

A high resolution reanalysis for the Mediterranean Sea

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Outline

Description

Evolution of basin averaged diagnostics

HovMoller of EANs (Estimated Accuracy Numbers): Comparisons with insitu data

Vertical profiles of EAN diagnostics

Conclusions



Description

Avg diags

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Hov Moller

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Conclusions

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Description

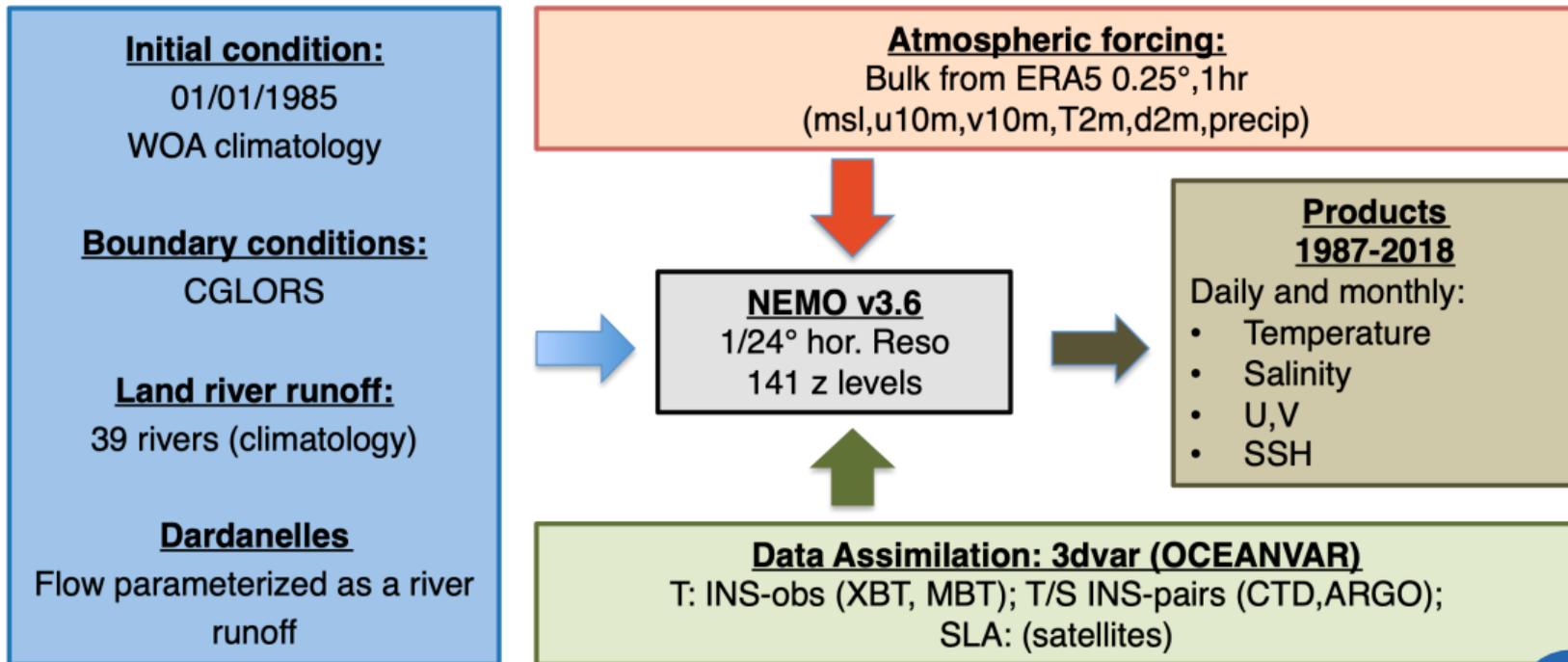


Characteristics of MEDREA24

- ▶ Period: 1987-2018
- ▶ Res: 1/24 and 141 levels
- ▶ Vertical coord: z^* with partial steps
- ▶ Nonlinear free surface
- ▶ Advection scheme for active tracers: mixed up-stream/MUSCL
- ▶ Biharmonic visc. and diff., Pacanowsky and Philander (1981) for vertical mixing
- ▶ Interactive air-sea fluxes with ERA5: MFS bulk formulae described in Pettenuzzo et al. (2010)
- ▶ Bathymetry: GEBCO HR + smoothing
- ▶ Nested in Global CMCC model daily reanalysis
- ▶ 39 river inputs (discharge $> 50 m^3/s$) + Dardanelles Strait (parameterized as a river)
- ▶ NEMO 3.6, MPI on 240 cores
- ▶ Planned delivery: December 2020



Characteristics



Comparison with previous reanalysis

	MEDREA16	MEDREA24
Resolution	1/16° (5-6km) horizontal 72 vertical levels	1/24° (4.5km) horizontal 141 vertical levels
Initial Conditions	SDN Clim T and S	WOA-V2 Winter Clim T and S
Bathymetry	Modified DBDB1 1min	Modified GEBCO 30arc-sec
Physical model	NEMO v3.2 linear free-surface Z coordinates	NEMO V3.6 non-linear free-surface Z* coordinates
River inputs	7 with $Q > 100m^3/s$ (climato)	39 with $Q > 50m^3/s$ (climato)
Data assimilation	Dobricic and Pinardi 2008	Storto et al, 2015
SST nudging	-40W/m ² /K constant during the day	Gaussian around 00:00 (max=-110W/m ² /K)
Lateral Boundaries	Monthly climatological fields from GLO-MFC 1/4	Daily mean fields from CGLORS REA 1/4
Atmospheric forcing	ERA interim (0.75°, 6hrs)	ERA5 (0.25°, 1hr)
Reanalysis period	1987-2018	1987->
Released variables	T, S, SSH, UV	T, S, SSH, UV, MLD, Tb
File frequency	Daily, monthly	Daily, monthly, hourly (SSH, SSUV)



