Comparability of Oceanic Nutrient Data
GO-SHIP Repeat Hydrography Nutrient Manual:

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Abstract:
The manual is an updated version of the original nutrient manual provided for the GO-SHIP endeavor. It reviews basic aspects of Continuous Flow Analysis (CFA) using an AutoAnalyzer (AA); provides a brief history of past inter-calibration exercises; outlines specific nutrient methods in use by many laboratories doing repeat hydrography for nitrate, nitrite, phosphate, silicate and ammonia; provides laboratory practices including QC/QA procedures to obtain the best results; and gives examples of documentation protocols. The document covers the details of sample collection, storage of samples, considerations in the preparation of reagents, the calibrations of the system and determination of low level nutrient concentrations. Protocols for the use of RMNS solutions to “track” the performance of a system during a cruise and between cruises are discussed.

I) Introduction:
• Nutrient Data Comparability: GEOSECS to GO-SHIP
• History of chemistries and instrumentation

II) Sampling, Sample Preservation and Storage:
• Filtered vs non-filtered, gloves, freezing, thawing, sample containers

III) Instrumentation:
• Sampler, pump(s), manifolds, detectors

IV) Basics of Measurement and Analysis:
• Baselines (DW, Reagent, LNSW)
• Peak height determination
• Calculations of nutrient concentrations
• Corrections (RI, drift, carryover, salinity effects)

V) Methods:
• Reagent recipes and manifold configurations

VI) Standards and Standardization:
• Primary Standards: purities and determination
• Secondary and working standard dilutions

VII) QA/QC:
• Accuracy and precision: definitions and determination
• Tracking standards
• Check Samples
• RMNS, CRMS, and other QC samples

VIII) Cruise Documentation:
• Meta data

Appendices:
A) Buoyancy corrections
B) Gravimetric calibration of glassware
C) Calibration fits
D) Low-level (nanomolar) nutrients

Figure 4: Silicate biases between US and Japanese efforts before (a, b) and after (c, d) pre-adjustments (US: -1 %; Japan: +1 %) were applied to the data (see main text for details)