Supplementary Material

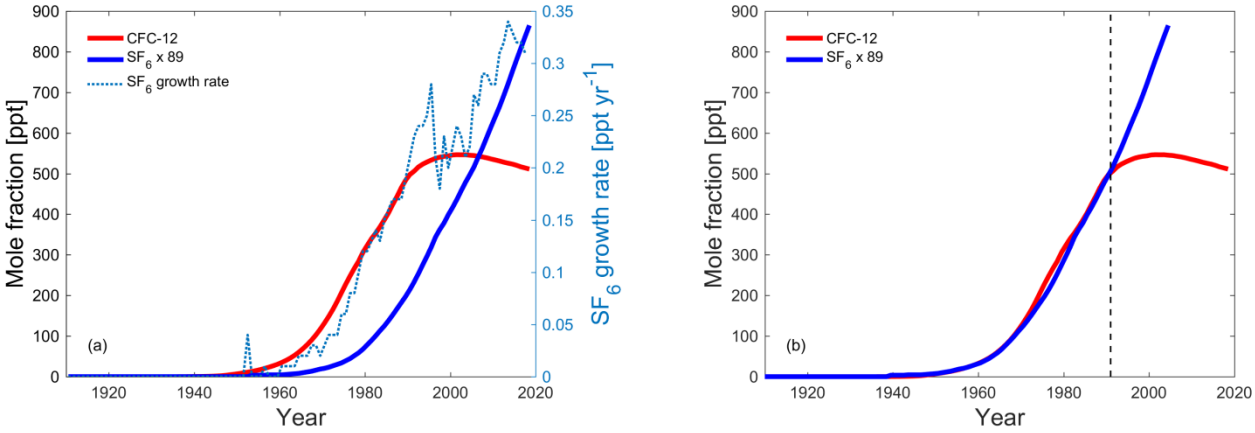

Figure S1. (a) Atmospheric mole fractions of CFC-12 and SF_6 and growth rate of SF_6 in the Northern Hemisphere; **(b)** Atmospheric mole fractions of CFC-12 and SF_6 but with the SF_6 record shifted back 14 years; the vertical dash line shows 2005 for SF_6 and 1991 for CFC-12.

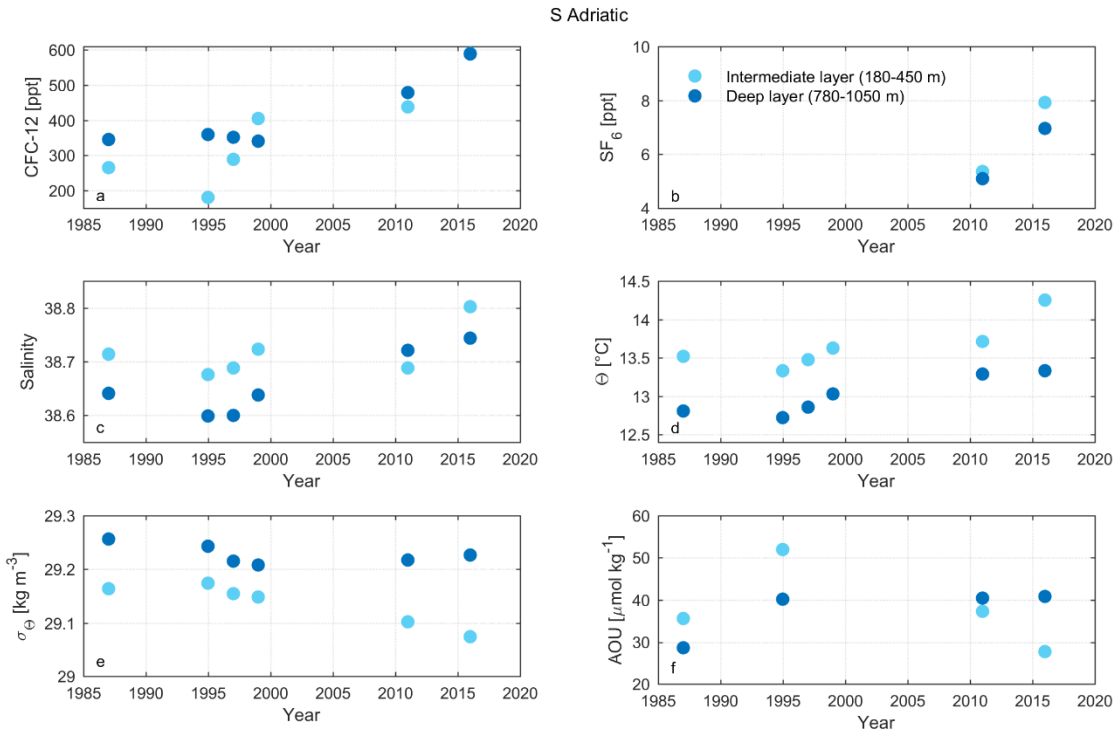

Figure S2. Time-series of averaged CFC-12, SF_6, salinity, potential temperature (Θ) and potential density (σ_Θ) and Apparent Oxygen Utilization (AOU) in the intermediate layer (180-450 m) and deep layer (780-1050 m) of the Southern Adriatic Sea.

