TABLE 1. Representative Properties for Important Water Masses Discussed in This Review

Water Mass	Abbreviation	T	S	Origin	Reference
Ambient Atlantic Water	AAW	12	36.5	Atlantic water into which MOW passes having exited the Strait of Gibraltar	Price and O'Neill-Baringer [1994]
Atlantic Inflow Water	AIW	15 to 16	36.5	Atlantic water inflowing as the surface layer in the Strait of Gibraltar. Also, the flow of mostly NACW toward Gibraltar in the Gulf of Cadiz	Millot [2009]
Atlantic Mediterranean Water	AMW	10.5 to 14	36.5 to 37.5	The mixing product of MOW and AAW found at intermediate depths in the northeast Atlantic	Term not previously used
Eastern Mediterranean Deep Water	EMDW	14	38.5	Dense water produced in the northern marginal basins of the eastern Mediterranean	Millot [2009]
Levantine Intermediate Water	LIW	14.5	38.5	Intermediate waters produced by winter cooling and evaporation in the easternmost Mediterranean	Millot [2009]
Modified Atlantic Water	MAW	14.5 to 15	~37	The mixing product of AIW and MOW produced at the eastern limit of the Strait of Gibraltar. Also, the relatively buoyant layer overlying the western Mediterranean	Rogerson et al. [2010]
Mediterranean Deep Water	MDW	12.7 to 12.9	38.5	Bottom water flowing westward over the Camarinal Sill. Comprises WMDW and lower TDW	Millot [2009]
Mediterranean Intermediate Water	MIW	12.9 to 13.5	38.5	Intermediate water flowing westward over the Camarinal Sill. Comprises LIW, WIW and upper TDW	Millot [2009]
Mediterranean Outflow Water	MOW	13	38.5	The sum of all Mediterranean-sourced waters flowing westward over the Camarinal Sill	Price and O'Neill-Baringer [1994]
North Atlantic Central Water	NACW	15.3	36.1	Water from within the upper layers of the North Atlantic gyre	Alvarez et al. [2005]
North Atlantic Deep Water	NADW	2	35.5	Dense waters produced in the Nordic and Labrador Seas flowing south as a bottom layer north of 30degreeN	Alvarez et al. [2005]
Tyrrhenian Dense Water	TDW	13	38.5	A complex of dense waters produced in the Tyrrhenian Sea "thermohaline staircase" by mixing of EMDW, LIW and WIW	Millot [2009]
Winter Intermediate Water	WIW	12.9 to 13	38.3	Intermediate water produced on the northern margin of the western Mediterranean during most winters	Millot [2009]
Western Mediterranean Deep Water	WMDW	12.7 to 12.8	38.44 to 38.48	Bottom water produced on the northern margins of the western Mediterranean (esp. Gulf of Lion) during some winters	Millot [2009]

TABLE 2. List of Parameters Used in This Study

Symbol	Parameter	Value (if Constant)	Units
Phi	Mixing coefficient		
Bgeo	Geostrophic buoyancy flux		m3 s-3
Ugeo	Geostrophic velocity		m s-1
g'	Reduced gravity		
Pi	Bottom gradient		o
f	Coriolis parameter	0.000084	
Hsrc	Height of MOW plume at source		m
Kgeo	Geostrophic Ekman number		
x	Distance from source of entrainment "event"	100,000	m
Wsrc	Width of MOW plume at source		m
g	Acceleration due to gravity	9.81	m s-2
RhoMO	Density of Mediterranean water		kg m-3
RhoATL	Density of inflowing Atlantic water		kg m-3
Dsettling	Mean settling depth of AMW		m
DeltaRhoMO	Density difference of Mediterranean and Atlantic water		kg m-3
Ds	Depth of water at the Camarinal Sill		m
h'	Global sea level change		m
PartRho/Partz	Atlantic vertical density gradient		kg m-4
QMO	Flux of MOW		Sv
DeltaSgib	Salinity difference between Atlantic and Mediterranean water		Sp
Satl	Salinity of inflowing Atlantic water		Sp
Xmed	Mediterranean net freshwater export flux		Sv
C	Geometric coefficient for Strait of Gibraltar	0.283	
Qtotal	Total, two-layer export at Gibraltar		Sv
B	Coefficient of saline contraction	0.00077	kg m-3 Sp-1
A	Coefficient of thermal expansion	0.0002	kg m-3 degreeC-1
DeltaTgib	Temperature difference between Atlantic and Mediterranean water		degreeC
qs	Sediment flux		kg s-1
X1	First entrainment coefficient		
X2	Second entrainment coefficient		
sd	Sediment density	2.65	g cm-3
D50	median grain size of sediment	2.4	mum
U*	Shear velocity		m s-1
U*crit	Critical shear velocity	2.4	m s-1

TABLE 3. Mean Delta18OG. bulloides and SST Data for Gibraltar Transect Cores and Summary of Evidence for Flow Within the Gulf of Cadiz and Alboran Seaa

Period	Mean Delta18OG. bulloides Gulf of Cadiz	Mean Delta18OG. bulloides Alboran Sea	DeltaDelta18OG. bulloides-Gib	Mean wSST Gulf of Cadiz	Mean wSST Alboran Sea	DeltawSSTGib	Mean sSST Gulf of Cadiz	Mean sSST Alboran Sea	DeltasSSTGib	Evidence of MOW Activity in Gulf of Cadiz			Evidence of Circulation in Alboran Sea	
										MOW 2 Active?	MOW 1 Active?	Depth on Iberian Margin	Alboran Gyres Active?	Bottom Water Stagnant?
Core Top	0.20	0.95	0.75	17.84	15.69	-2.15	22.51	21.16	-1.35	Yes	Yes	500-1500 m	Yes	No
Early Holocene	0.36	0.84	0.48	18.22	18.42	0.2	22.56	23.41	0.85	?	?	?	No	Yes
Younger Dryas	1.58	2.06	0.48	12.30	9.97	-2.33	18.05	13.93	-4.12	Yes	Yes	500-2000 m	No	No
Bolling-Allerod	1.01	1.83	0.81	15.67	12.5	-3.17	20.00	16.00	-4	?	?	~800 m	No	Yes
LGM	1.97	3.34	1.37	14.11	9.41	-4.71	19.48	13.33	-6.16	Yes	No	1000-2000 m	No	No
HS1	2.32	2.67	0.35	8.62	8.81	0.18	13.44	12.61	-0.83	Yes	Yes	<2600m	No	No

aEntries for MOW, Alboran gyre and bottom stagnation changes are drawn from the more detailed analysis provided in section 5.