Supplement of Earth Syst. Sci. Data, 12, 1985–2011, 2020
https://doi.org/10.5194/essd-12-1985-2020-supplement

Open Access Earth System Science Data

Supplement of

Dissolved inorganic nutrients in the western Mediterranean Sea (2004–2017)

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Supplementary material – Part 1

Figure S1. Overview of vertical inorganic nutrient profiles and spatial coverage of reference cruises.

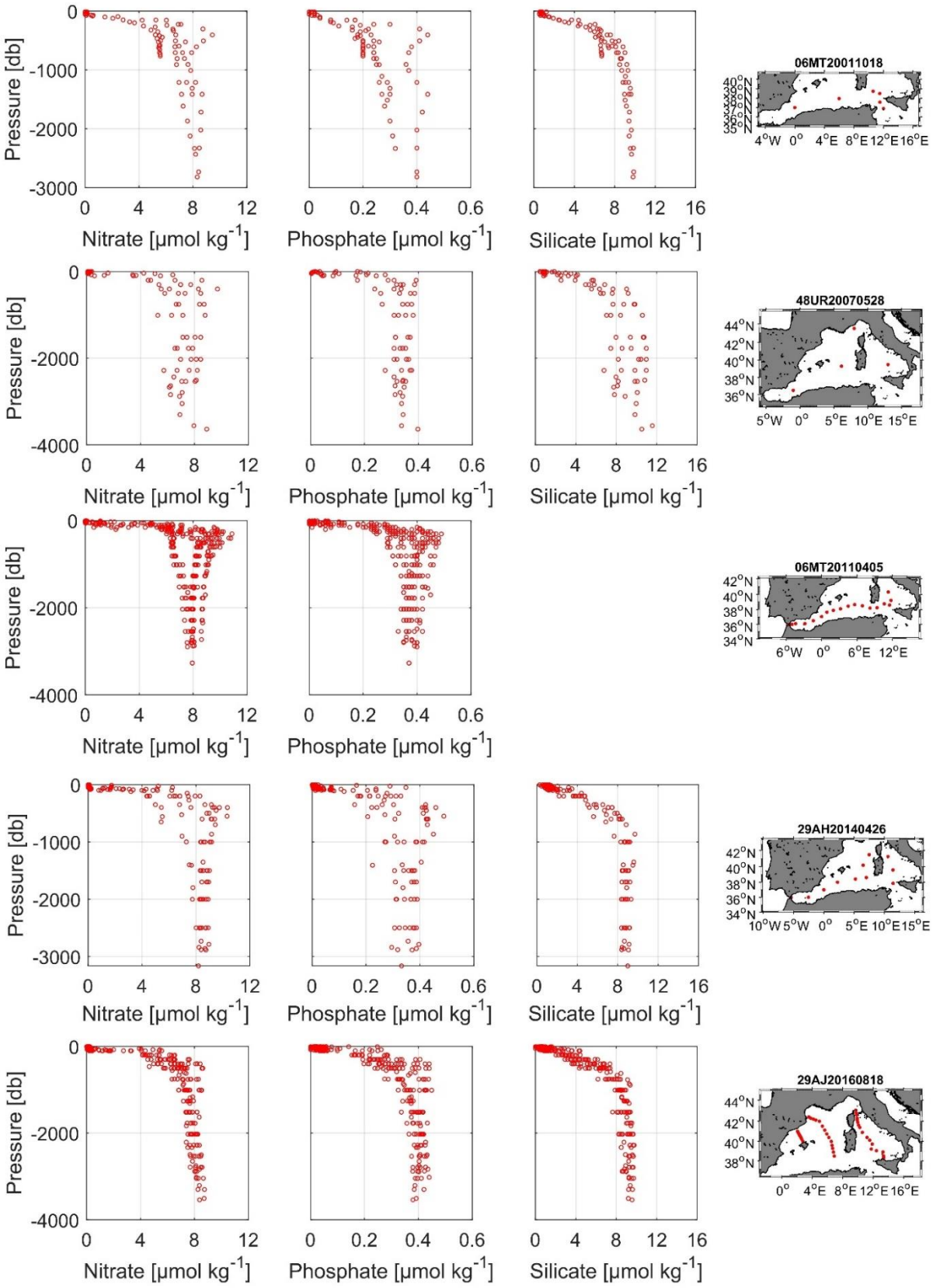
Pressure [db]
Nitrate [µmol kg-1]
Phosphate [µmol kg-1]
Silicate [µmol kg-1]
06MT20011018
48UR20070528
06MT20110405
29AH20140426
29AJ20160818