Nomenclature

-  MEDHIND24: Hindcast at 1/24 (same as reanalysis without assimilation)
-  MEDREA24_c5: This version of the reanalysis
-  MEDREA16: Previous reanalysis



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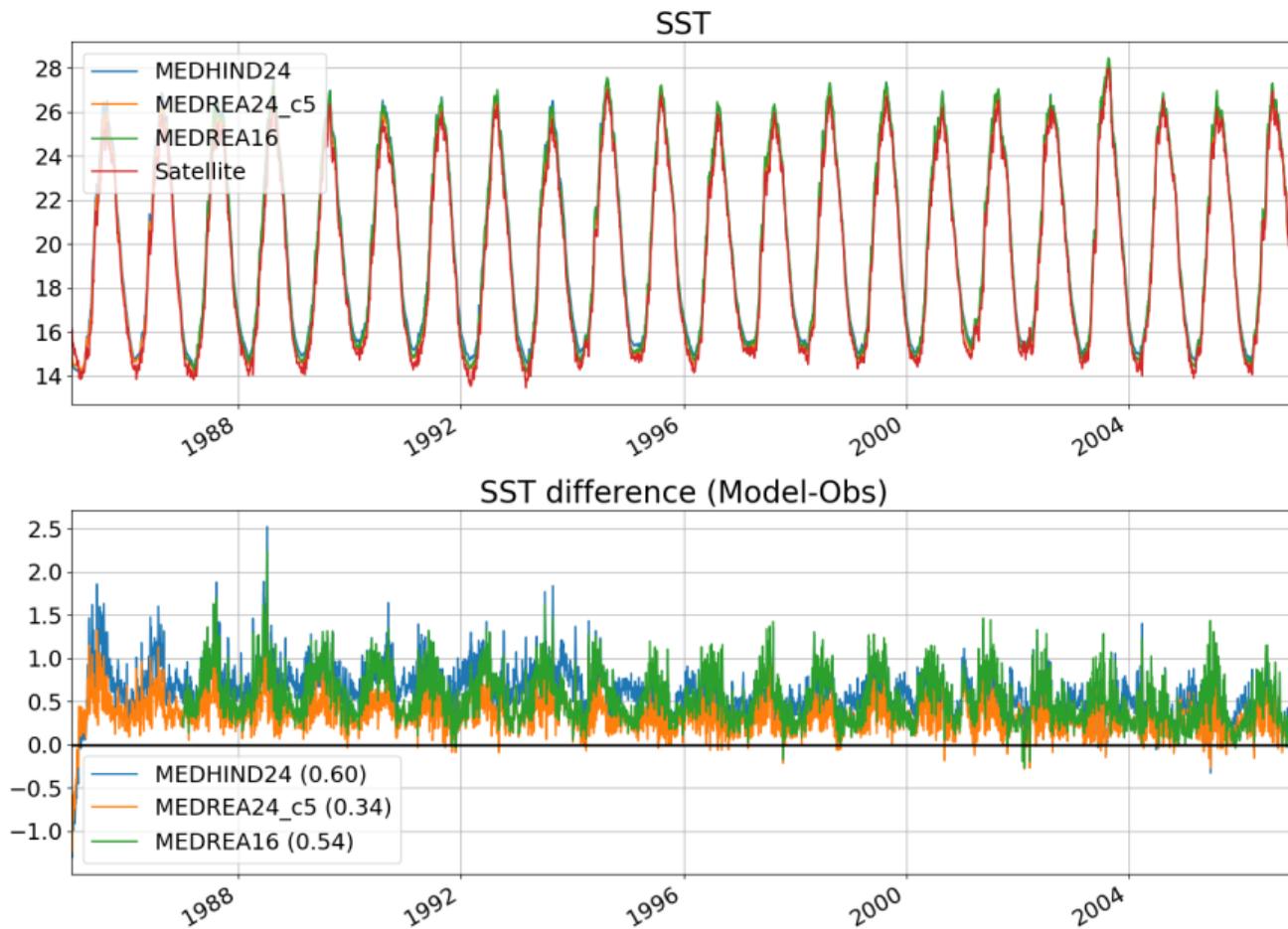
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Evolution of basin averaged diagnostics





