Supplementary Materials: Mediterranean Water properties at the eastern limit of the North Atlantic Subtropical Gyre since 1981

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1. Introduction

The supporting information includes three additional figures (Figures S1–S3) to complement the results shown and one additional table (Table S1) with complementary information regarding the CTD profiles in addition to the WOD18 used in this study.

In Figure S1 we present a summary of the spatial and temporal distribution of both CTD and Argo datasets in the study domain of Figure 1a.

In Figure S2 we present the time-series of temperature, salinity, potential density (σ_1), thickness, and dissolved oxygen calculated using only CTD profiles (1981-2018) and Argo/Bio-Argo floats (2001–2018; 2010–2017 for the dissolved oxygen).

In Figure S3 we compare the temperature and salinity time-series from two different datasets: EN4 gridded product from UK Met Office [1], and the dataset used in this study.

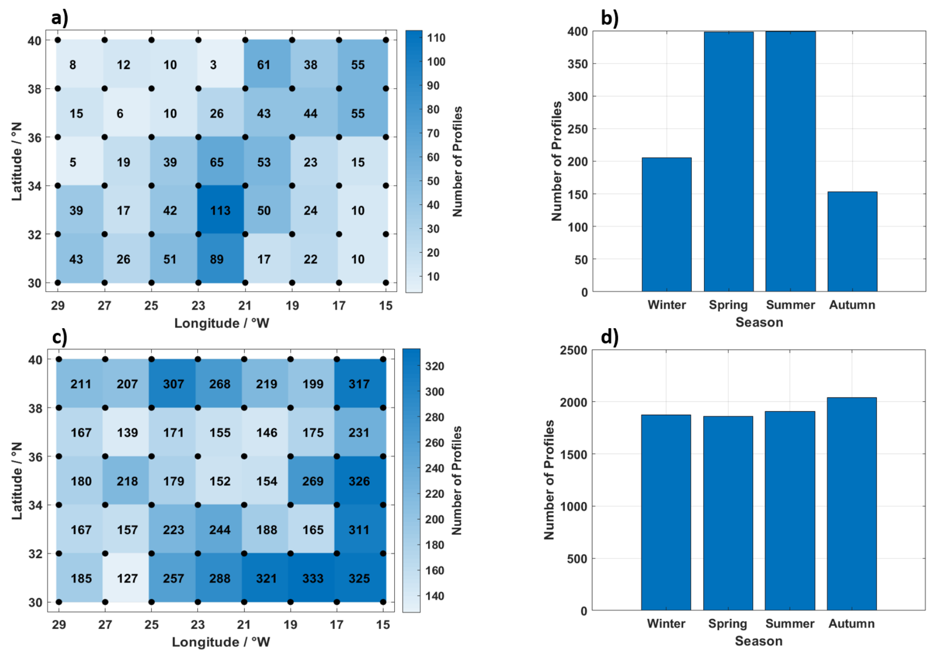

Figure S1. (a) Number of temperature and salinity CTD profiles for each box of the 2° × 2° grid over the study domain in Figure 1(a). **(b)** Histogram with the number of CTD profiles per season. **(c)** Same as (a) but for the number of Argo floats. **(d)** Same as (b) but with respect to the number of Argo floats.