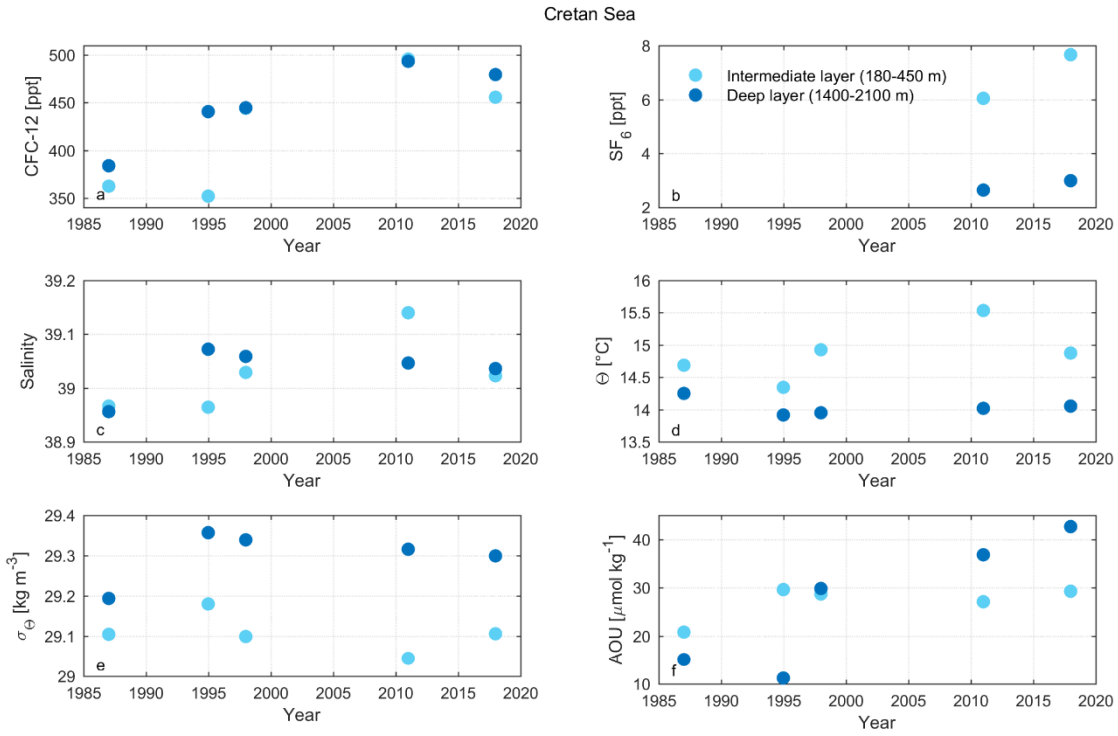

Figure S3. Time-series of averaged CFC-12, SF_6, salinity, potential temperature (Θ) and potential density (σ_Θ) and Apparent Oxygen Utilization (AOU) in the intermediate layer (180-450 m) and deep layer (140-2100 m) of the Cretan Sea.

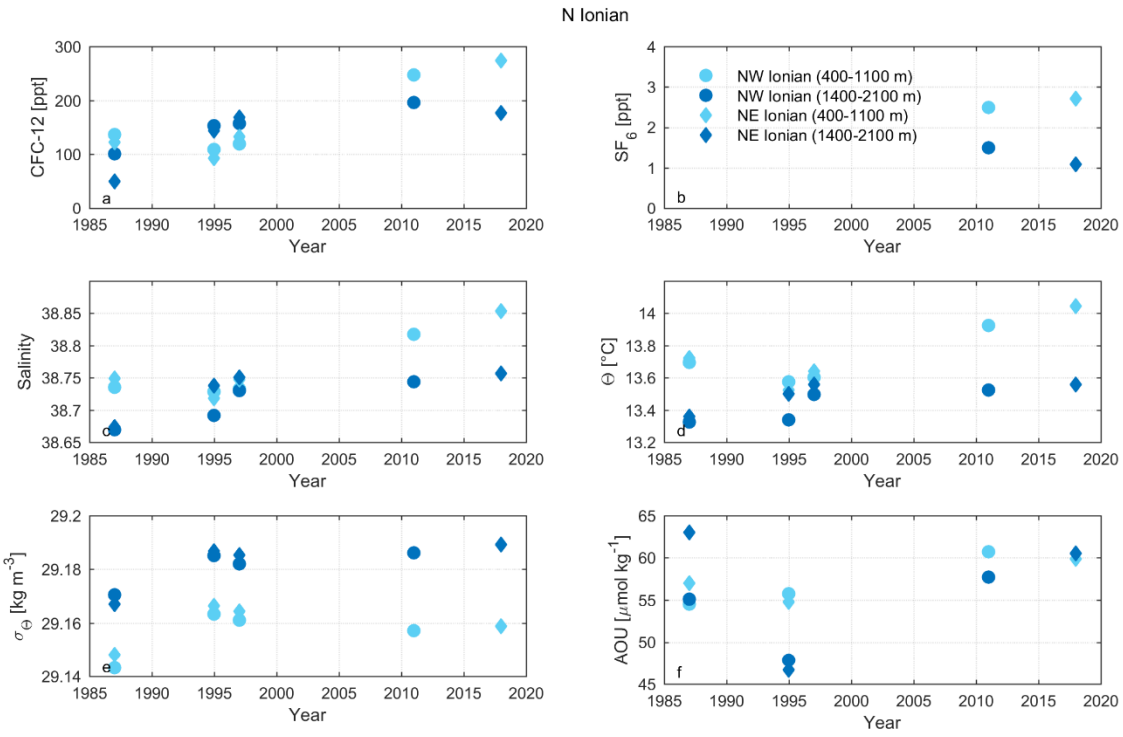

Figure S4. Time-series of averaged CFC-12, SF_6, salinity, potential temperature (Θ) and potential density (σ_Θ) and Apparent Oxygen Utilization (AOU) in the intermediate layer (400-1100 m) and deep layer (1400-2100 m) of the north-western and north-eastern Ionian Sea.