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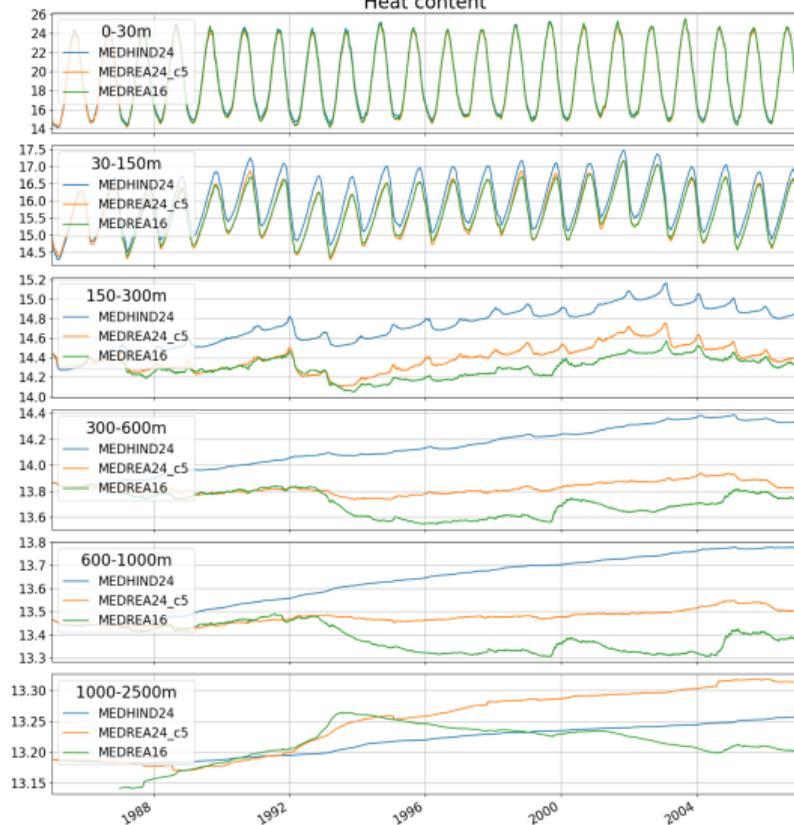
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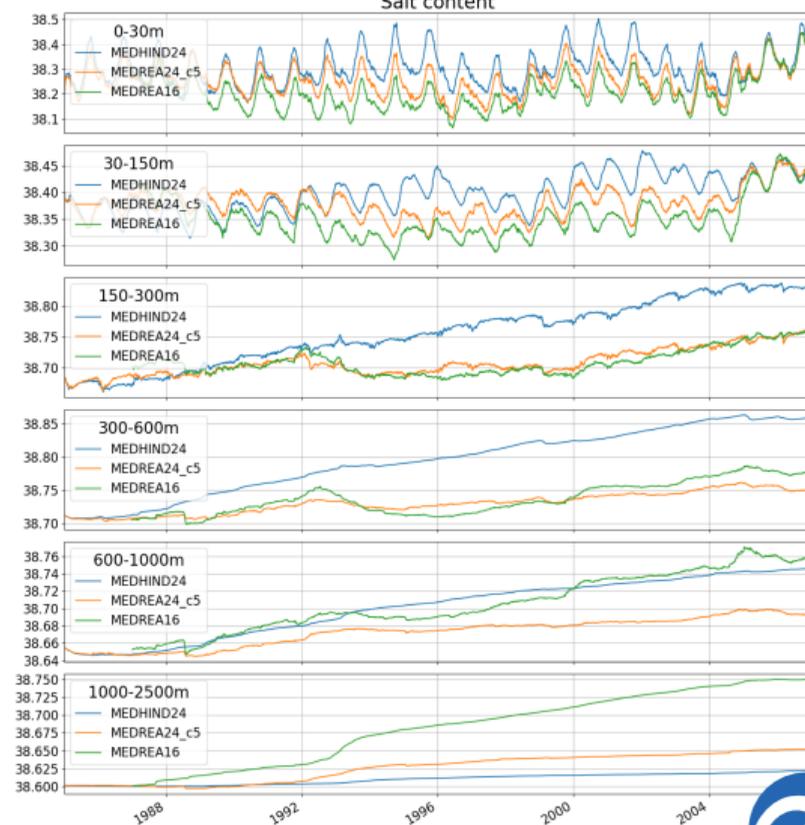
Conclusions

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Heat content



Salt content



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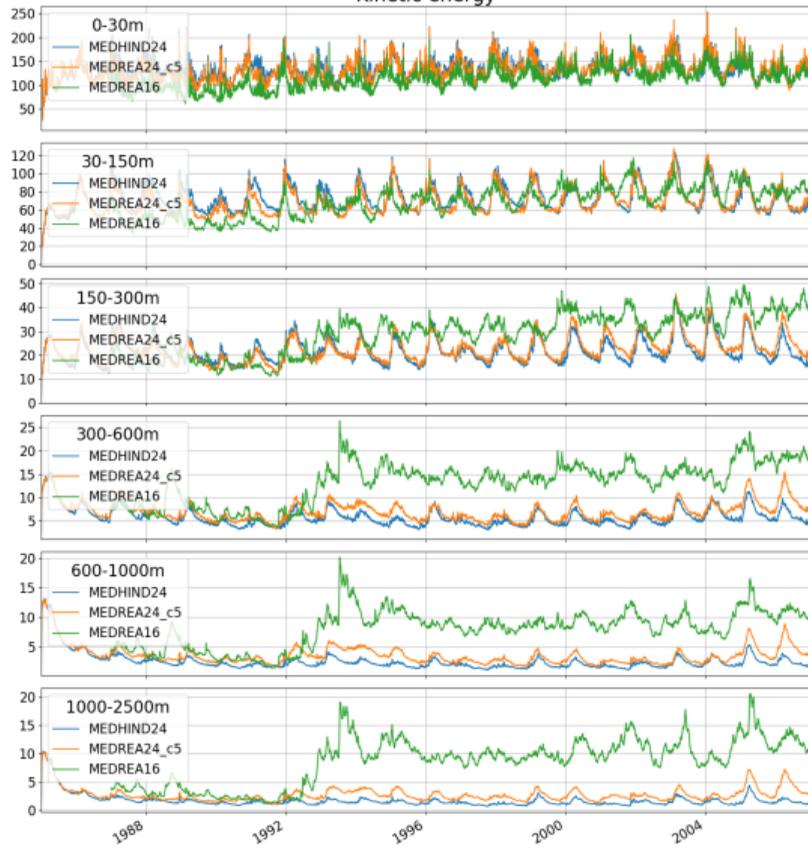
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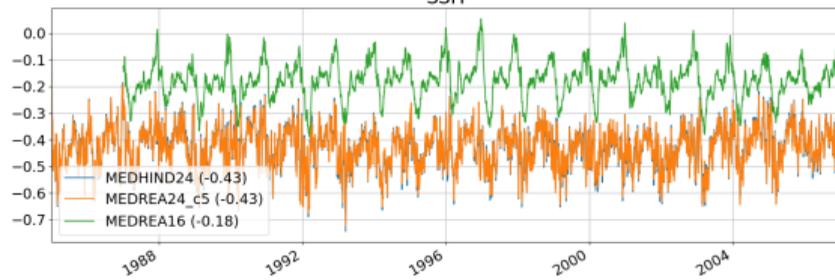
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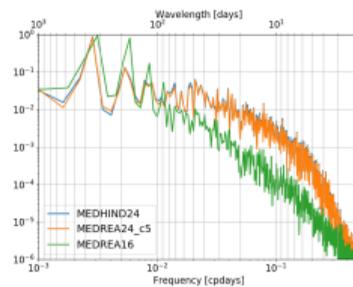
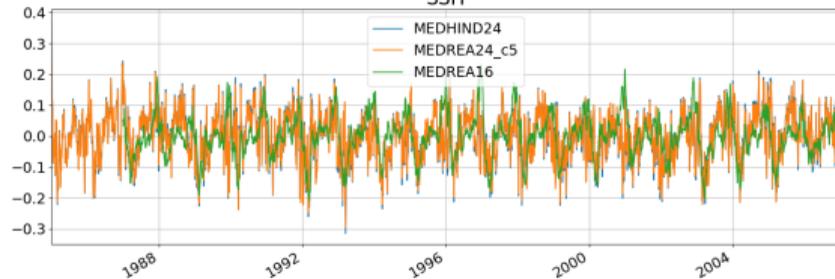
Kinetic energy