Figure S2. Map of the WMED showing the geographical limits of the MEDAR/Medatlas sub-regions defined in Table S2. according to Manca et al. (2004).

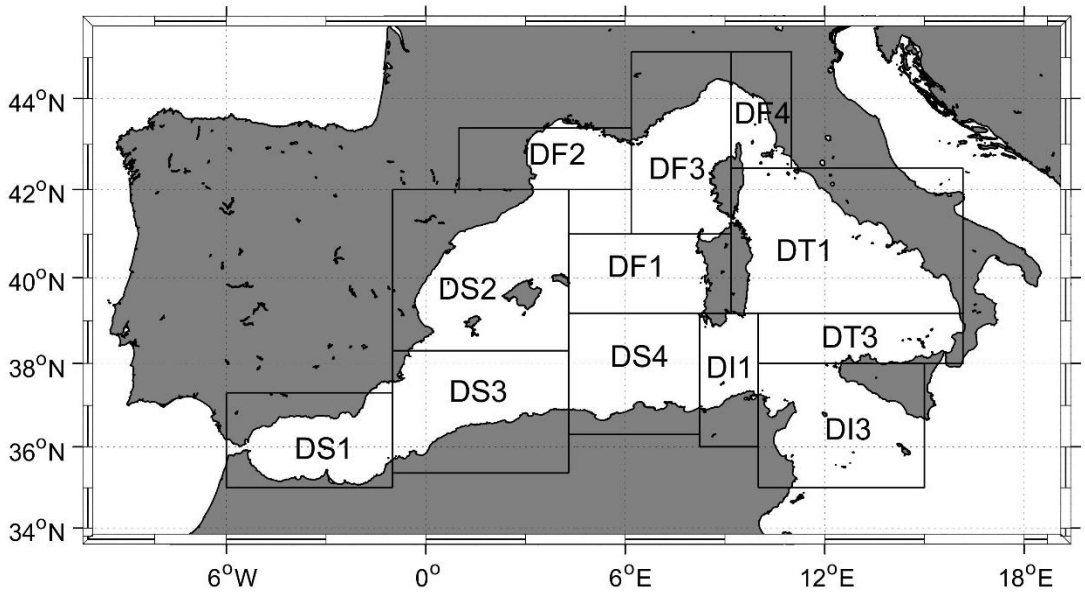

Figure S3. Weighted mean offset for nitrate, before (grey) and after adjustment (blue). Error bars indicate the standard deviation of the absolute weighted offset. The dashed lines indicate the accuracy limit 2% for an adjustment to be recommended

