

An internally consistent biogeochemical data product for the world ocean

Siv K. Lauvset, Nico Lange, Toste Tanhua, Henry C. Bittig, Are Olsen, Alex Kozyr, Marta Álvarez, Kumiko Azetsu-Scott, Peter J. Brown, Brendan R. Carter, Leticia Cotrim da Cunha, Mario Hoppema, Matthew P. Humphreys, Masao Ishii, Emil Jeansson, Akihiko Murata, Jens Daniel Müller, Fiz F. Pérez, Carsten Schirnick, Reiner Steinfeldt, Adam Ulfsbo, Anton Velo, Ryan J. Woosley, and Robert M. Key

The Global Ocean Data Analysis Project (GLODAP) is a synthesis activity for ocean surface to bottom biogeochemical data collected through chemical analysis of water samples. Observations of 13 core variables (temperature, salinity, oxygen, phosphate, nitrate, silicate, dissolved inorganic carbon, total alkalinity, and the transient tracers CFC-11, CFC-12, CFC-113, CCl₄ and SF₆) are subjected to primary and secondary quality control to identify outliers and correct for systematic differences between cruises. The goal is to create a data product that is as consistent as possible, within our measurement capabilities. GLODAP may be wrong, but it is at least consistently wrong.

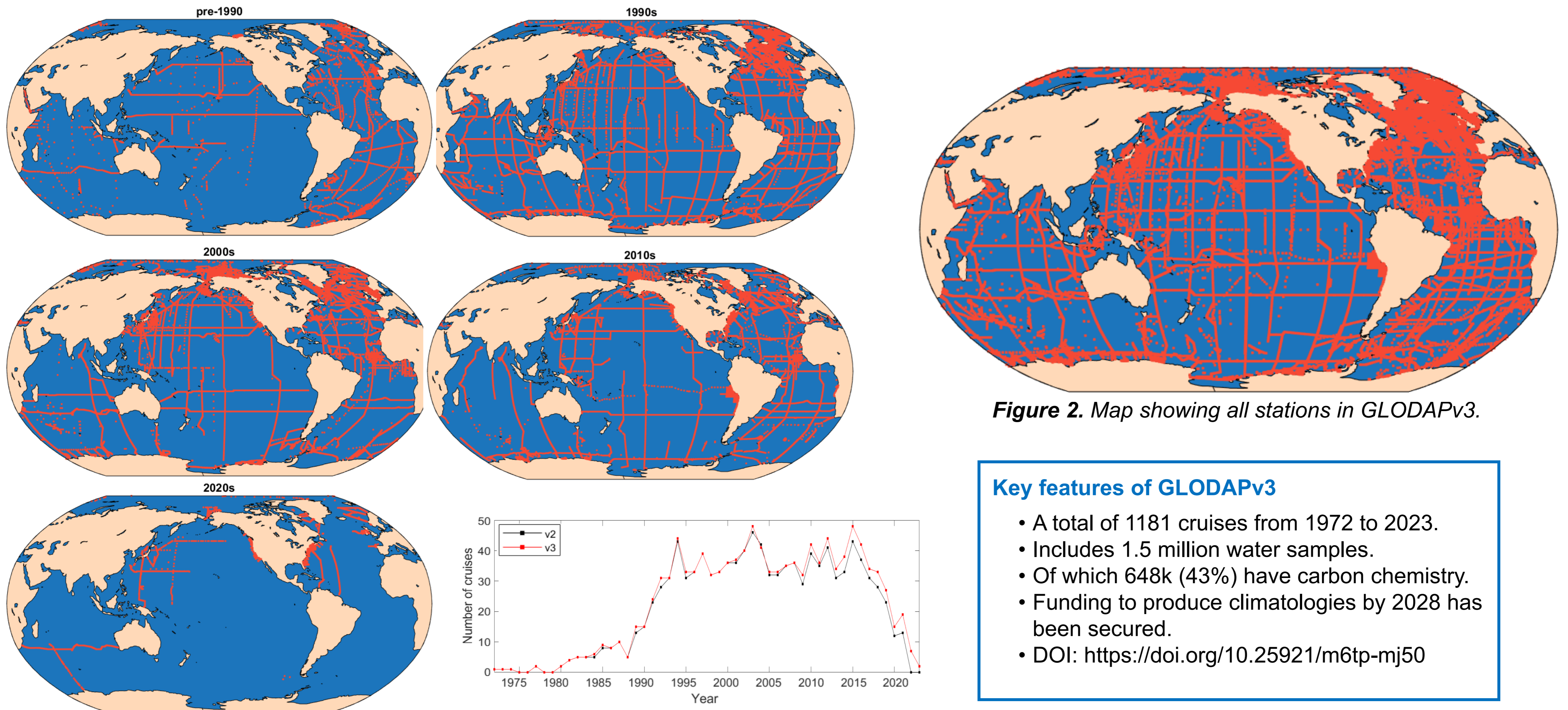


Figure 2. Map showing all stations in GLODAPv3.

