Updated temperature correction algorithm for nitrate

Carole Sakamoto, Ken Johnson, Xiaogang Xing, Luke Coletti, and Joshua Plant

Monterey Bay Aquarium Research Institute

LIMNOLOGY
and
OCEANOGRAPHY: METHODS

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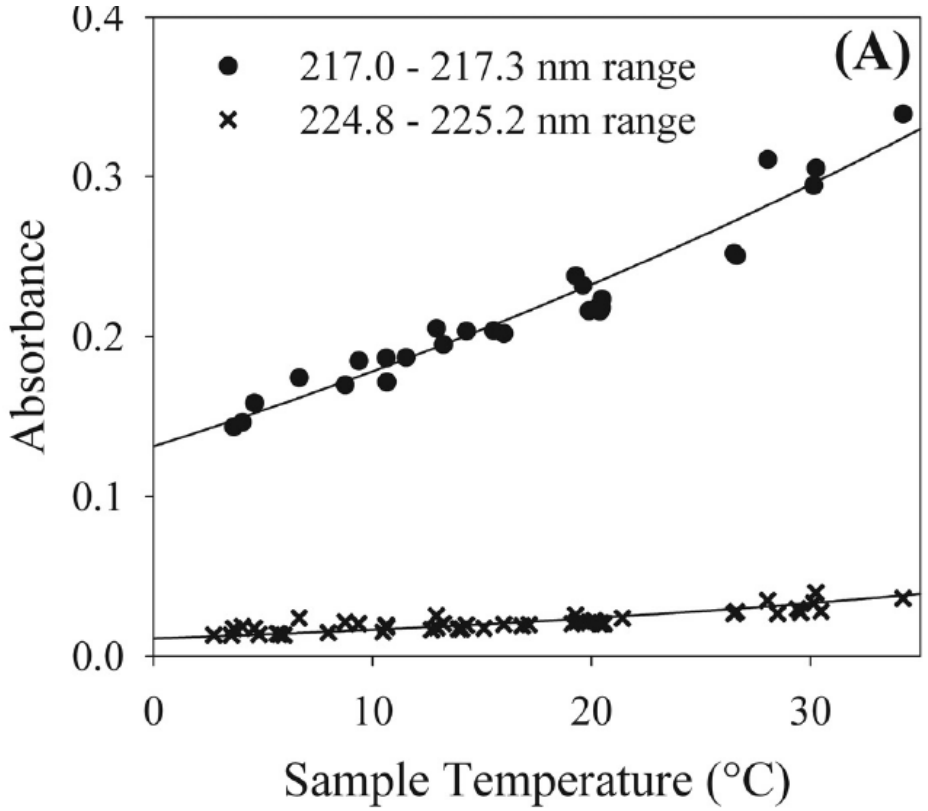
Improved algorithm for the computation of nitrate concentrations in seawater using an in situ ultraviolet spectrophotometer

Carole M. Sakamoto, Kenneth S. Johnson, Luke J. Coletti*

$$ASW_{(\lambda,T)} = (A + B \times T) \times \exp((C + D \times T) \times (W))$$