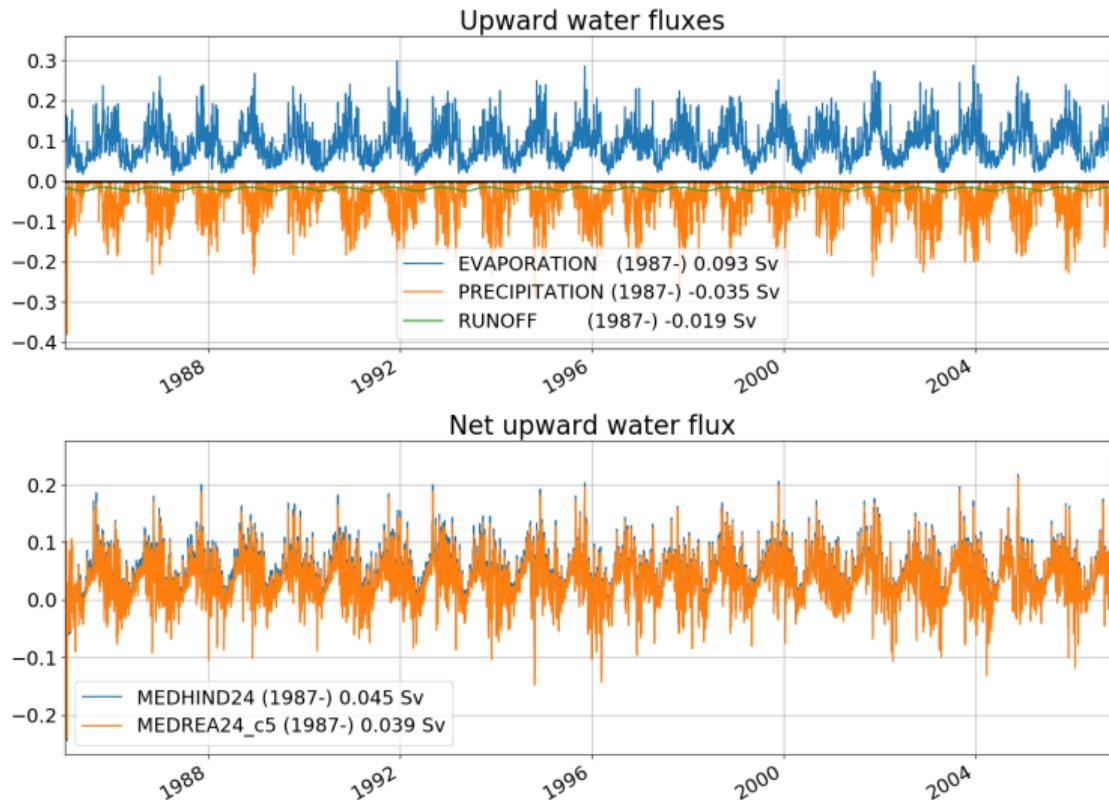
SSH



SSH



Water fluxes MEDREA24_ERA5



Water fluxes averaged compared to literature (1988-2000)

	Precipitation	Evaporation	E-P	Net
Mariotti et al, 2010	1.12 ± 0.21	2.94 ± 0.37	1.71 ± 0.38	
MEDHIND24	1.15	3.36	2.31	1.56
MEDREA24_c5	1.15	3.13	1.98	1.33
MEDREA16	1.20	2.99	1.74	

Water fluxes averaged values (in $\text{mm}\cdot\text{day}^{-1}$)



