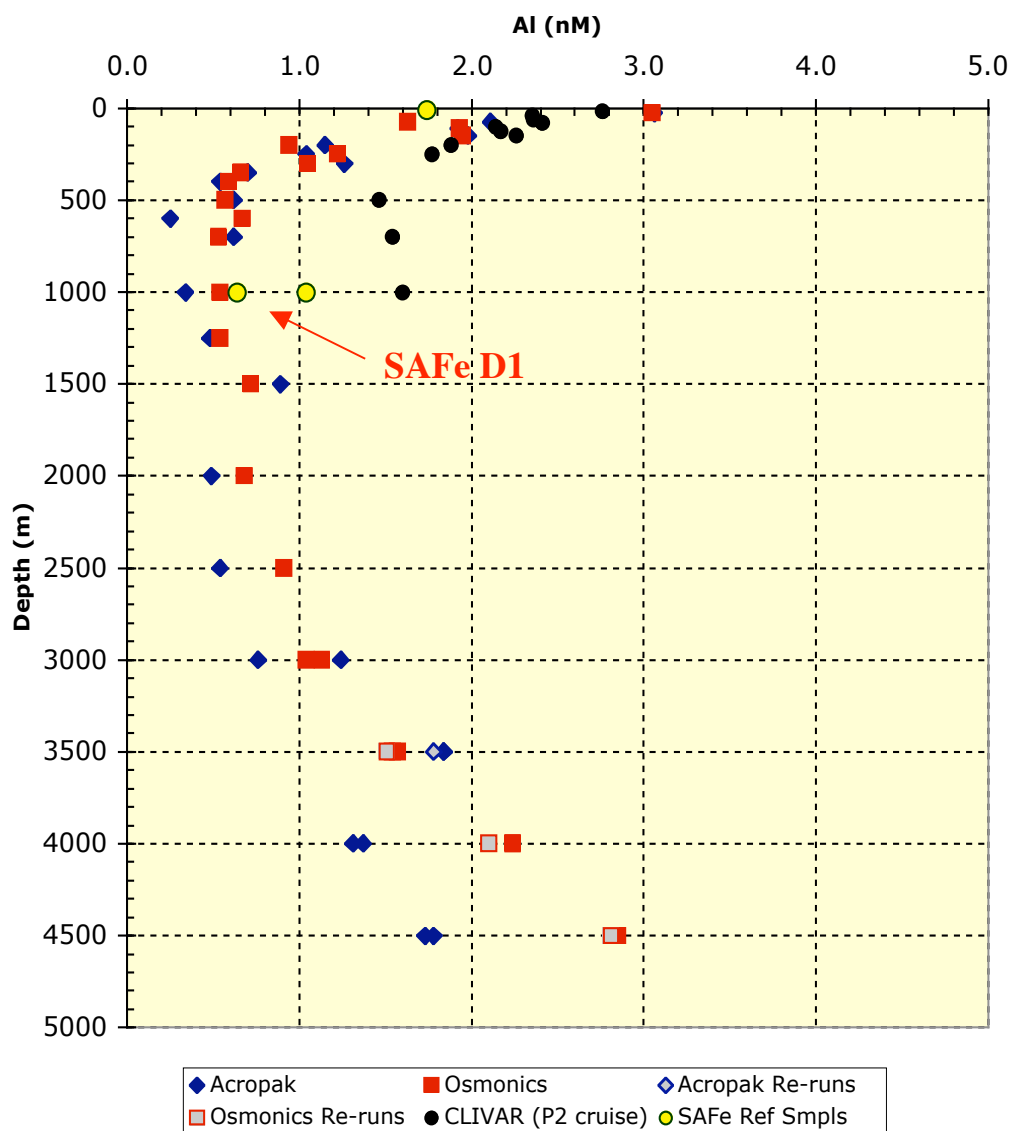
Jingling Ren (Oceans University, China):

Solvent extraction with fluorometric detection – based upon Zhang et al. (2000).

The method used for the measurement of dissolved Al is an improved fluorometric method after extracting the Al-Lumogallion complex into two aliquots of n-hexanol, with a concentration factor of 5. The major differences with the original method of Hydes were improving the sensitivity by extraction and overcoming interferences from fluoride and iron at the same time.



Data from a station to the southwest of the SAFe site (further into the central gyre) published in Orions and Bruland (1986). The consensus values for the SAFe reference samples are plotted for comparison.



Data from Brown and Bruland (determined at the UCSC shore lab) for the SAFE site on the Pacific GEOTRACES Intercalibration cruise in May 2009 comparing the Osmonics (red squares) and Acropak (blue diamonds) capsule filters, along with data from a CLIVAR station (black solid circles) determined on board ship (Measures et al.) at a nearby station (obtained with the Acropak capsule filters) collected with the CLIVAR rosette. The determination of dissolved Al at the low concentrations observed in the North Pacific is turning out to be difficult. The SAFE D1 reference sample appears to be most representative of the 1000 meter water. We are currently investigating the cause of these problems. It is the sampling/acidification/storage at the low concentrations found in the North Pacific that appear to be most difficult, and not the actual determination of dissolved Mn as there is good agreement between the different labs. In the North Atlantic, with its high dissolved Al concentration, there was good agreement between filtration methods.