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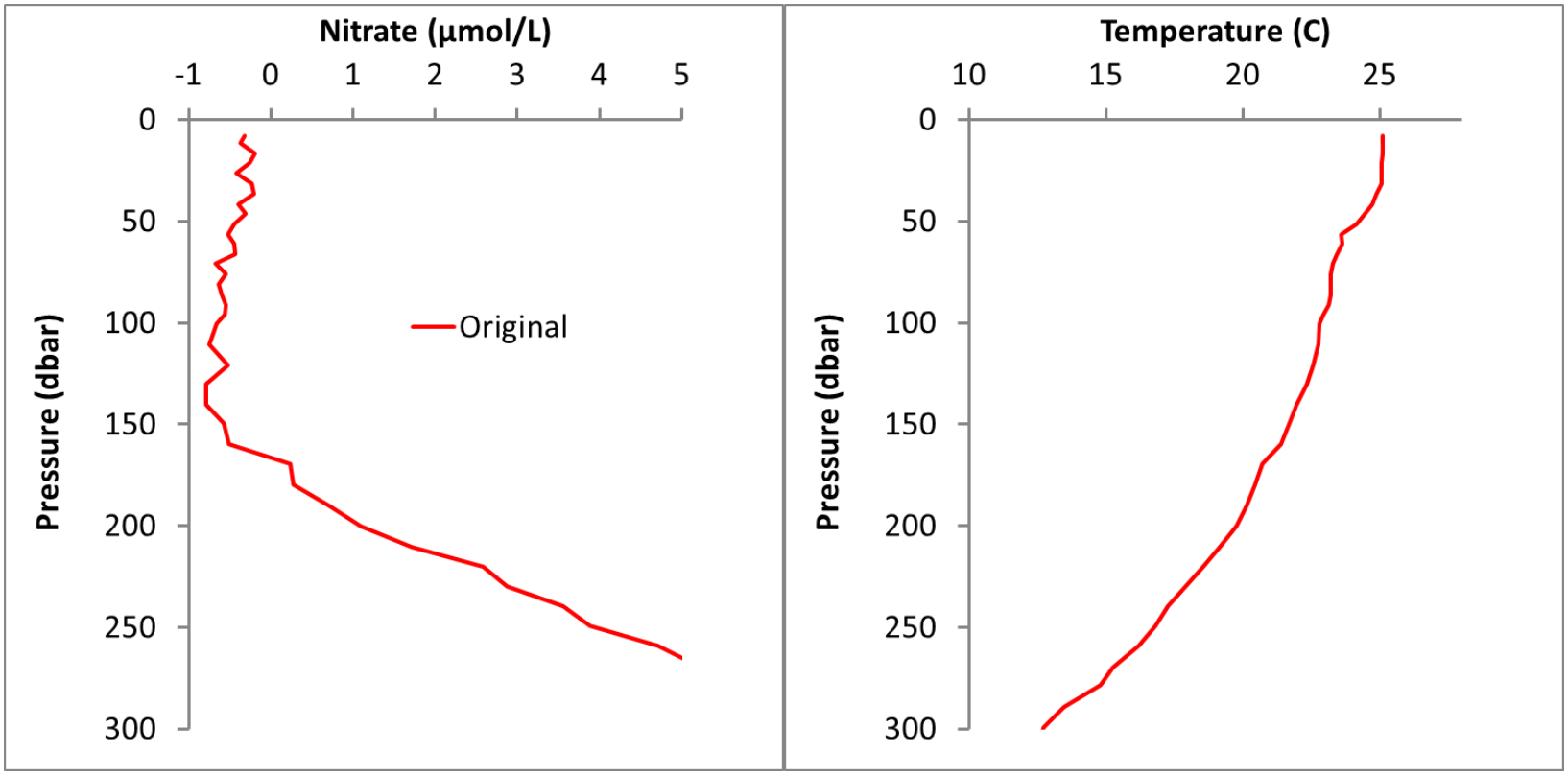
Nitrate profiles have an unrealistic minimum in warm (>20C) thermoclines. Concentration should be uniform.