HovMoller of EANs (Estimated Accuracy Numbers): Comparisons with insitu data



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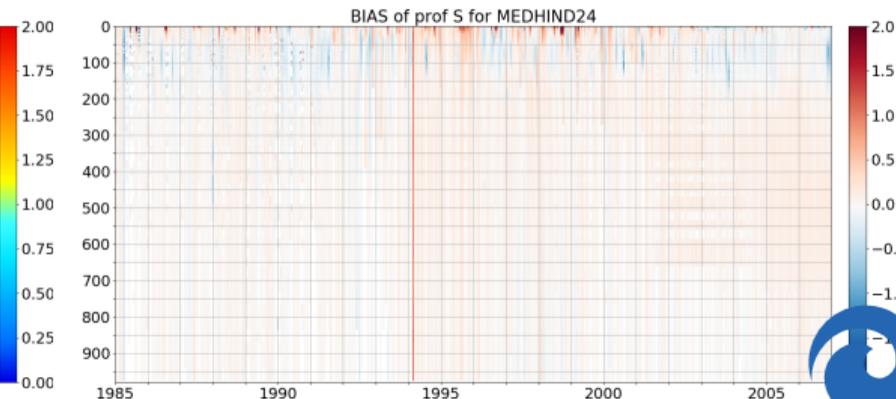
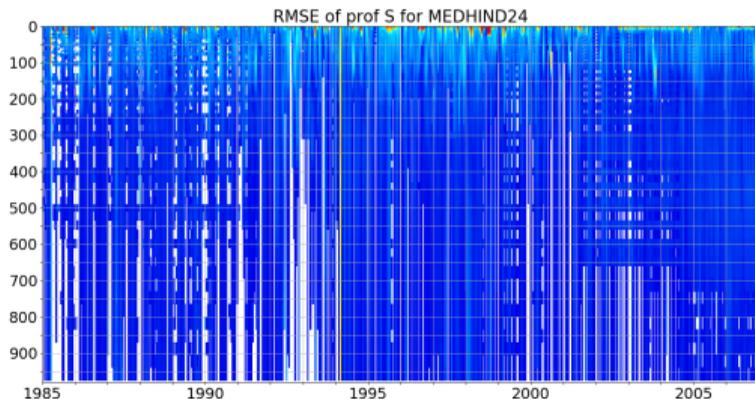
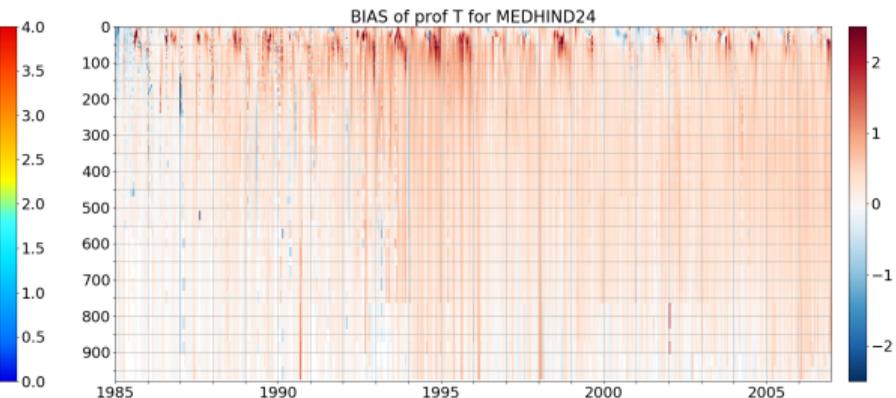
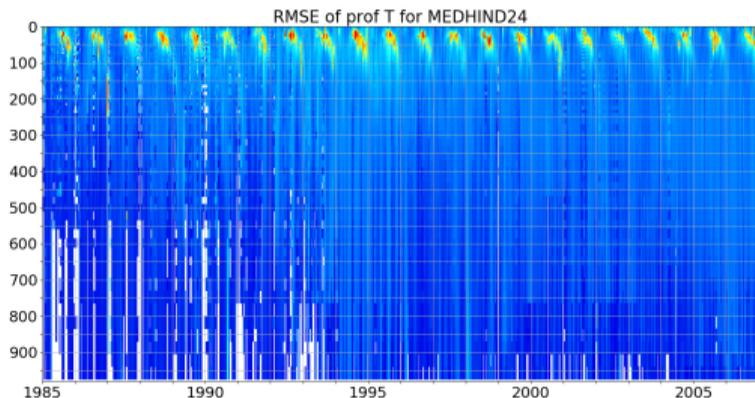
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Hovmollers for MEDHIND24