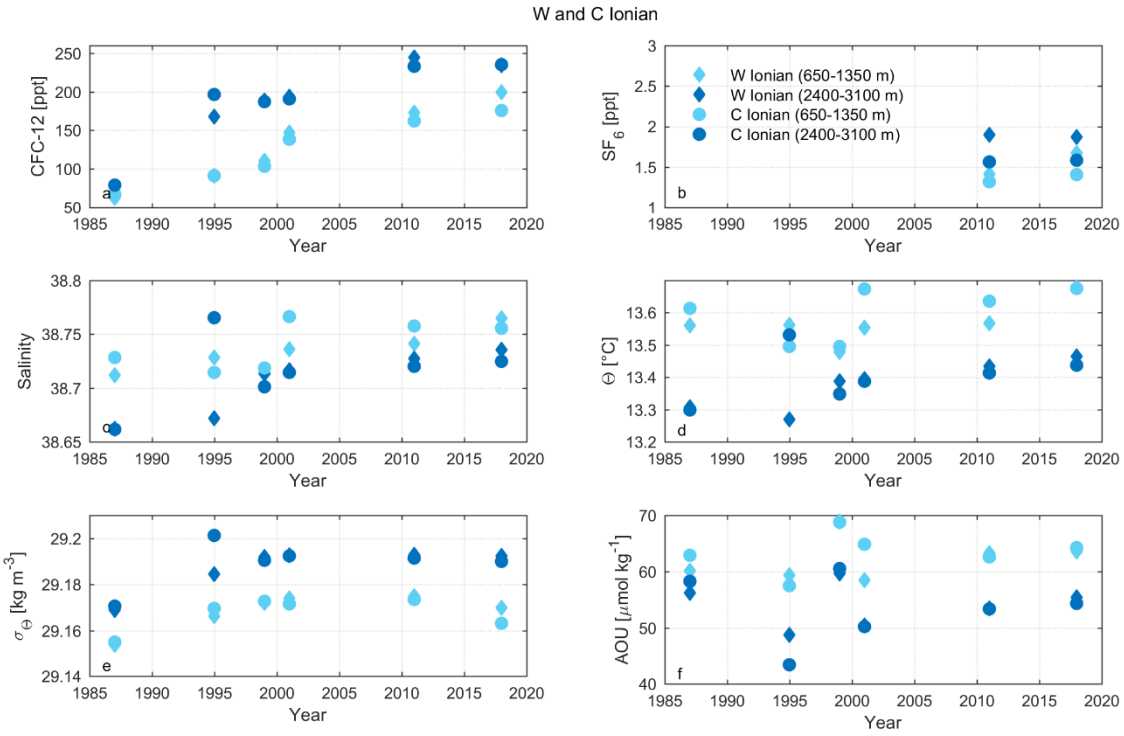

Figure S5. Time-series of averaged CFC-12, SF_6, salinity, potential temperature (Θ) and potential density (σ_Θ) and Apparent Oxygen Utilization (AOU) in the intermediate layer (650-1350 m) and deep layer (2400-3100 m) of the western and central Ionian Sea.

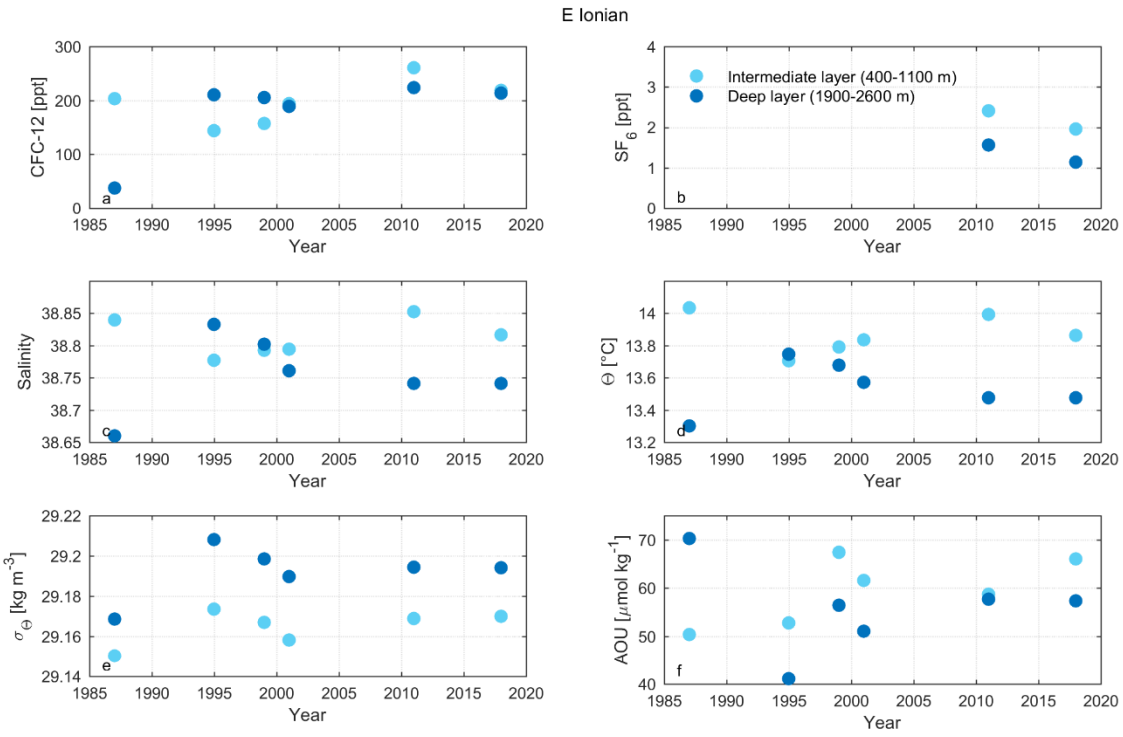

Figure S6. Time-series of averaged CFC-12, SF_6, salinity, potential temperature (Θ) and potential density (σ_Θ) and Apparent Oxygen Utilization (AOU) in the intermediate layer (400-1100 m) and deep layer (190-2600 m) of the eastern Ionian Sea.