FLOAT 8486/WMO 5904124
Profile 2

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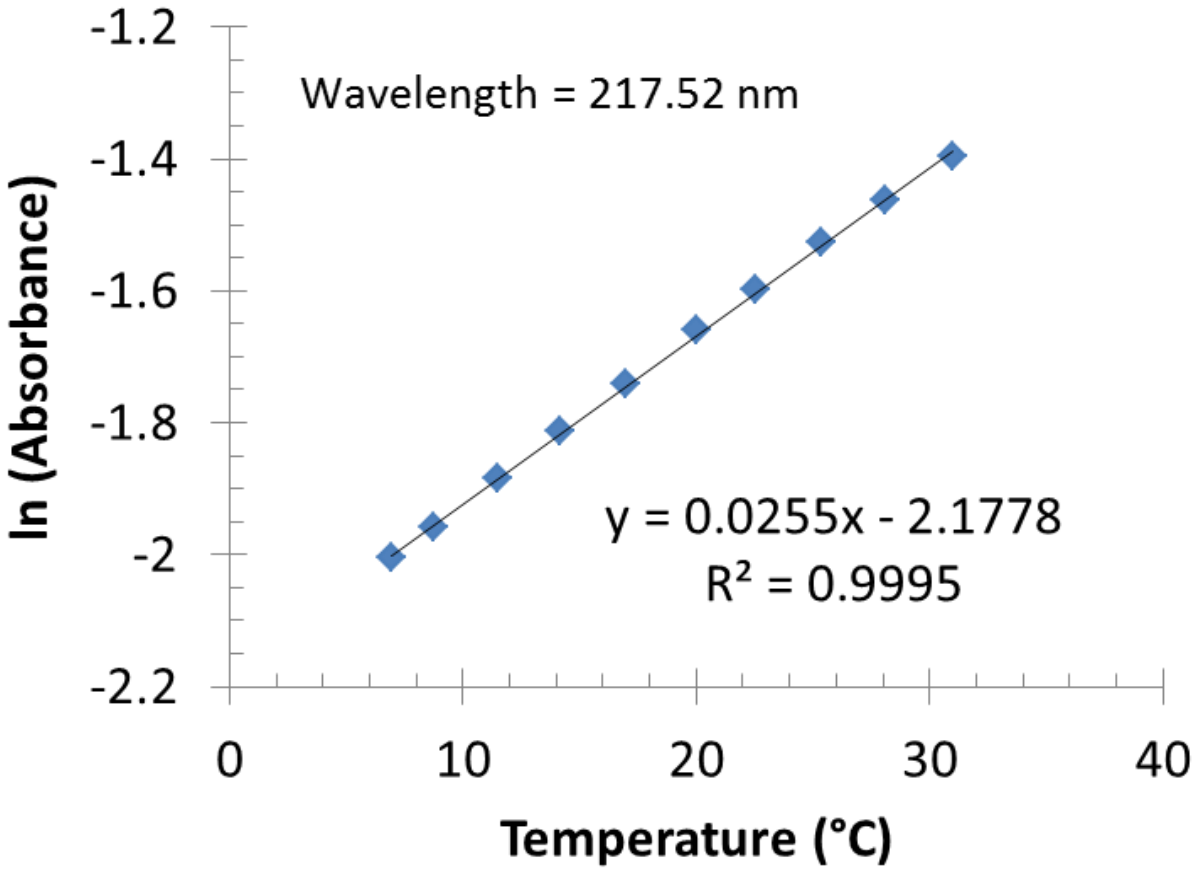
Bromide ion absorbance an exponential function of TEMP