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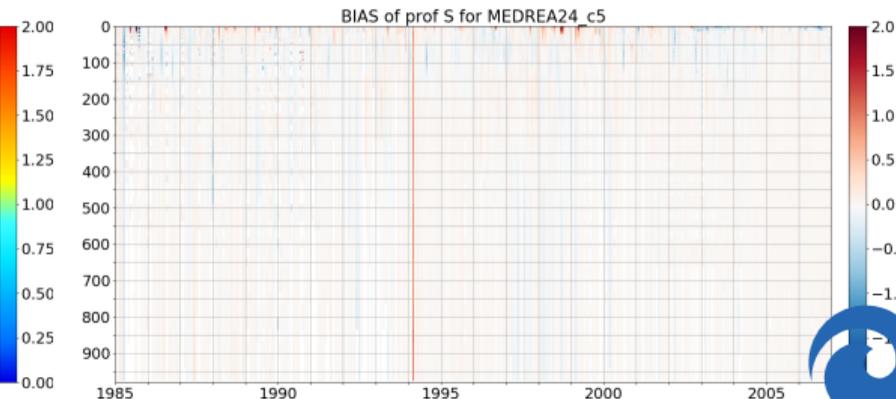
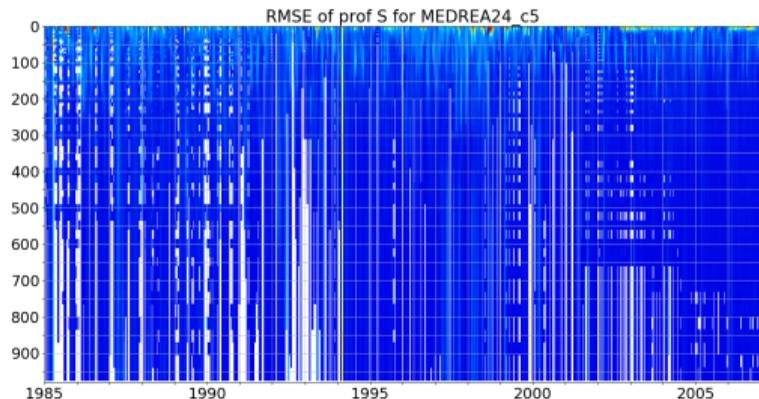
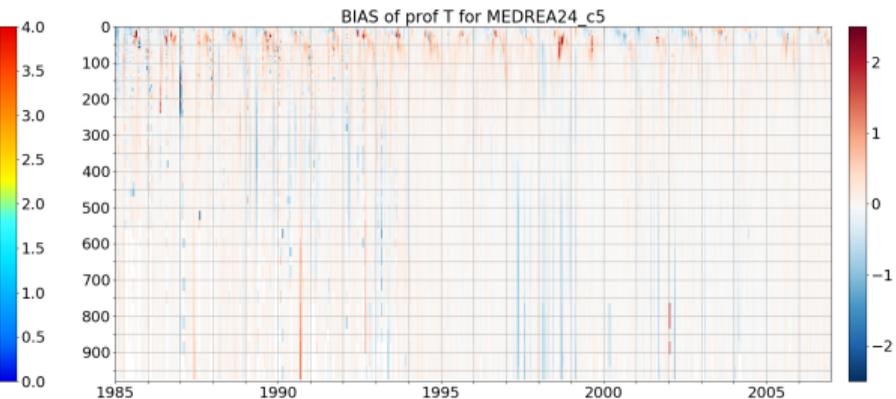
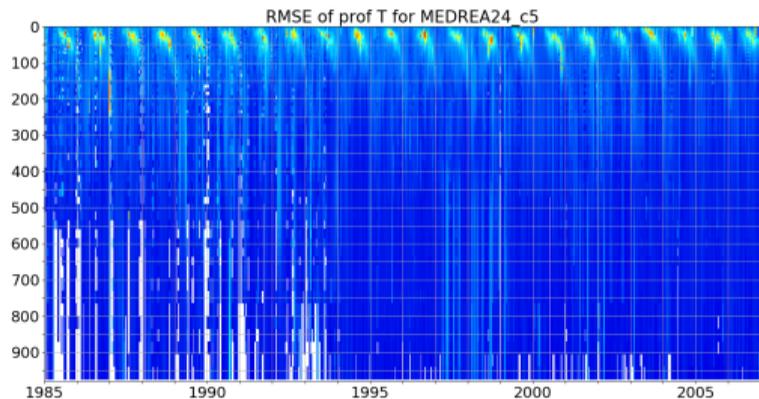
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Hovmollers for MEDREA24_c5