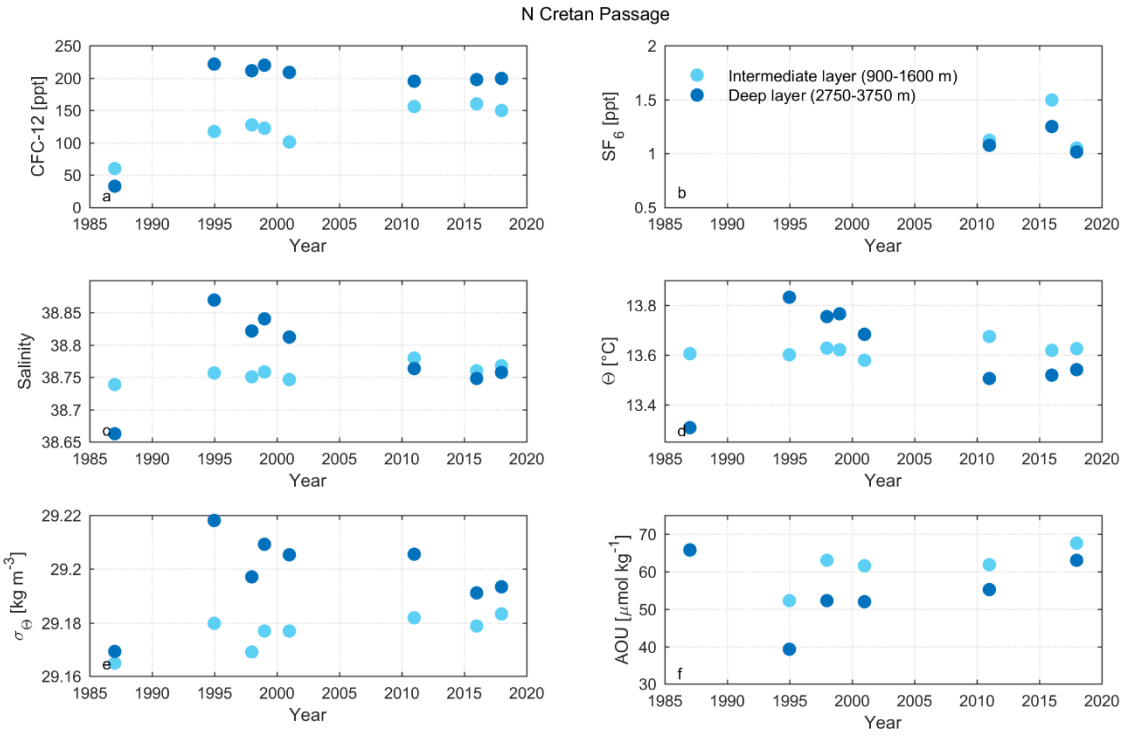

Figure S7. Time-series of averaged CFC-12, SF_6, salinity, potential temperature (Θ) and potential density (σ_Θ) and Apparent Oxygen Utilization (AOU) in the intermediate layer (900-1600 m) and deep layer (2750-3750 m) of the northern Cretan Passage.

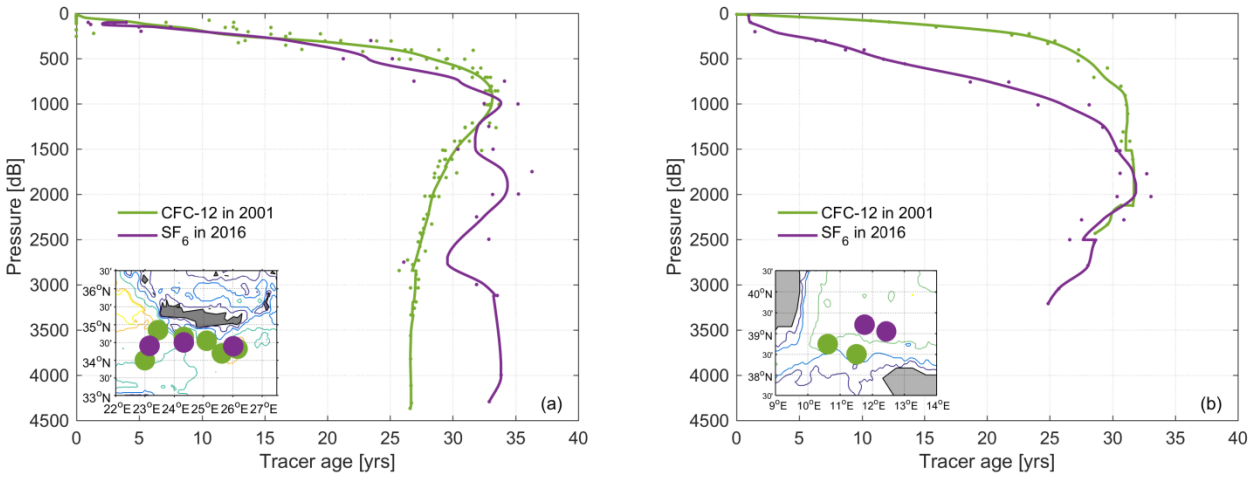

Figure S8. Comparison of averaged tracer age profiles of CFC-12 in 2001 and SF_6 in 2016 in the **(a)** northern Cretan Passage and **(b)** the Tyrrhenian Sea (see inset map for station locations). CFC-12 data in 2001 is from cruise M51/2; SF_6 data in 2016 is from **(a)** cruise CERLEV2016 and **(b)** cruise TalPro2016, respectively.

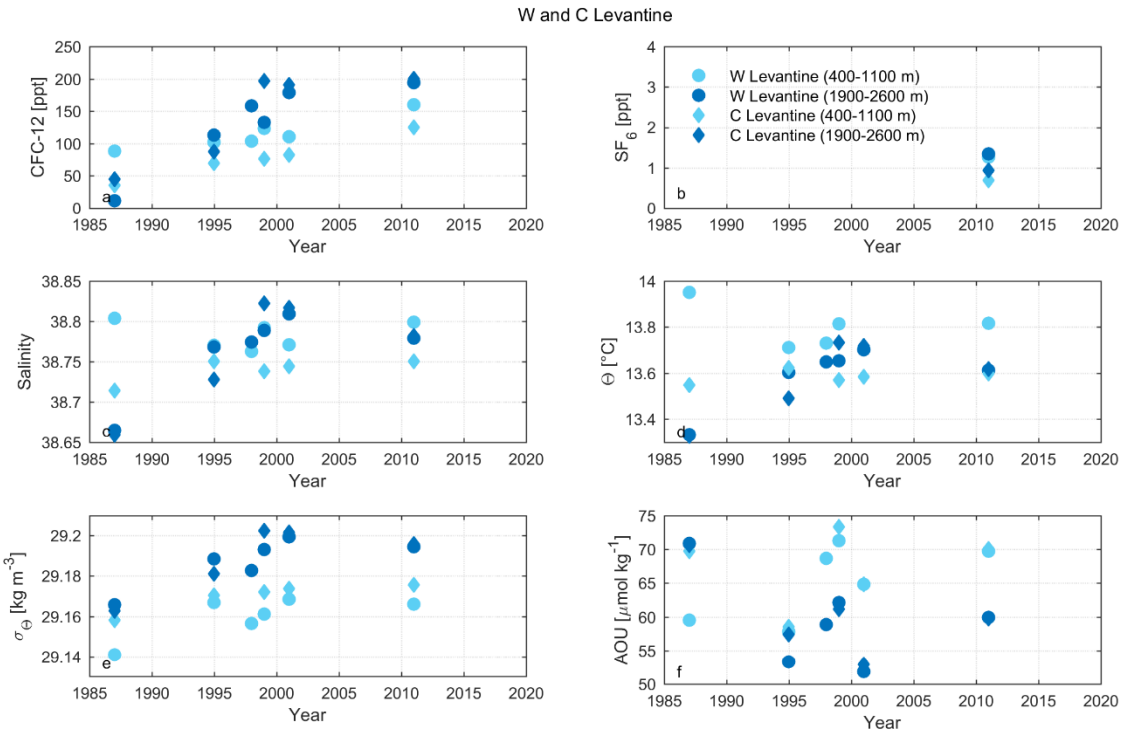

Figure S9. Time-series of averaged CFC-12, SF_6, salinity, potential temperature (Θ) and potential density (σ_Θ) and Apparent Oxygen Utilization (AOU) in the intermediate layer (400-1100 m) and deep layer (1900-2600 m) of the western and central Levantine basin.