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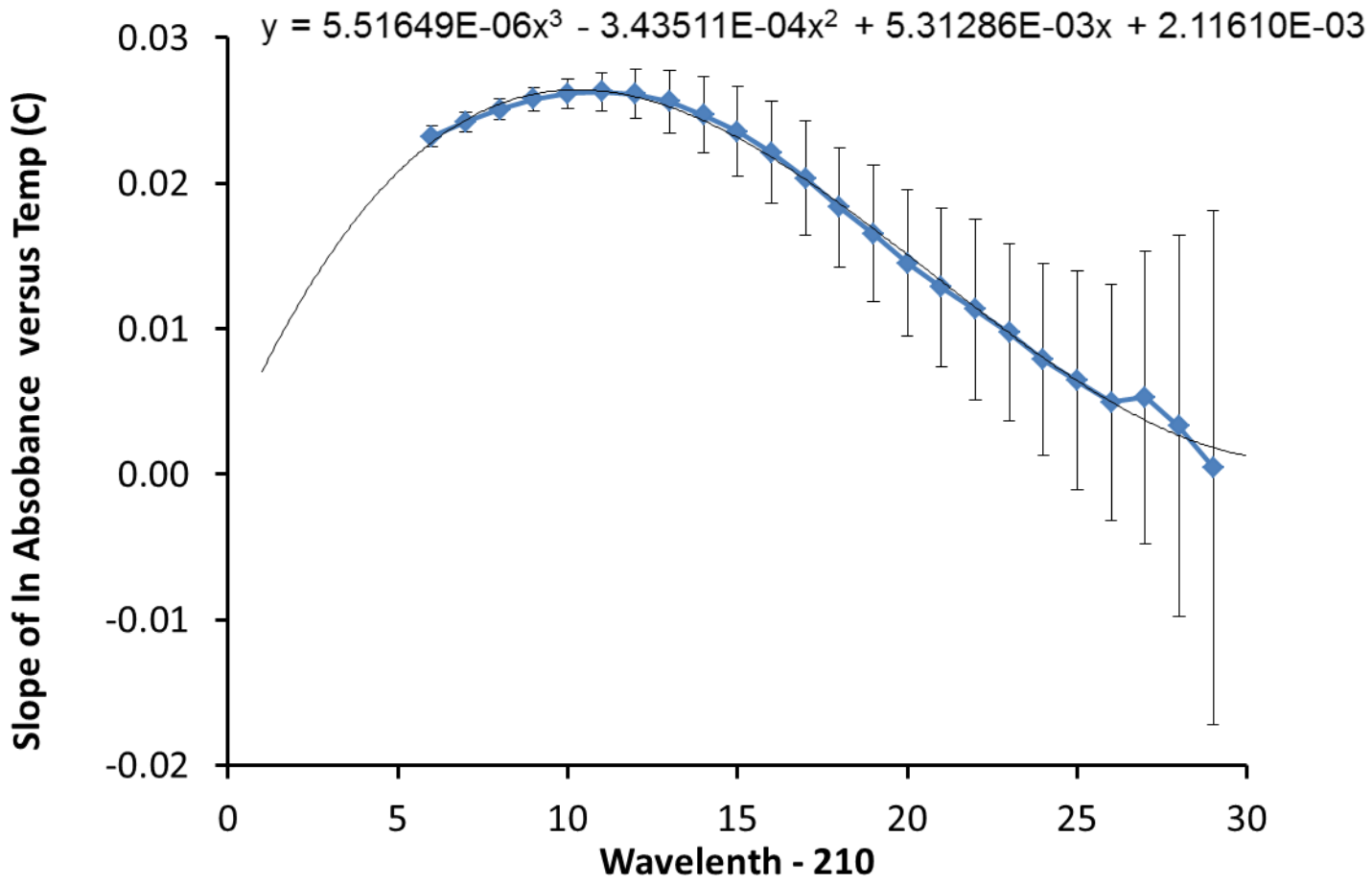
Remeasured temperature dependence of bromide ion in seawater using improved temperature control, modified analysis method.



