



Supplement of

IAPv4 ocean temperature and ocean heat content gridded dataset

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Supplementary Table S1. Choice of the depth- and time-varying time windows in IAPv4 used for monthly reconstructions. Data within each time window is used for monthly reconstructions. These choices account for several issues: 1) the data coverage and the maximum depths of the key instruments (e.g., XBT data with a terminal depth of ~750 m after the 1990s associated with the wide use of T7 and Deep Blue, and ~500 m within 1970~1990 associated with the wide use of T4 and T6; Argo data cover upper ~1900 m ocean); 2) Time scales of the temperature variability at different depths: better persistence of ocean changes in the deeper ocean than in the upper ocean; 3) change of the observation system over time; 4) ensure the global coverage of reconstruction. Cheng (2024) describes this issue more explicitly with a new metric of Effective Data Coverage: *“Because an individual observation can impact a certain ocean area (defined by the influencing radius and spatial covariance), compared to the amount of data, a more useful metric for quantifying the actual impact of an observational platform is “effective data coverage” (EDC). It is defined as the fraction of global ocean volume sampled by the distinct instrumental platform associated with a mapping approach. Specifically, a one-degree latitude/longitude grid point is sampled if at least one observation is available within the influence radius. The EDC is calculated as the percentage of the sampled volume relative to the total ocean volume.”*

Year	Window (months)
1940~1957	1-280 m: 8 300-500 m: 20 500-750 m: 20 800-1450 m: 30 1500-2000 m: 48 Below-2000 m: 60
1958~1969	1-280 m: 6 300-500 m: 10 500-750 m: 18 800-1450 m: 20 1500-2000 m: 48 Below-2000 m: 60
1970~1990	1-280 m: 5 300-500 m: 10 500-750 m: 10 800-1450 m: 20 1500-2000 m: 30 Below-2000 m: 60
1990~2005	1-280 m: 5 300-500 m: 5

	500-750 m: 5 800-1450 m: 7 1500-2000 m: 10 Below-2000 m: 60
2006~present	1-280 m: 3 300-500 m: 3 500-750 m: 3 800-1450 m: 3 1500-1950 m: 3 2000 m: 10 Below-2000 m: 60

References:

Cheng, L.: Sensitivity of Ocean Heat Content to Various Instrumental Platforms in Global Ocean Observing System, Ocean-Land-Atmos. Res., 3, 0037, <https://doi.org/10.34133/olar.0037>, 2024.