

# Particulate Th-234 collected using large volume McLane pumps (LVPs) as part of the EAGER chief scientist training cruise (KM1910) at Station ALOHA, subtropical North Pacific gyre in June 2019

**Website:** <https://www.bco-dmo.org/dataset/854150>

**Data Type:** Cruise Results

**Version:** 1

**Version Date:** 2021-07-13

## Project

» [EAGER Collaborative Research: Early career chief scientist training for biological and chemical oceanographers](#)  
(Chief Sci KM1910)

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## Abstract

This dataset includes particulate Th-234 collected using large volume McLane pumps (LVPs) as part of the EAGER chief scientist training cruise at Station ALOHA in the subtropical North Pacific gyre in June 2019.

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## Coverage

**Spatial Extent:** N:22.833 E:-157.922 S:22.709 W:-158.067

**Temporal Extent:** 2019-06-17 - 2019-06-22

## Methods & Sampling

In-situ particulate material was collected using McLane pumps. All thorium data were decay-corrected back to mid-pumping times. See Pike et al., 2005 and Clevenger et al., 2021 for detailed methods and counting

techniques.

**>51 micrometer ( $\mu\text{m}$ ) Th-234 (LSF, large particulate Thorium):** The entire 142 millimeter (mm) mesh screen was rinsed onto a 25 mm silver filter and dried in a low temperature oven before beta counting. The mean volume pumped through the 142 mm mesh screens was ~640 liters (L).

**1-51 micrometer ( $\mu\text{m}$ ) Th-234 (SSF, small particulate Thorium):** Whole 142 mm QMAs, located below the mesh screen in the filter head housing, were dried in a low temperature oven. A 25 mm subsample was taken from this 142 mm filter for beta counting for Th-234.

## Data Processing Description

Data were flagged with quality indicators: 1 = Good Value; 2 = Probably Good Value.

Empty fields marked 'nd' denote that there were pump or filterhead issues that resulted in a compromised sample or no sample at this depth for either the QMA or screen or both. Data were originally calculated in dpm per L and were converted to mBq per kilogram (kg) using the standard ocean  $\rho = 1.025 \text{ kg/L}$  and  $1 \text{ dpm} = 16.667 \text{ mBq}$ .

Data flags are according to the SeaDataNet scheme (<https://www.geotraces.org/geotraces-quality-flag-policy/>).

BCO-DMO processing description:

- Adjusted field/parameter names to comply with BCO-DMO naming conventions;
- Added a conventional header with dataset name, PI names, version date;
- Converted dates to ISO8601 format: YYYY-MM-DDThh:mmZ;
- Converted longitude values from positive degrees West to negative degrees East;
- Rounded fields as requested by data submitter.

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## Data Files

File
<b>Th-234_pumps.csv</b> (Comma Separated Values (.csv), 1.26 KB) MD5:d58d74bb7c43270c533e07aa58dcf369
Primary data file for dataset ID 854150

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## Related Publications

Clevenger, S. J., Benitez-Nelson, C. R., Drysdale, J., Pike, S., Puigcorb , V., & Buesseler, K. O. (2021). Review of the analysis of  $^{234}\text{Th}$  in small volume (2–4 L) seawater samples: improvements and recommendations. *Journal of Radioanalytical and Nuclear Chemistry*, 329(1), 1–13. <https://doi.org/10.1007/s10967-021-07772-2>  
*Methods*

Pike, S. M., Buesseler, K. O., Andrews, J., & Savoye, N. (2005). Quantification of  $^{234}\text{Th}$  recovery in small volume sea water samples by inductively coupled plasma-mass spectrometry. *Journal of Radioanalytical and Nuclear Chemistry*, 263(2), 355–360. doi:10.1007/s10967-005-0062-9 <https://doi.org/10.1007/s10967-005-0594-z>  
*Methods*

Winn, C., C. Sabine, D. Hebel, F. Mackenzie and D. M. Karl. (1991) Inorganic carbon system dynamics in the central Pacific Ocean: Results of the Hawaii Ocean Time-series program. *EOS, Transactions of the American Geophysical Union* 72, 70.  
*Results*

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## Related Datasets

### IsRelatedTo

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Kenyon, J., Black, E., Church, M. J. (2021) **Particulate Th-234 collected with surface-tethered sediment traps at Station ALOHA as part of the EAGER chief scientist training cruise (KM1910) in the subtropical North Pacific gyre in June 2019**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2021-07-20 doi:10.26008/1912/bco-dmo.854241.1 [[view at BCO-DMO](#)]

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### Parameters

<b>Parameter</b>	<b>Description</b>	<b>Units</b>
Pump_Event_ID	Pump casts were indicated with a P, followed by the cast number (1 to 5)	Unitless
Depth	Depth below water surface (zero = water surface and all values are reported as positive)	Meters
Latitude	Latitude North	Decimal degrees
Longitude	Longitude East	Decimal degrees
Date_Pump_On_HAST	Date and Time in Hawaiian-Aleutian Standard Time (GMT-10) when large volume pumps were programmed to turn on; format: MM/DD/YYYY hh:mm	Unitless
Date_Pump_Off_HAST	Date and Time in Hawaiian-Aleutian Standard Time (GMT-10) when large volume pumps were programmed to turn off; format: format: MM/DD/YYYY hh:mm	Unitless
Pump_On_ISO_DateTime_UTC	Date and Time in UTC when large volume pumps were programmed to turn on in ISO8601 format: YYYY-MM-DDThh:mmZ	Unitless
Pump_Off_ISO_DateTime_UTC	Date and time in UTC when large volume pumps were programmed to turn off in ISO8601 format: YYYY-MM-DDThh:mmZ	Unitless
Filtered_Volume	Volume of water passing through the filterhead.	Liters
Th234_LSF	>51 $\mu\text{m}$ Thorium-234 (large particle activity)	mBq/kg
LSF_Err	Error of Th234_LSF. Error is propagated from the counting uncertainty and uncertainties associated with sample processing.	mBq/kg
LSF_QF	Quality flag for Th234_LSF	Unitless
Th234_SSF	1-51 $\mu\text{m}$ Thorium-234 (small particle activity)	mBq/kg
SSF_Err	Error of Th234_SSF. Error is propagated from the counting uncertainty and uncertainties associated with sample processing.	mBq/kg
SSF_QF	Quality flag for Th234_SSF	Unitless

