

Cruise RR2106 Processed CTD data

Expedition to the SEPR on the R/V Revelle (chief scientist Joe Resing; 18Sep-06Nov2021)

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All files are ASCII text files; all data files are comma or tab delimited.

The purpose of the cruise was to investigate the frequency of low-temperature VS high-temperature venting along the fast-spreading Southern East Pacific Rise (SEPR, 15-18°S) and the processes that stabilize iron for transport across the Pacific basin.

This cruise utilized 3 different CTD systems that were identified as:

- 1) "Hydrothermal CTD": PMEL provided the main Vents frame with up to 21 * 19-L Niskin bottles, SBE *9plus* CTD, Seapoint Turbidity meters (optical backscatter, 5X custom sensitivity), PMEL Oxidation-Reduction Potential (ORP) sensors, and Valeport VA500 altimeter. 35 vertical casts and 9 tow-yo operations were completed with this CTD during RR2106. Tows were navigated using a lay-back method; a limited number of vertical casts moved during the operations (noted in the cast location summary file and metadata lines at the start of each data file); USBL data was available for some, but not all, of those casts.
- 2) "Trace Metal CTD": The Resing Trace Metal frame with 12 * 10-L GoFlow bottles was used for vertical casts only (32 casts total). PMEL provided a SBE *9plus* CTD, Seapoint Turbidity meters (optical backscatter, 5X custom sensitivity), PMEL Oxidation-Reduction Potential (ORP) sensors, and Valeport VA500 altimeter for this system. A limited number of vertical casts had variable positions during the operations (noted in the cast location summary file and metadata lines at the start of each data file); USBL data was available for some, but not all, of those casts.
- 3) "Pump CTD": The ship's CTD with up to 12 Niskin bottles was being used to support high-volume water sampling for radon samples using WHOI-provided McLane Pumps. 12 vertical "Pump" casts were completed during RR2106. Optical backscatter, ORP, pressure and temperature data were acquired using PMEL Miniature Autonomous Plume Recorder (MAPR) instruments attached to the wire ~1 m above each pump.

This data set includes two files for each cast, identified by the file names, which are:

"CTDdata" – 5-second average data for the entire cast (down and upcasts)

"BottleFile" – 5-second average of CTD data at the time each bottle was tripped

The following Seabird Data Processing modules were used:

Data Conversion

Wild Edit

Bin Average (to 5 second bins)

Translate

Bottle Summary

Navigation for CTD tows used a lay-back method to calculate the position of the CTD and added to the CTDdata files based on time. The location for bottles tripped during CTD tows was extracted from the CTDdata file at the times the bottles were tripped and added to the BottleFile files.

USBL data for vertical casts that had variable positions was quite noisy. The data was smoothed and added to the CTDdata files when available. USBL data was not available for all vertical casts that had variable positions, in which case only one location is assigned to the cast. Most casts that had variable positions did not wander more than 100-200 m from the target position.

Cast numbers and station names: Casts were numbered sequentially throughout the cruise regardless of which CTD or type of operation was being conducted. Station names include a prefix letter to identify the operation, and numbered sequentially within each operation type as follows:

“Hydrothermal CTD” vertical casts:	V21A-xx	(ex: V21A-01 through V21A-35)
“Hydrothermal CTD” tows:	T21A-xx	(ex: T21A-01 through T21A-09)
“Trace Metal CTD” vertical casts:	M21A-xx	(ex: M21A-01 through M21A-32)
“Pump CTD” vertical casts:	P21A-xx	(ex: P21A-01 through P21A-12)

Metadata: The first few rows of each file contain the following metadata for each operation:

Cast number, Station Name, Latitude (degree), Latitude (minutes), Longitude (deegree), Longitude (minutes), Start time (UTC), End time (UTC), bottom depth (meters), Comments, Longitude (decimal degrees), Latitude(decimal degrees)

Data rows: begin with a line of column headings and include measured and derived variables including:

Measured: pressure (db), temperature (°C), conductivity (S/), voltage for each of the auxiliary analog channels on the SBE *9plus* CTD (i.e., for turbidity, ORP and altimeter sensors as noted)
Derived: salinity (PSU), potential temperature (Theta, °C), potential density anomaly (Sigma-theta), altitude (m), turbidity anomaly (Δ NTU), ORP (E, mV), and ORP anomaly (Δ E, mV), and temperature anomaly (Δ Theta, °C).

[Note “d” or “delta” may be used as a substitute for “ Δ ” for text-only requiriements in files)

Additional files: two additional files for each CTD system summarize the cast locations (and other metadata that is also included in the first few lines of each data file) and notes about the configuration of each CTD system. These files include in their names along with identifying which system they apply to:

“StationSummary”

“InstrumentConfigurationAndNotes”

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