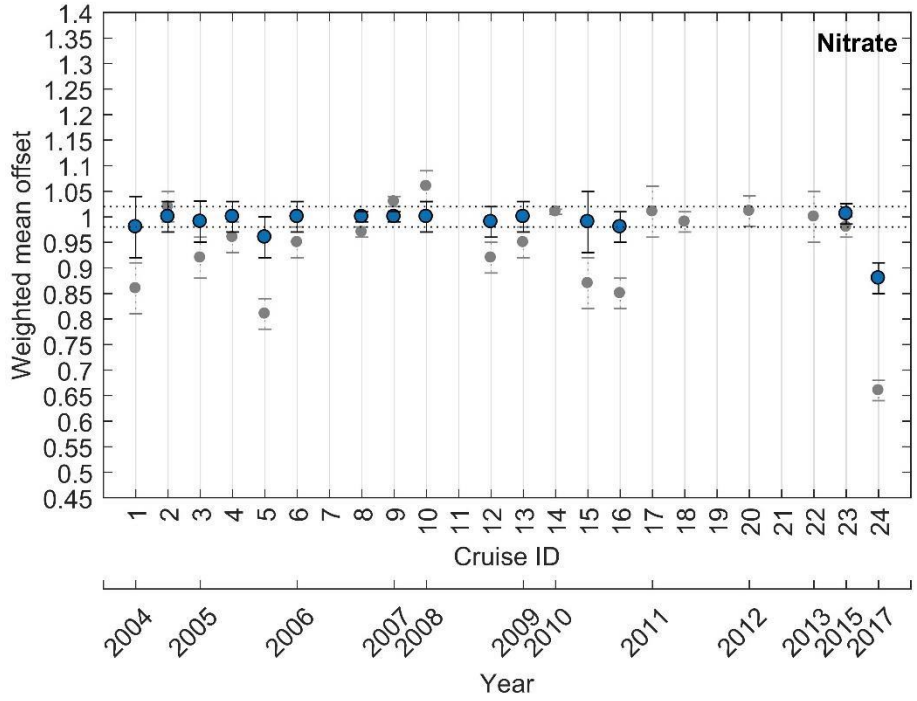

Figure S4. Same as Fig. S2 but for phosphate

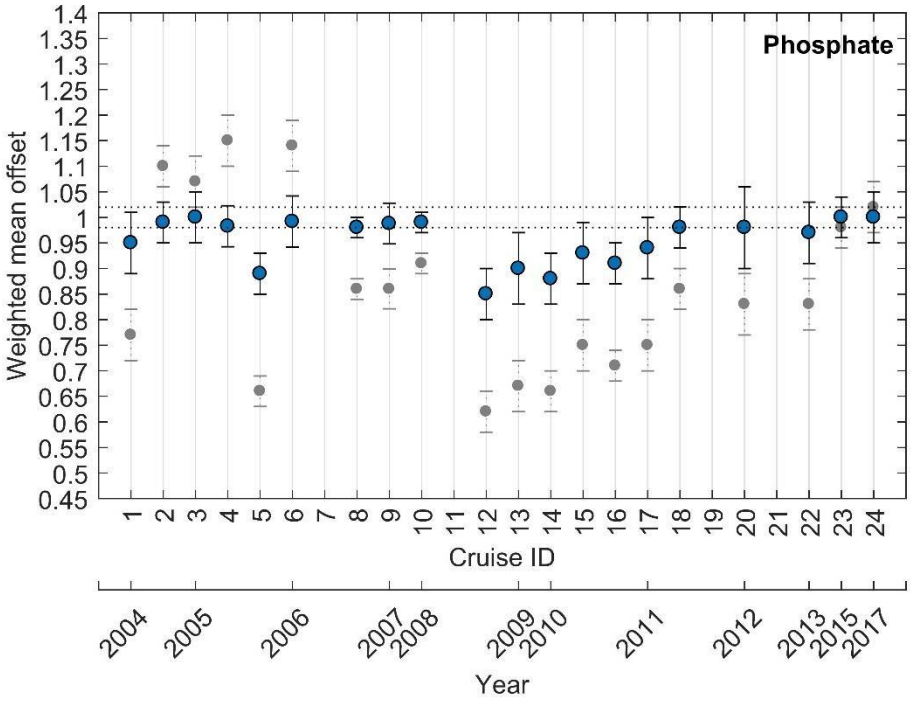

Figure S5. Same as Fig. S2 but for silicate.