Key features of GLODAPv3

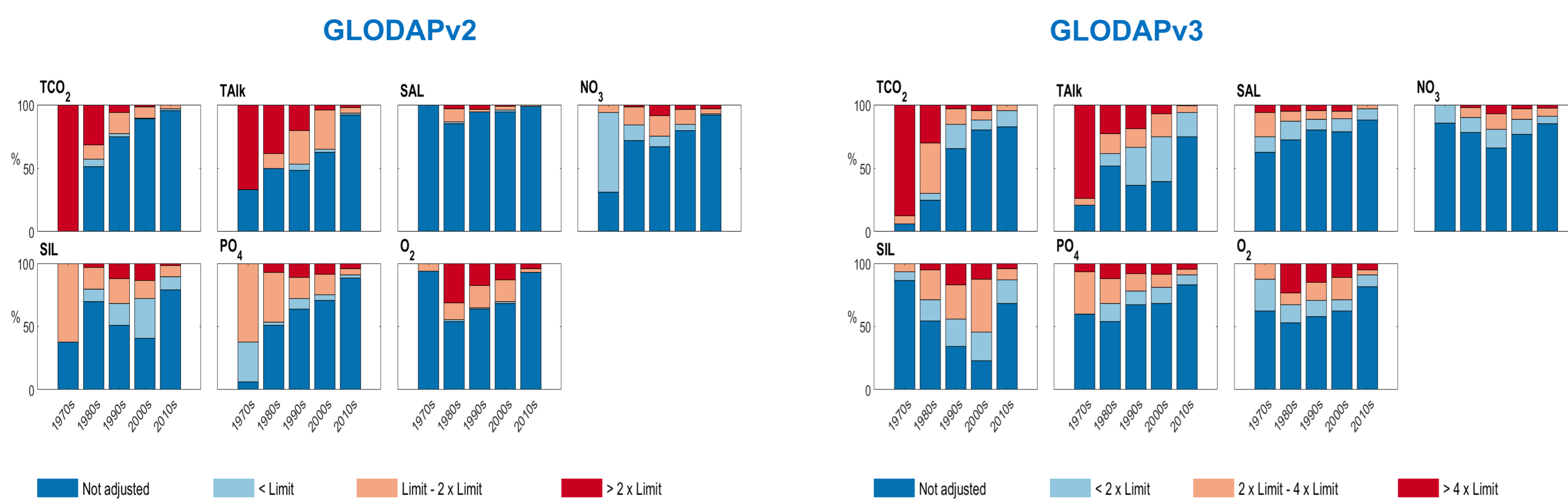
- A total of 1181 cruises from 1972 to 2023.
- Includes 1.5 million water samples.
- Of which 648k (43%) have carbon chemistry.
- Funding to produce climatologies by 2028 has been secured.
- DOI: <https://doi.org/10.25921/m6tp-mj50>

Figure 1. Decadal distribution of data in GLODAPv3, and the number of cruises per year.

GLODAPv2 vs. GLODAPv3

GLODAPv3 is a complete reevaluation of all cruises in the dataset. Of the total 1181 cruises, 57 have not been included in any other GLODAP data product. There are several differences between the methods used for GLODAPv3 compared to previous versions. These are the most important:

- No secondary quality control has been performed for pH.
- We no longer use weighted least squares to solve the matrix inversion, instead the 'Furthest-First' inversion method is applied.
- We have implemented an explicit accounting for trends in the deep ocean and seek to retain such trends after adjustments are applied.
- We now use a statistical determination of the minimum adjustment limits, instead of fixed pre-defined limits.
- We quantify uncertainties for all core variables, but only for each cruise.
- We have undertaken a review of the available metadata for cruises in GLODAP.



Data consistency

The values in this table represent the inter-cruise consistency in the GLODAPv3 product. They are the weighted root mean squared error of the cruise weighted mean offsets. The total number of valid crossovers is n.

Variable	Consistency	n
salinity (x1000)	1.30	23042
oxygen (%)	0.70	20988
nitrate (%)	0.40	18642
phosphate (%)	0.50	17576
silicate (%)	0.50	15977
DIC ($\mu\text{mol kg}^{-1}$)	1.20	8882
TA ($\mu\text{mol kg}^{-1}$)	1.40	7277

Figure 4. Distribution of applied adjustments per decade. Left: GLODAPv2; right: GLODAPv3

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