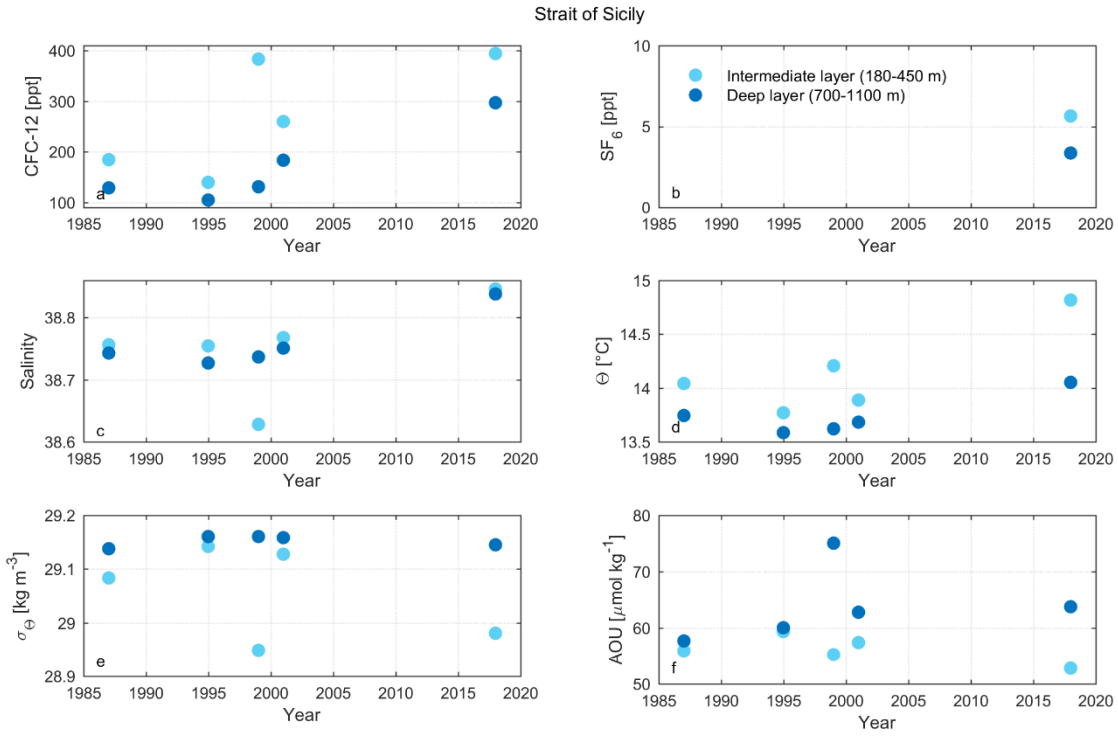

Figure S10. Time-series of averaged CFC-12, SF_6, salinity, potential temperature (Θ) and potential density (σ_Θ) and Apparent Oxygen Utilization (AOU) in the intermediate layer (180-450 m) and deep layer (700-1100 m) of the Strait of Sicily.

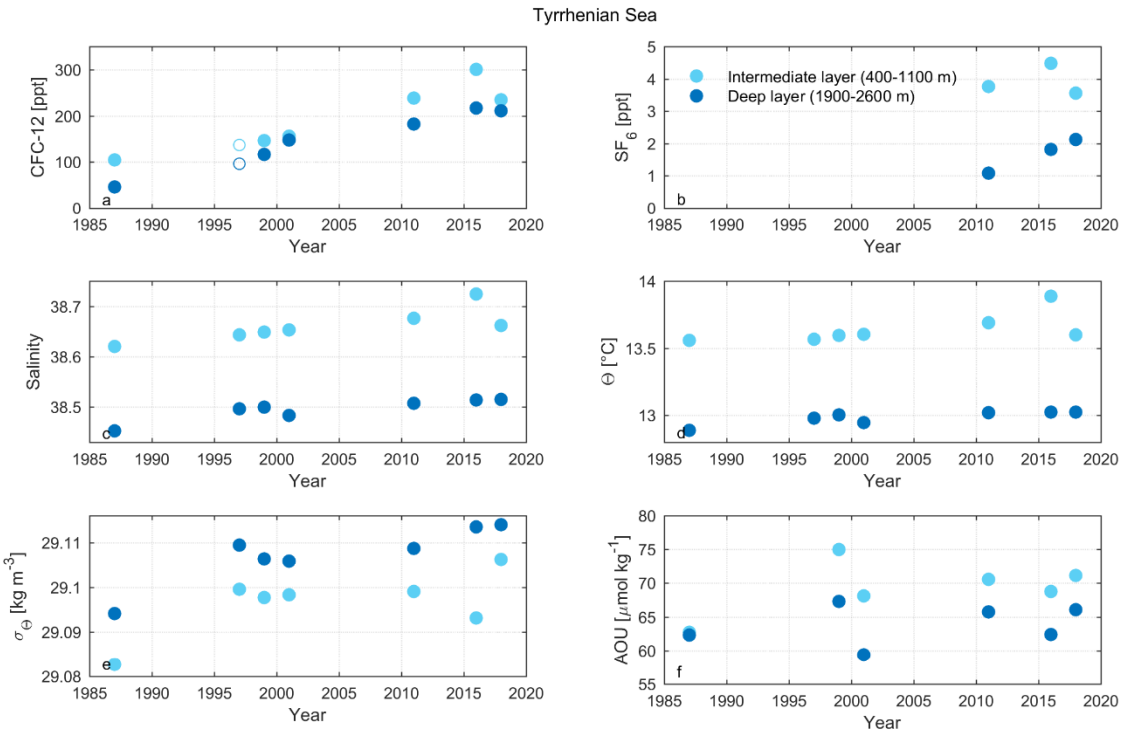

Figure S11. Time-series of averaged CFC-12, SF_6, salinity, potential temperature (Θ) and potential density (σ_Θ) and Apparent Oxygen Utilization (AOU) in the intermediate layer (400-1100 m) and deep layer (1900-2600 m) of the Tyrrhenian Sea. In **(a)**, the 1997 data from cruise P234 with "o" symbols were calculated from CFC-11.