## Instruments

<b>Dataset-specific Instrument Name</b>	
<b>Generic Instrument Name</b>	McLane Pump
<b>Dataset-specific Description</b>	McLane pumps sample large volumes of seawater at depth. They are attached to a wire and lowered to different depths in the ocean. As the water is pumped through the filter, particles suspended in the ocean are collected on the filters. The pumps are then retrieved, and the contents of the filters are analyzed in a lab.
<b>Generic Instrument Description</b>	McLane pumps sample large volumes of seawater at depth. They are attached to a wire and lowered to different depths in the ocean. As the water is pumped through the filter, particles suspended in the ocean are collected on the filters. The pumps are then retrieved and the contents of the filters are analyzed in a lab.

<b>Dataset-specific Instrument Name</b>	
<b>Generic Instrument Name</b>	Riso Laboratory Anti-coincidence Beta Counter
<b>Dataset-specific Description</b>	Low-level beta detectors manufactured by Risø (now Nutech) in Denmark. These instruments accept samples that can be mounted on a 25mm filter holder. These detectors have very low backgrounds, 0.17 counts per minute, and can have counting efficiencies as high as 55%. Efficiency Calibrations: The detectors are intercalibrated with each other and across the transect using low-energy U standards. Limits of Detection: Limits of detection are not reported because they are not applicable to the <sup>234</sup> Th beta counting method. A 'non-detect' for <sup>234</sup> Th or a case where there is no <sup>234</sup> Th present (initially or after 6 months of decay) will still result in a measurable amount of background radioactivity due to the beta decay of long lived natural radionuclides that are also present. These background values are utilized and therefore, they are not reported as a non-detections of <sup>234</sup> Th. See: <a href="https://cafethorium.who.edu/services/">https://cafethorium.who.edu/services/</a> and <a href="https://www.nutech.dtu.dk/english/products-and-services/radiation-instru...">https://www.nutech.dtu.dk/english/products-and-services/radiation-instru...</a>
<b>Generic Instrument Description</b>	Low-level beta detectors manufactured by Riso (now Nutech) in Denmark. These instruments accept samples that can be mounted on a 25mm filter holder. These detectors have very low backgrounds, 0.17 counts per minute, and can have counting efficiencies as high as 55%. Typically used in laboratory analyses. Designed to measure low levels of beta particle emission. The systems work on the principle of anticoincidence.

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## Deployments

KM1910

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/841636">https://www.bco-dmo.org/deployment/841636</a>
<b>Platform</b>	R/V Kilo Moana
<b>Report</b>	<a href="https://datadocs.bco-dmo.org/docs/305/Chief_Sci_KM1910/data_docs/matt_church_EAGER_cruise_plan_06_17_2019.pdf">https://datadocs.bco-dmo.org/docs/305/Chief_Sci_KM1910/data_docs/matt_church_EAGER_cruise_plan_06_17_2019.pdf</a>
<b>Start Date</b>	2019-06-15
<b>End Date</b>	2019-06-24
<b>Description</b>	NSF Chief Scientist Training Cruise. For more information, see Rolling Deck to Repository (R2R): <a href="https://www.rvdata.us/search/cruise/KM1910">https://www.rvdata.us/search/cruise/KM1910</a> (cruise DOI: 10.7284/908380)

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## Project Information

### **EAGER Collaborative Research: Early career chief scientist training for biological and chemical oceanographers (Chief Sci KM1910)**

**Coverage:** Station ALOHA (22.75N, 158W), North Pacific Ocean

#### *NSF Award Abstract:*

##### Intellectual Merit

The PIs request funds to provide training in leading and organizing research cruises to early career researchers in the areas of Biological and Chemical Oceanography. Participants in this training program would be introduced to pre-cruise planning and logistics, receive training in commonly used oceanographic sampling equipment, and conduct shipboard measurements during a 10-day oceanographic cruise to the North Pacific Subtropical Gyre (NPSG). The goal of this training program is to prepare early career scientists for leading and participating in interdisciplinary oceanographic research at sea.

##### Broader Impacts

The proposed program addresses the broader impacts criteria successfully. The research cruise and follow-up reports and publications focus on interdisciplinary questions important for advancing the field. Given the rapid changes that oceanic systems are undergoing, it is important to have a cadre of junior scientists who are adept at managing interdisciplinary collaborations and conducting research at sea. The PIs are considering ways to connect with diverse audiences in recruiting participants. The impact on early career oceanographers will be very strong. This will create an experience that will be a major impact on the careers of the trainees, especially if they stay in the oceanography field.

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## Funding

<b>Funding Source</b>	<b>Award</b>
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1911831</a>
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1911990</a>

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