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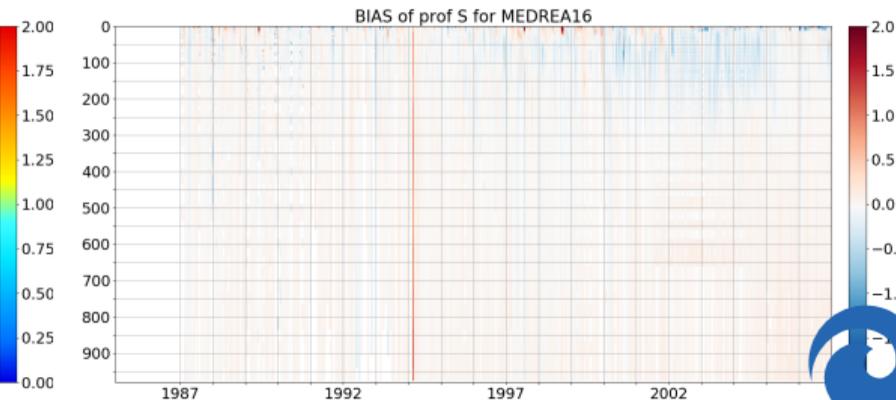
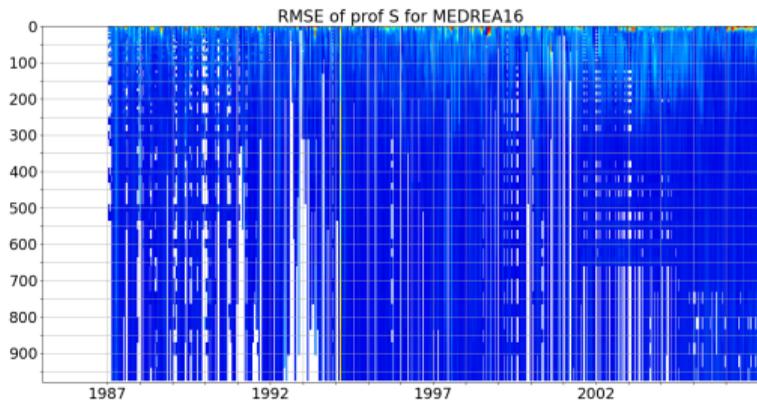
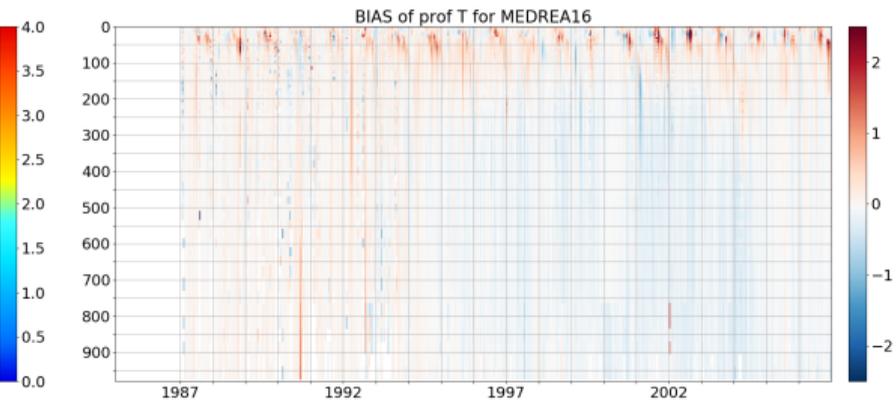
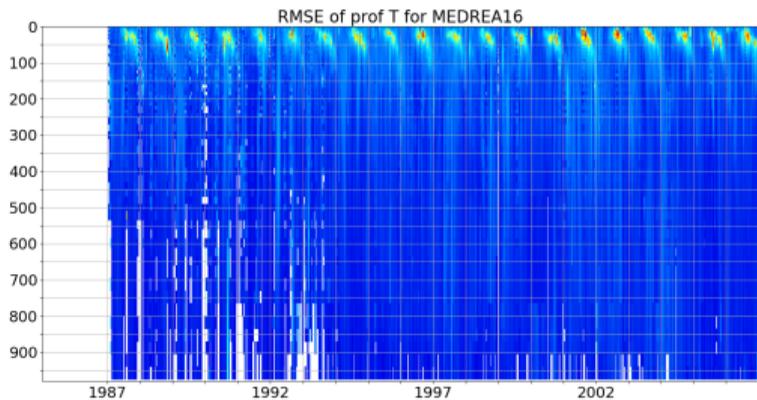
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Hovmollers for MEDREA16



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Conclusions

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Vertical profiles of EAN diagnostics