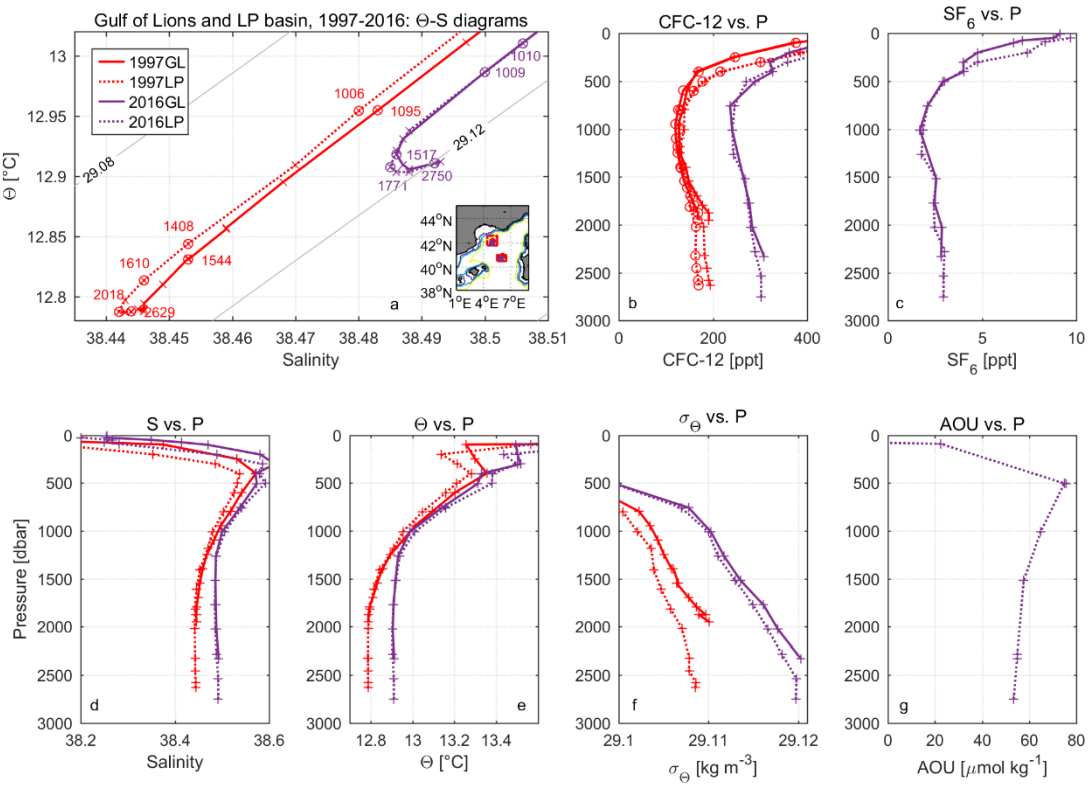

Figure S12. Similar to **Figure 3** but in the Gulf of Lions (GL) and Liguro-Provençal (LP) basin. The stations shown in the Gulf of Lions are P234 756 and TALPro2016 28 (continuous lines). The stations shown in the Liguro-Provençal basin are P234 750 and TALPro2016 25 (dotted lines). In **(b)**, we added the 1997 data with "o" symbols calculated from CFC-11.

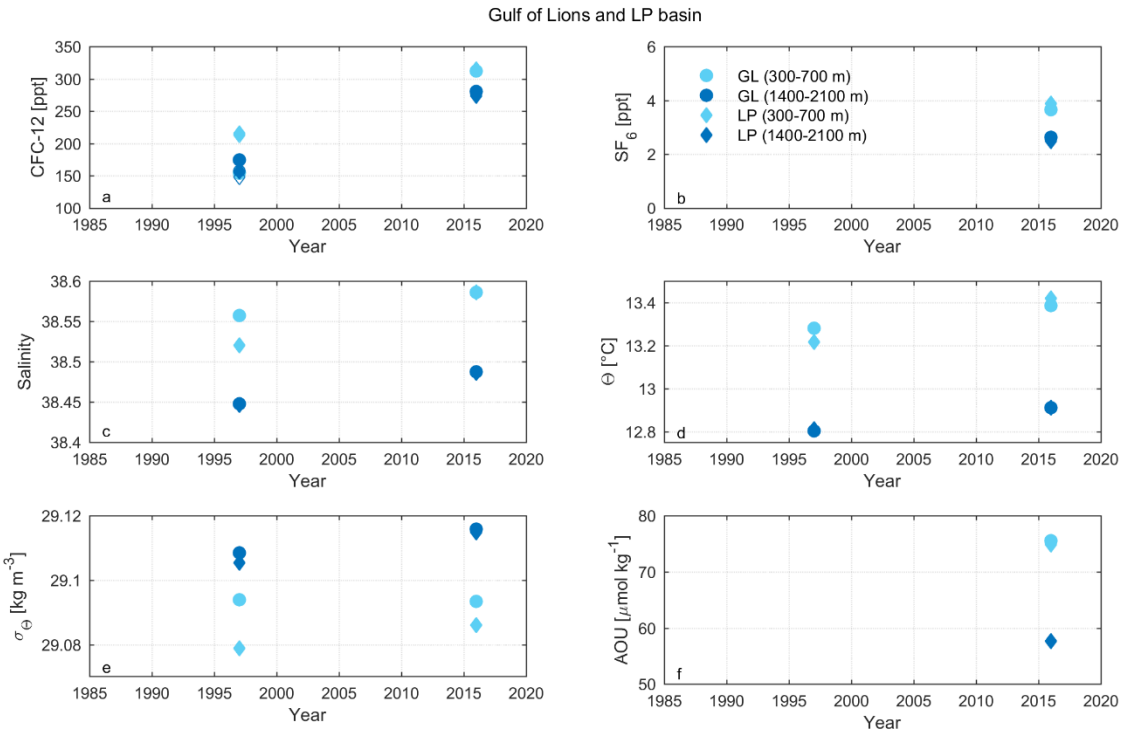

Figure S13. Time-series of averaged CFC-12, SF_6, salinity, potential temperature (Θ) and potential density (σ_Θ) and Apparent Oxygen Utilization (AOU) in the intermediate layer (300-700 m) and deep layer (1400-2100 m) of the Gulf of Lions and Liguro-Provençal basin. In **(a)**, we added the 1997 data with "o" and hollow diamond symbols calculated from CFC-11.