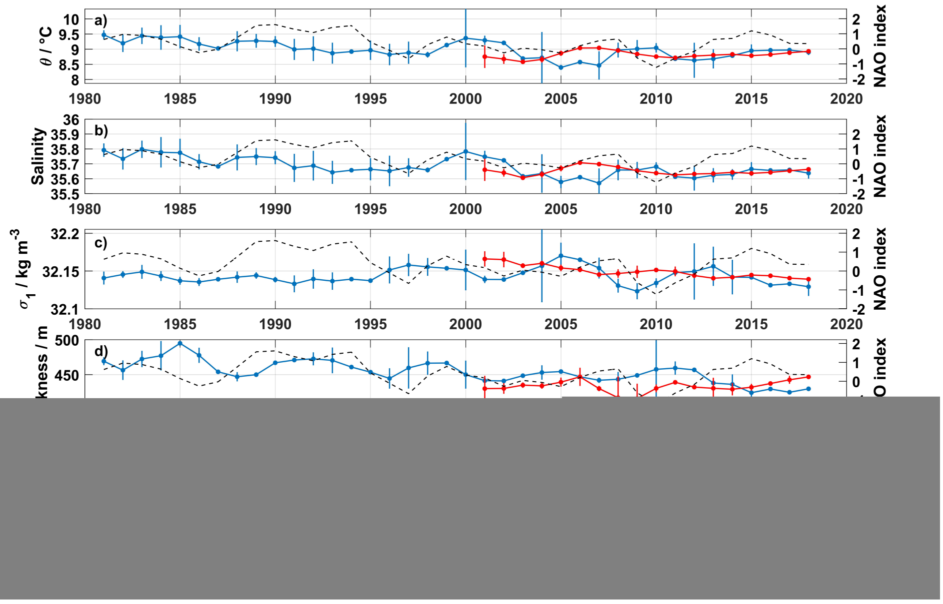

Figure S2. Annual mean potential temperature **(a)**, salinity **(b)**, potential density (with reference to 1000 dbar) **(c)**, thickness **(d)**, and dissolved oxygen concentration **(e)** averaged at the core of MOW (between 1000 and 1100 dbar). The blue time-series were calculated using only CTD profiles, and the red time-series were determined using only Argo/Bio-Argo profiles. Black dashed time-series are the 3-years moving mean winter NAO-index [DJFM, 2]. The annual means were averaged over the entire domain of Figure 1a and smoothed with a 3-years running mean. Error bars represent the standard error of the mean. Points without error bars were interpolated using a 3-point moving mean filter.

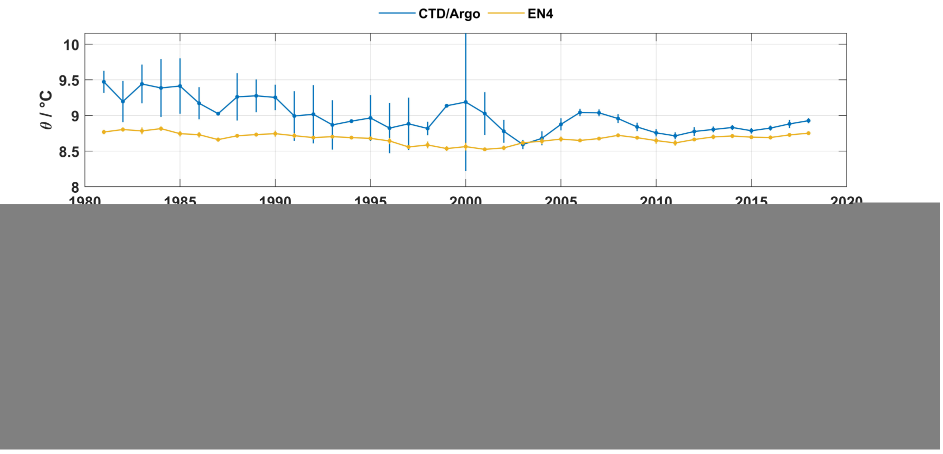

Figure S3. Annual mean potential temperature **(a)**, and salinity **(b)** averaged at the core of MOW (between 1000 and 1100 dbar). The blue time-series were calculated using the combined CTD and Argo profiles, and the yellow time-series were determined using the EN4 gridded product [1]. The annual means were averaged over the entire domain of Figure 1a and smoothed with a 3-years running mean. Error bars represent the standard error of the mean. Points without error bars were interpolated using a 3-point moving mean filter.

Table S1. Hydrographic data used from cruises in the Northeast Atlantic within the study domain of Figure 1.a obtained from the PANGAEA, ICES repository, CCHDO, and BODC data centres for the period 1981–2018. The date format includes the month and year.