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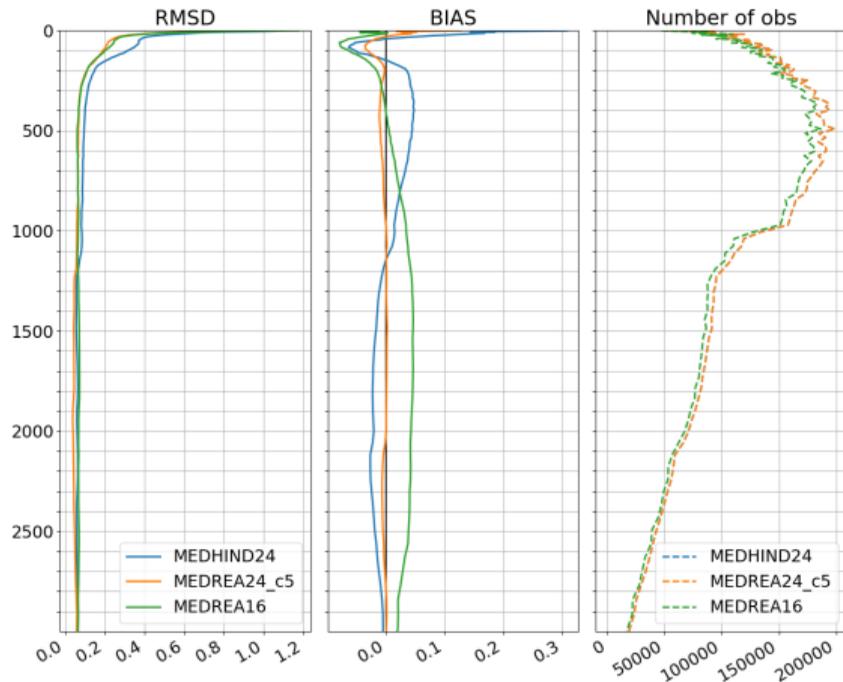
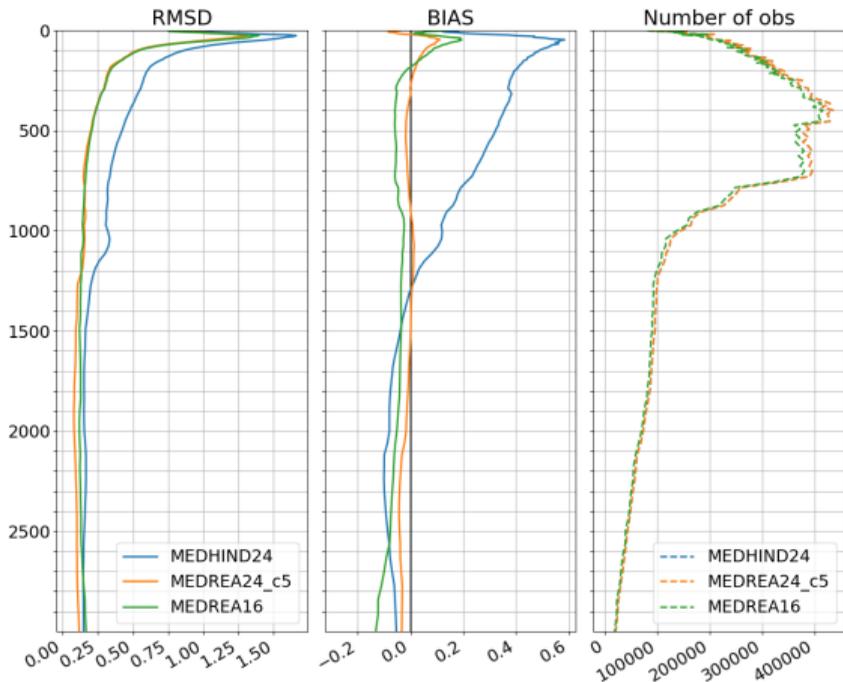
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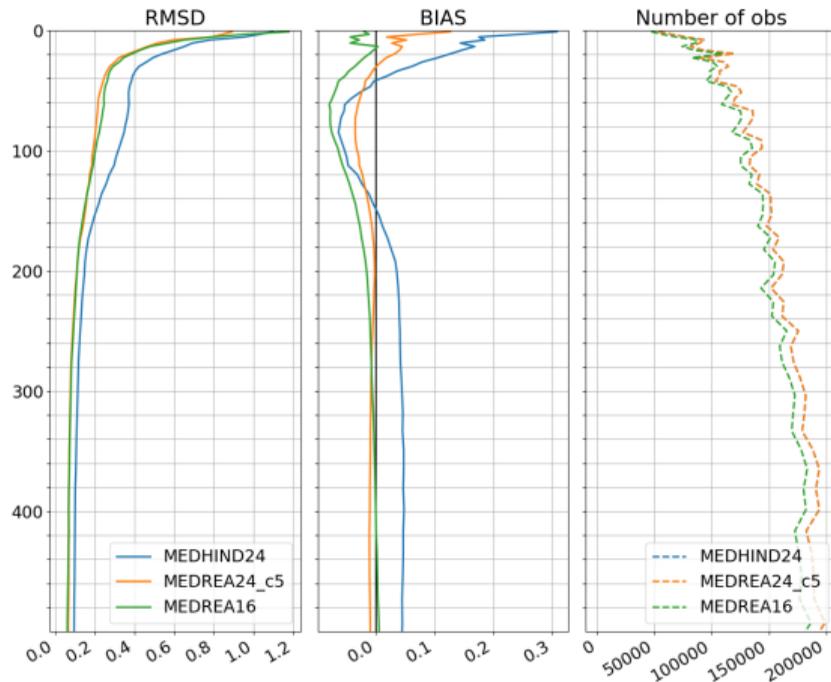
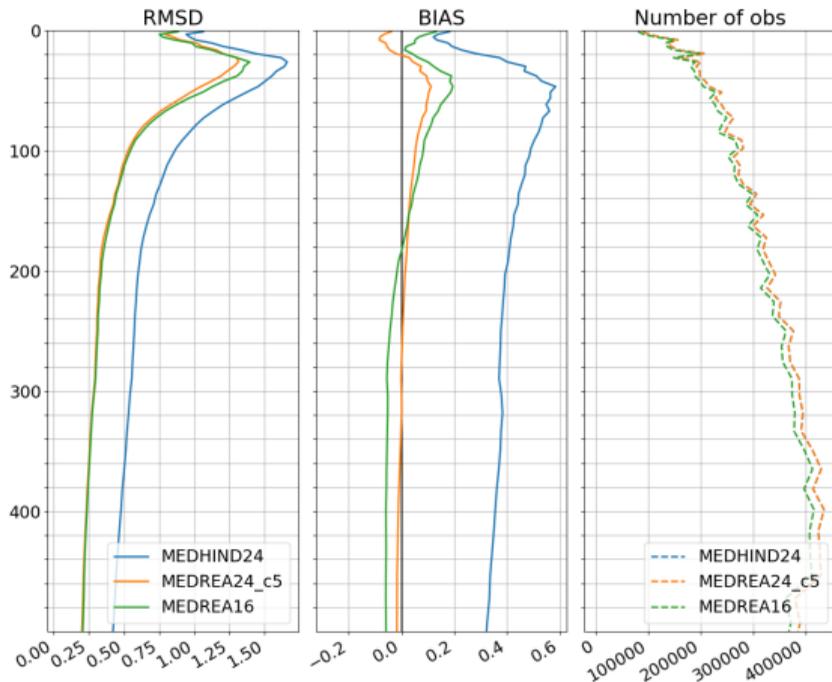
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Conclusions

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Conclusions

- ▶ New reanalysis of the Mediterranean Sea with improved resolution and physics
- ▶ Better SST comparisons with satellites
- ▶ Less drift in deeper salinity content than previous reanalysis
- ▶ Lower levels of KE at depth, is it good?
- ▶ Water budget within range of literature estimates
- ▶ Comparison with insitu measurements (EAN) show improvement with previous reanalysis

Perspectives

Reanalysis that is promising but there is still work to do:

- ▶ Finish to run the period 1987-2019
- ▶ Evaluate circulation
- ▶ Evaluate water masses
- ▶ Study specific events