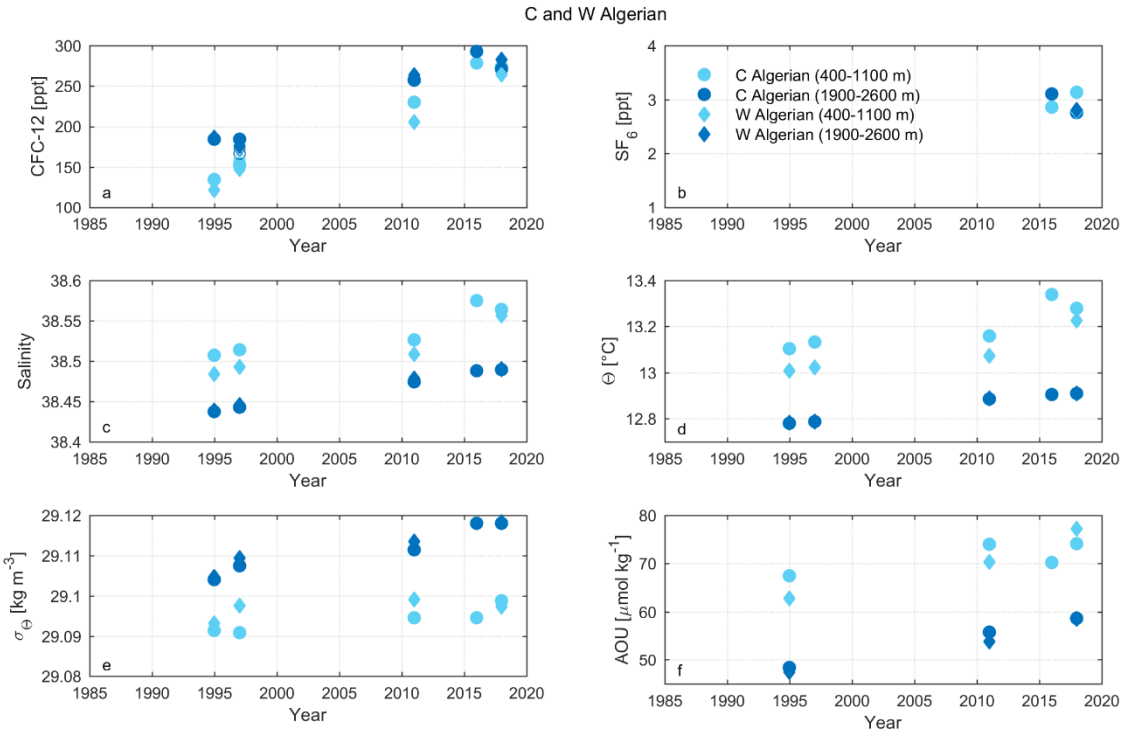

Figure S14. Time-series of averaged CFC-12, SF_6, salinity, potential temperature (Θ) and potential density (σ_Θ) and Apparent Oxygen Utilization (AOU) in the intermediate layer (400-1100 m) and deep layer (1900-2600 m) of the central and western Algerian basin. In **(a)**, we added the 1997 data with "o" and hollow diamond symbols calculated from CFC-11.

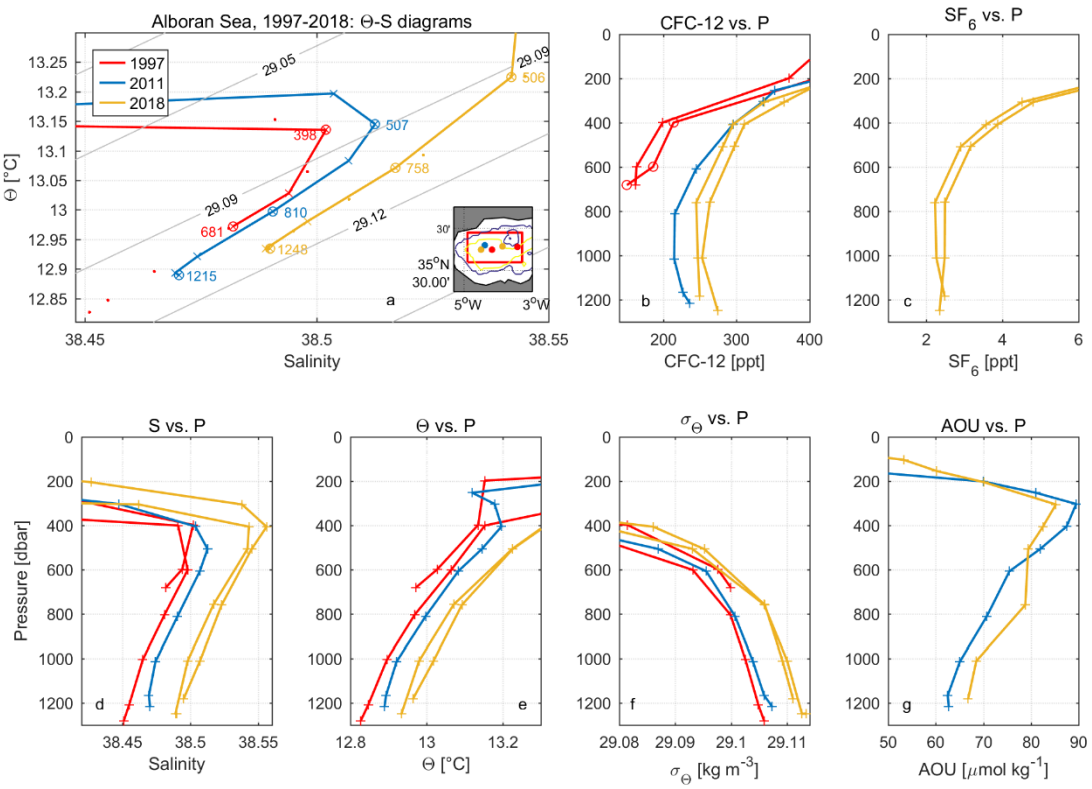

Figure S15. Similar to **Figure 3** but in the Alboran Sea. The stations shown are P234 716 and 715, M84/3 334 and MSM72 130 and 129. In **(b)**, we added the 1997 data with "o" symbols calculated from CFC-11.