Cruise	Research Vessel	Date	Number of Profiles	Reference
D117	RRS Discovery	Jan-Feb/1981	2	https://www.bodc.ac.uk/data/bodc_database/ctd/
316N19810516	Knorr	May-Jun/1981	8	https://cchdo.ucsd.edu/cruise/316N19810516
06PO		Mar-Apr/1982	9	ICES repository
06MT		Oct/1984	1	ICES repository
M9/2	Meteor	Jan/1989	9	https://doi.org/10.1594/PANGAEA.880023
M10/1	Meteor	Apr/1989	3	https://doi.pangaea.de/10.1594/PANGAEA.62022
NAPP90-1	Tyro	Apr-May/1990	15	https://doi.pangaea.de/10.1594/PANGAEA.817065
M14/1	Meteor	Sep/1990	1	https://doi.pangaea.de/10.1594/PANGAEA.880027
03OC240_2	Oceanus	May-Jun/1991	3	https://doi.pangaea.de/10.1594/PANGAEA.290745
07AL991_3	Alexander von Humboldt	Sep-Oct/1991	11	https://doi.org/10.1594/PANGAEA.290774
90MD46_1	Dmitry Mendeleyev	Sep-Nov/1991	17	https://cchdo.ucsd.edu/cruise/90MD46_1
32OC254_4	Oceanus	Dez/1992	1	https://cchdo.ucsd.edu/cruise/32OC254_4
POS200	Poseidon	Apr&Jul/1993	10	https://doi.pangaea.de/10.1594/PANGAEA.914338
3175MB93	Malcolm Baldrige	Jul-Aug/1993	5	https://doi.pangaea.de/10.1594/PANGAEA.290789
90CT40_1	Professor Multanosvskiy	Sep-Oct/1993	15	https://doi.pangaea.de/10.1594/PANGAEA.293942
90P431_1	Professor Shtokman	Oct/1993	26	https://cchdo.ucsd.edu/cruise/90P431_1
CD83	Charles Darwin	Dec/1993	2	https://doi.org/10.1594/PANGAEA.805824
POS202	Poseidon	Sep/1994	2	https://doi.pangaea.de/10.1594/PANGAEA.93019
				https://doi.pangaea.de/10.1594/PANGAEA.93018
POS212/2	Poseidon	Sep/1995	3	https://doi.pangaea.de/10.1594/PANGAEA.93125
				https://doi.pangaea.de/10.1594/PANGAEA.93126
				https://doi.pangaea.de/10.1594/PANGAEA.93128
POS212/4	Poseidon	Oct/1995	1	https://doi.pangaea.de/10.1594/PANGAEA.817060
DCM	Tydeman	Aug/1996	1	https://doi.pangaea.de/10.1594/PANGAEA.761693
M37/2	Meteor	Jan/1997	10	https://doi.org/10.1594/PANGAEA.816974
POS231/3	Poseidon	Aug/1997	2	https://doi.pangaea.de/10.1594/PANGAEA.816971
POS233	Poseidon	Sep/1997	6	https://doi.pangaea.de/10.1594/PANGAEA.93298
				https://doi.pangaea.de/10.1594/PANGAEA.93300
				https://doi.pangaea.de/10.1594/PANGAEA.93301
				https://doi.pangaea.de/10.1594/PANGAEA.93302
				https://doi.pangaea.de/10.1594/PANGAEA.93304
				https://doi.pangaea.de/10.1594/PANGAEA.93306
MERLIM	Pelagia	Mar/1998	2	https://doi.pangaea.de/10.1594/PANGAEA.817093
CAMBIOS98	RV Thalassa	Apr-May/1998	5	https://www.seanoe.org/data/00298/40905/

Table S1. Continuation.