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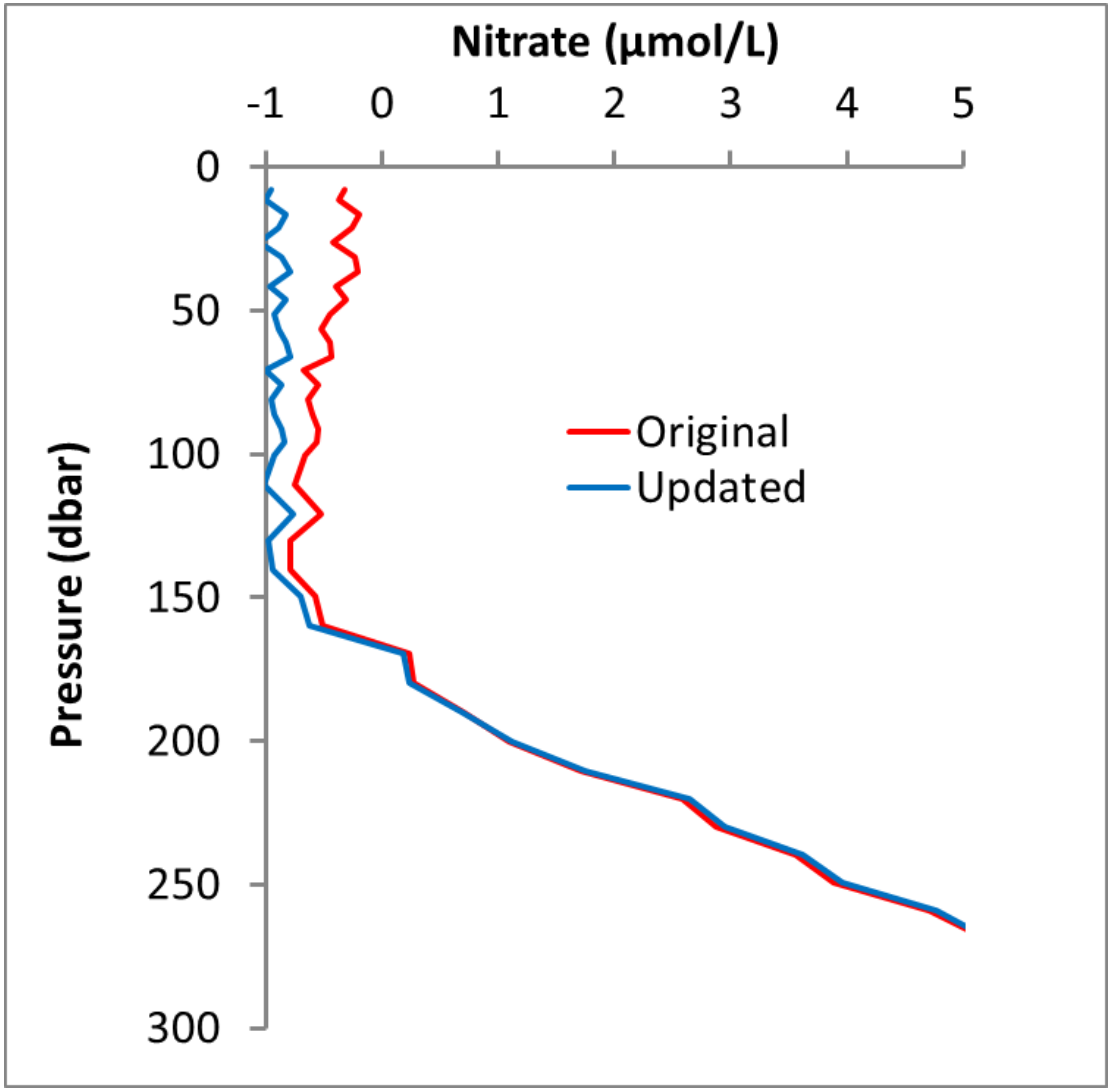