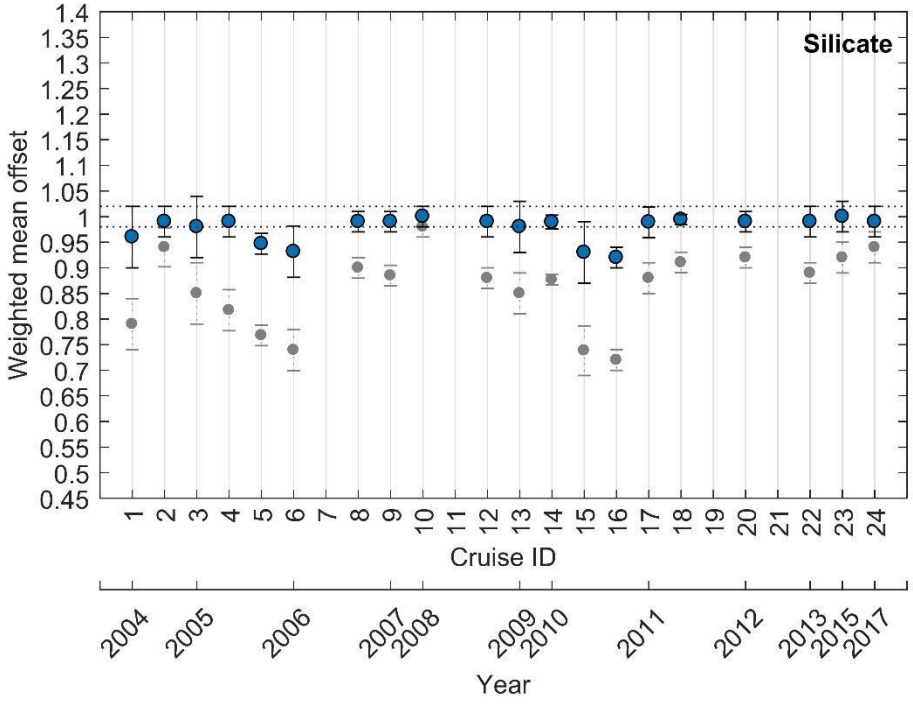

Table S1. Summary table of laboratories and instruments used for nutrient analysis.

Laboratory	Autoanalyzer	Detection limit
ENEA	continuous-flow system multichannel (Auto Analyzer Bran+Luebbe III Generation	limit of 0.01µM for nitrate+nitrite, 0.01µM for phosphate and 0.05 for silicate
CNR-ISMAR Trieste	OI-Analytical (Flow Solution III) flow-segmented	limit of 0.01µM for nitrate+nitrite, 0.01µM for phosphate and 0.05 for silicate
CNR-ISMAR Venezia	Systea discrete analyzer EasyChem Plus	limit of 0.1µM for nitrate, 0.01µM for phosphate and 0.02µM for silicate

Table S2. Geographical limits of subregion referring to Manca et al. (2004).

Code	Region	Lat °N (min)	Lat °N(max)	Lon °E (min)	Lon °E (max)	Maximum pressure(db)
DF2	Gulf of Lions	42	43.36	1	6.18	2517
DF3	Liguro-Provençal	41	45	6.18	9.18	2728
DF4	Ligurian East	42.48	45	9.18	11	1299
DS2	Balearic Sea	38.30	42	-1	4.3	2741
DF1	Algero-Provençal	39.18	41	4.3	9.18	2891
DS1	Alboran Sea	35.0	37.3	-6	-1	2683
DS3	Algerian West	35.36	38.3	-1	4.3	2837
DS4	Algerian East	36.30	39.18	4.3	8.24	2890
DT1	Tyrrhenian North	39.18	42.48	9.18	16.16	3610
DT3	Tyrrhenian South	38	39.18	10	16.16	3551
DI1	Sardinia Channel	36.0	39.18	8.24	10	2455
DI3	Sicily Strait	35	38	10	15	664

Table S3. Reference cruises and coefficient of variation of nitrate, phosphate and silicate below 1000db.

Reference cruise ID	EXPOCODE	std Nitrate	std Phosphate	std Silicate	# samples
6	06MT20011018	0.064	0.179	0.035	26
22	48UR20070528	0.121	0.074	0.144	34
27	29AJ20160818	0.052	0.062	0.054	116
64	06MT20110405	0.073	0.071	-	42
17	29AH20140426	0.045	0.112	0.036	91

Supplementary material – Part 2

A1. Data product description

The data product includes 870 stations sampled during 24 cruises between 2004 and 2017 in the Western Mediterranean Sea mainly on board of research vessels owned by the Italian National Research Council. It includes bottle data combined with CTD data.