74DI233_1	Discovery	May/1998	1	https://cchdo.ucsd.edu/cruise/74DI233_1
M42/1b	Meteor	Jul/1998	6	https://doi.pangaea.de/10.1594/PANGAEA.92975 https://doi.pangaea.de/10.1594/PANGAEA.92977 https://doi.pangaea.de/10.1594/PANGAEA.92981 https://doi.pangaea.de/10.1594/PANGAEA.92983 https://doi.pangaea.de/10.1594/PANGAEA.92985 https://doi.pangaea.de/10.1594/PANGAEA.92987
06GA350A_1	Gauss	May/2000	1	https://doi.pangaea.de/10.1594/PANGAEA.290787
FICARAM II	R/V Hespérides	Apr/2001	2	https://cchdo.ucsd.edu/cruise/29HE20010305
ARQ	Arquipelago	Jul/2003	2	https://doi.pangaea.de/10.1594/PANGAEA.326113 https://doi.pangaea.de/10.1594/PANGAEA.326112
M60/5	Meteor	Apr/2004	10	https://www.tib.eu/en/suchen/id/awi: doi~10.2312%252Fcr_m60/ [a]
D282	Discovery	Jul/2004	7	https://doi.pangaea.de/10.1594/PANGAEA.265173 https://doi.pangaea.de/10.1594/PANGAEA.265175 https://doi.pangaea.de/10.1594/PANGAEA.265176 https://doi.pangaea.de/10.1594/PANGAEA.265177 https://doi.pangaea.de/10.1594/PANGAEA.265179 https://doi.pangaea.de/10.1594/PANGAEA.265165 https://doi.pangaea.de/10.1594/PANGAEA.265166
CD171	RRS Charles Darwin	May-Jun/2005	21	https://www.bodc.ac.uk/data/
POS349	Poseidon	Apr/2007	5	http://dx.doi.org/10.2312/cr_po349 [a]
PE278	Pelagia	Oct/2007	1	https://doi.pangaea.de/10.1594/PANGAEA.897976
POS366/2	Poseidon	May/2008	1	https://doi.pangaea.de/10.1594/PANGAEA.729612
POS377	Poseidon	Dec/2008	6	https://doi.pangaea.de/10.1594/PANGAEA.729612
POS383	Poseidon	Apr-May/2009	9	https://doi.pangaea.de/10.1594/PANGAEA.729612
POS404	Poseidon	Sep/2010	19	http://dx.doi.org/10.2312/cr_po404 [a]
POS418/1	Poseidon	Jul/2011	6	https://doi.pangaea.de/10.1594/PANGAEA.890525
POS432	Poseidon	May/2012	4	http://oceanrep.geomar.de/id/eprint/27465 [a]
POS452	Poseidon	May/2013	2	http://dx.doi.org/10.2312/cr_po452 [a]
POS459	Poseidon	Sep/2013	10	http://dx.doi.org/10.2312/cr_po459 [a]
POS470	Poseidon	May-Jun/2014	31	http://dx.doi.org/10.3289/CR_POS470 [a]
POS471/1	Poseidon	Jun/2014	10	https://doi.pangaea.de/10.1594/PANGAEA.890578
POS485	Poseidon	May/2015	17	http://dx.doi.org/10.3289/CR_POS485 [a]
MSM48	Maria S. Merian	Nov/2015	3	https://doi.pangaea.de/10.1594/PANGAEA.860823
POS501	Poseidon	Jun/2016	24	http://dx.doi.org/10.3289/CR_POS_501 [a]
POS521	Poseidon	Mar/2018	27	J. J. Waniek (not published)
POS523	Poseidon	May/2018	9	https://doi.pangaea.de/10.1594/PANGAEA.903400

[a] Reference to the cruise report.

References

1. Good, S.A.; Martin, M.J.; Rayner, N.A. EN4: Quality controlled ocean temperature and salinity profiles and monthly objective analyses with uncertainty estimates. *J. Geophys. Res. Ocean.* **2013**, *118*, 6704–6716. doi:10.1002/2013JC009067.
2. Hurrell, J. The Climate Data Guide: Hurrell North Atlantic Oscillation (NAO) Index (Station-Based). 2020. Available online: https://climatedataguide.ucar.edu/climate-data/hurrell-north-atlantic-oscillation-nao-index-station-based (accessed on 4 March 2020).