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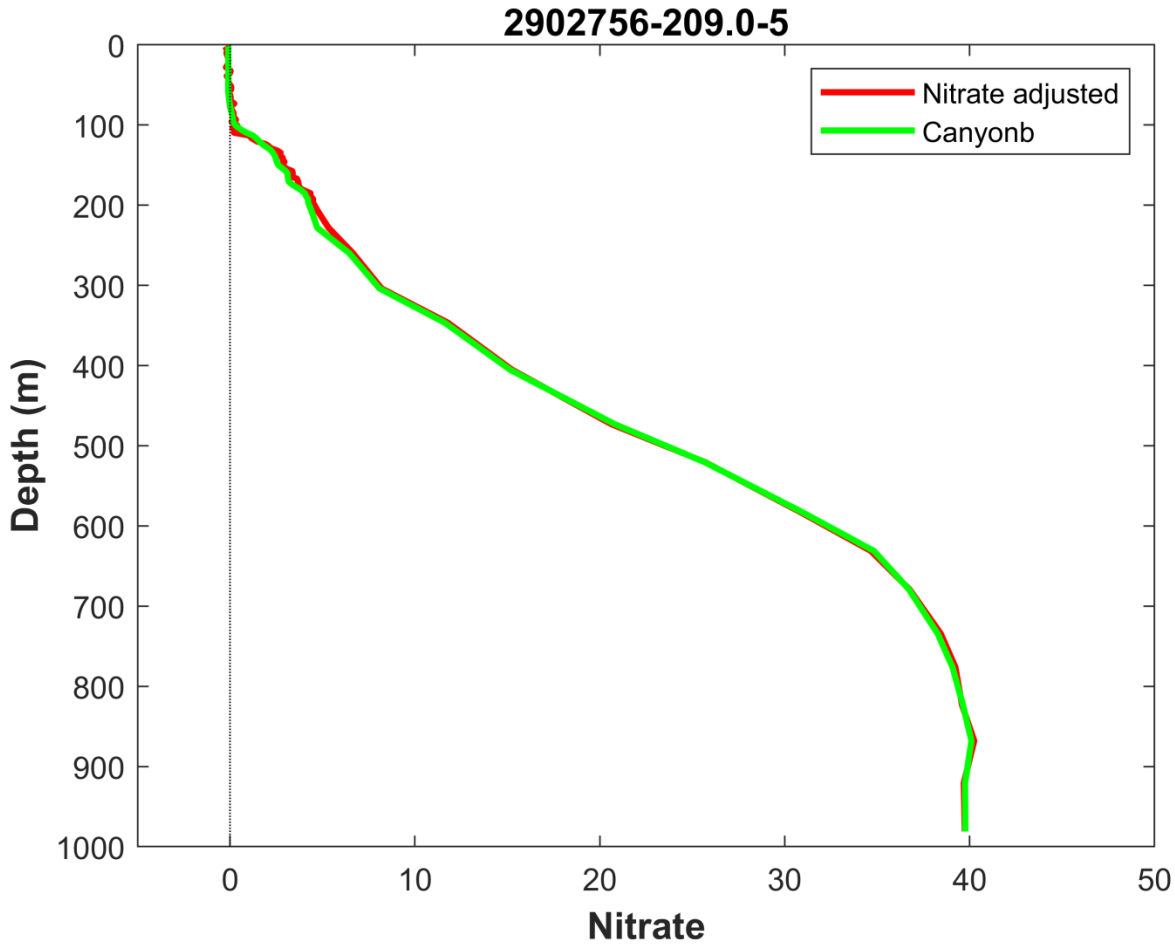
Works well with Argo China floats



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argo data

Processing Bio-Argo nitrate concentration at the DAC Level

Version 1.1

March 3rd 2018

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ORIGINAL METHOD , page 10 of Nitrate Processing :

Calculate the spectrum due to Bromide and other sea salt components, with a correction of the in situ temperature :

E_SWA_INSITU(R) = *E_SWA_NITRATE*(R) * F(R, TEMP) / F(R, *TEMP_CAL_NITRATE*)
(Eq. 2)

With two calculations of F, for TEMP (temperature sampled by the CTD (cf 3.1)) and for *TEMP_CAL_NITRATE* following:

F(R, T) = (A + B*T) *exp[(C + D*T)*(*OPTICAL_WAVELENGTH_UV*(R) – *OPTICAL_WAVELENGTH_OFFSET*)]
(Eq. 3)

A = 1.1500276, B = 0.02840, C = -0.3101349, D = 0.001222

OPTICAL_WAVELENGTH_OFFSET = 210 nm (*)

UPDATED METHOD, page 10 of Nitrate Processing:
Calculate the spectrum due to Bromide and other sea salt components, with a correction of the in situ temperature :

E_SWA_INSITU(R) = *E_SWA_NITRATE*(R) * exp[G(R) * (TEMP – *TEMP_CAL_NITRATE*)] (Eq. 2)

where

G(R) = (0.00000551649 * WL(R) ^ 3 - 0.000343511 * WL(R) ^ 2 + 0.00531286 * WL(R) + 0.0021161) (Eq. 3)

WL(R) = (*OPTICAL_WAVELENGTH_UV*(R) – *OPTICAL_WAVELENGTH_OFFSET*)

OPTICAL_WAVELENGTH_OFFSET = 210 nm

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1. Carole Sakamoto writing short note to update her temperature correction paper

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2. Update Argo document.

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