In all stations, measurements were carried out with a CTD-rosette system consisting of a CTD SBE 911 plus and a General Oceanics rosette with 24 12-l Niskin Bottles at the observed depth of the bottle sample. Temperature measurements were performed with an SBE-3/F thermometer with a resolution of 10−3 °C and conductivity measurements were performed with an SBE-4 sensor with a resolution of 3·10−4 S/m. The probes were calibrated before and after the cruise. Except for salinity, no certified reference material (CRM) was used. CTD salinity was calibrated against measurements made with a salinometer.

Samples of nitrate, phosphate and silicate were frozen to -20°C and stored before being analysed in laboratories onshore.

Measurements were subjected to a rigorous quality control (primary and secondary quality control) and the dataset presented is the product adjusted after the application of quality control approaches.

A2. Data product organization details

Cruise identification: To guarantee the comparability between measurements, an alphanumeric identification code (ID) together with an expedition code (Expocode) are defined a unique identifier. The list of the parameters included in the data product are detailed in table below:

#	Short name in data files	Parameter	Unit/format	Method/ description	Comment	Original Dataset	Adjusted Product
1	EXPOCODE	Expedition code	24 EXPOCODEs	12 digits: *Shipcode_yyyy_mm_dd* *yyyy_mm_dd: cruise starting day*		✓	✓
2	CRUISE	Cruise ID	24 Cruise IDs			✓	✓
3	DATE	Event date	yyyy-mm-dd			✓	✓
4	TIME	Event time	hhmm			✓	✓
5	DAY	Day	dd			✓	✓
6	MONTH	Month	mm			✓	✓
7	YEAR	Year	yyyy			✓	✓
8	LATITUDE	Longitude				✓	✓
9	LONGITUDE	Latitude				✓	✓
10	STNNBR	Station number				✓	✓
11	BTLNBR	Niskin bottle number				✓	✓
12	CASTNO	Cast number				✓	✓
13	CTDPRS	Pressure	dbar	CTD pressure		✓	✓
14	DEPTH	Depth	Meters	Depth from pressure		✓	✓
15	CTDSAL	Salinity		CTD salinity	PSS-78	✓	✓
16	CTDSAL_FLAG_W	Salinity flag		WOCE flags		✓	✓
17	CTDTMP	Temperature	°C	CTD temperature	ITS-90	✓	✓
18	THETA	Potential temperature		Theta from CTDTMP & CTDSAL		✓	✓
19	NITRAT	Nitrate	μmol kg^{-1}	standard colorimetric methods*		✓	✓
20	NITRAT_FLAG_W	Nitrate flag		WOCE flags After 1st quality control		✓	
				Flags after 2nd QC Flag 2: adjusted and acceptable Flag 3: adjusted and recommended questionable	Details in Section 4.4		✓
21	PHSPHT	Phosphate	μmol kg^{-1}	standard colorimetric methods*		✓	✓
22	PHSPHT_FLAG_W	Phosphate flag		WOCE flags After 1st quality control		✓	
				Flags after 2nd QC Flag 2: adjusted and acceptable Flag 3: adjusted and recommended questionable	Details in Section 4.4		✓
23	SILCAT	Silicate	μmol kg^{-1}	standard colorimetric methods*		✓	✓
24	SILCAT_FLAG_W	Silicate flag		WOCE flags After 1st quality control		✓	
				Flags after 2nd QC Flag 2: adjusted and acceptable Flag 3: adjusted and recommended questionable	Details in Section 4.4		✓

* Standard colorimetric methods of seawater analysis (Grasshoff et al. (1999)).

- **Data format**

Original dataset: CNR_DIN_WMED_20042017_original.csv: This is the original dataset with 24 parameter including flag variables of 24 cruises for nitrate, phosphate, silicate and CTD salinity from the primary quality control.

Adjusted dataset: CNR_DIN_WMED_20042017_adjusted.csv: This is the adjusted product with 24 parameters, after removing outlier data (issued from primary quality control) and after applying adjustment factors from the secondary quality control (Crossover Analysis).