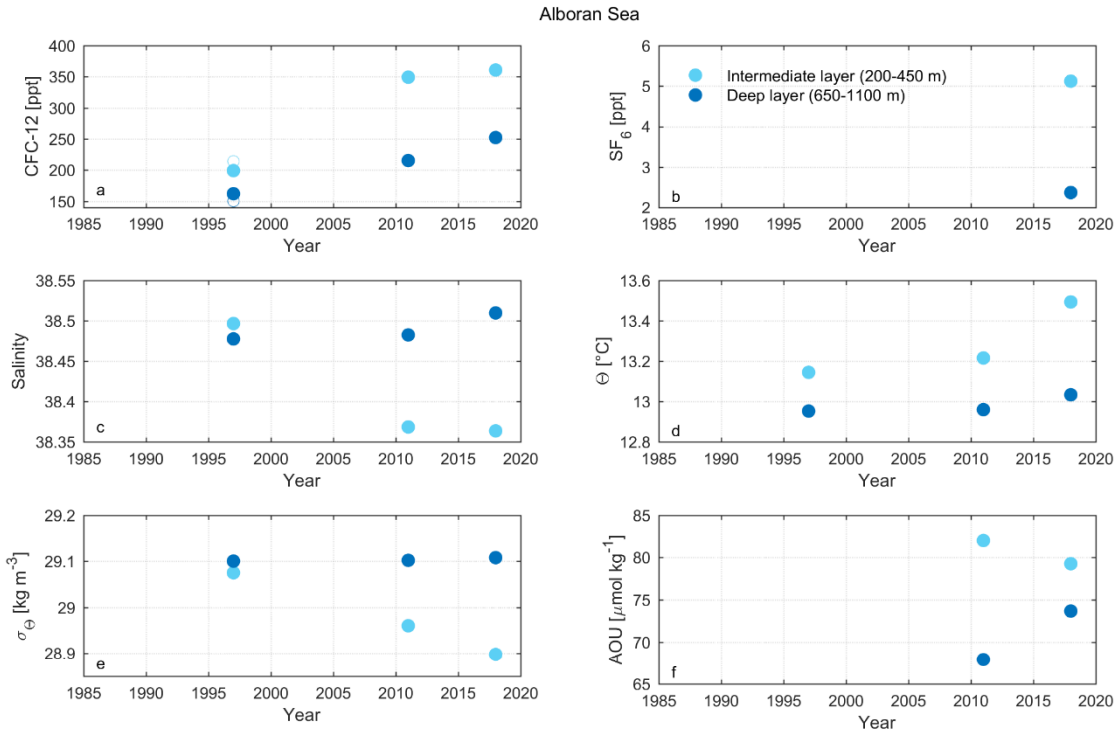

Figure S16. Time-series of averaged CFC-12, SF_6, salinity, potential temperature (Θ) and potential density (σ_Θ) and Apparent Oxygen Utilization (AOU) in the intermediate layer (200-450 m) and deep layer (650-1100 m) of the Alboran Sea. In **(a)**, we added the 1997 data with "o" symbols calculated from CFC-11.

Table S1. Abbreviations and corresponding full names of terms used in this study

Abbreviation	Full name	Abbreviation	Full name
CFC-11	Trichlorofluoromethane	EMed	Eastern Mediterranean basin
CFC-12	Dichlorodifluoromethane	EMT	Eastern Mediterranean Transient
SF_6	Sulfur hexafluoride	EMDW	Eastern Mediterranean Deep Water
TTD	Transit Time Distribution	tEMDW	transitional EMDW
ppt	part per trillions	WMed	Western Mediterranean basin
S	Salinity	WMT	Western Mediterranean Transition
Θ	Potential temperature	WMDW	Western Mediterranean Deep Water
σ_Θ	Potential density	MAW	Modified Atlantic Water
P	Pressure	LIW	Levantine Intermediate Water
DO	Dissolved oxygen	CIW	Cretan Intermediate Water
AOU	Apparent Oxygen Utilization	CDW	Cretan Deep Water
CTD	Conductivity, temperature, and depth	AdDW	Adriatic deep water
DWF	Deep/Dense Water Formation	TMW	Transitional Mediterranean Water
TMZ	Tracer Minimum Zone	TDW	Tyrrhenian Deep Water

Table S2. Depth (m) of the Tracer Minimum Zone (TMZ) during 1987-2018 based on CFC-12 (black) and SF_6 (blue) observations.

Basin/Sea	1987	1995	1997	1999	2001	2011	2016	2018
Adriatic Sea	~200	300-400	300-400	500-800		~300 ~300	not present not present	
Cretan Sea	~800	400-500				1200-1500 ~1500	1000-2000 ~2000	
North-western Ionian Sea	1200-1300	800-900	~800			~1000 ~1000		
North-eastern Ionian Sea	~1600	~700	~800					1200-1300 1200-1300
Western Ionian Sea	~1900	~1000		700-800	~1000	~1000 ~1000		~1500 ~1500
Central Ionian Sea	1200-1400	~700		700-800	1200-1300	~1000 1000-1500		1200-1300 1200-1300
Eastern Ionian Sea	~1400	~600		~800	700-800	~1000 ~1000		1000-1300 1000-1500
Northern Cretan Passage	2100-2200	~800		~1000	~1000	1500-1600 1700-1800	1000 700-800	1500-1600 2700-2800
Western Levantine basin	~1600	800-900		1200-1300	~1200	~1000 ~1000		
Central Levantine basin	1500-1600	1800-1900		~1300	~1200	~1000 ~1000		
Tyrrhenian Sea	1800-1900		1000-2400	2000-2100	1800-1900	1700-1800 not present	1700-1800 1700-2000	1200-1600 1700-2000
Gulf of Lion			900-1000				700-800 ~1000	
LP basin			1100-1200				~1000 1200-1300	
Central Algerian basin	~700	900-1000				800-1000	1200-1300 1200-1300	1000-1300 1200-1300
Western Algerian basin	800-900	~1100				~1000		1200-1300 ~1000
Alboran Sea			600-700			~1000		700-1000 700-1300