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Warming of Western Med. Deep Water in the context of halted deep convection

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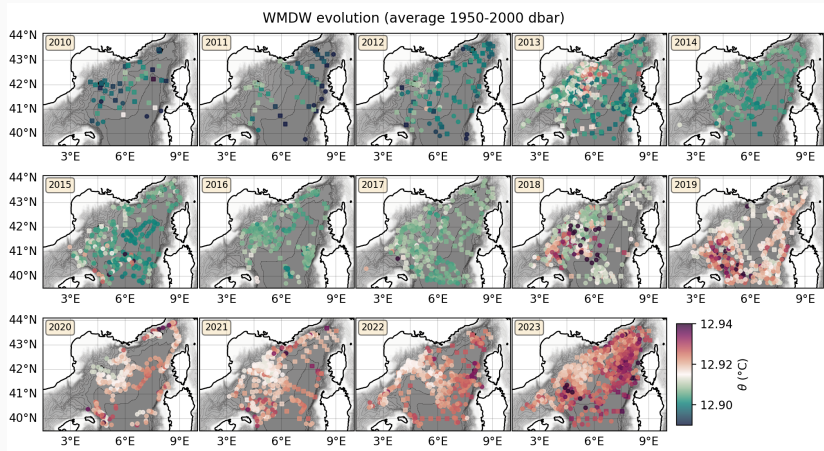
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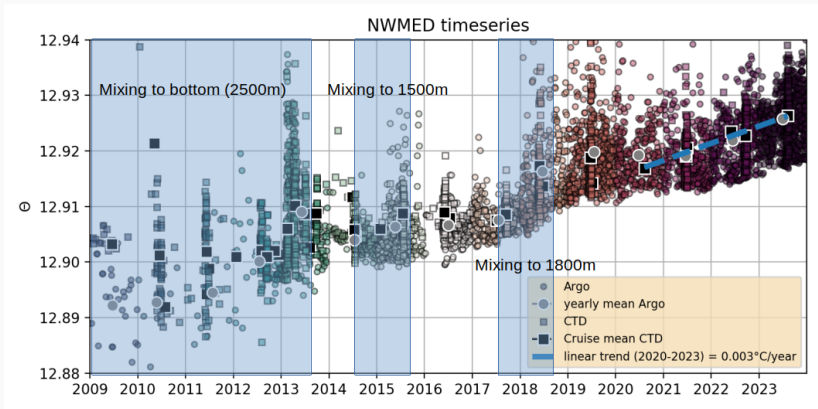
Warming of Western Med. Deep Water in the context of halted deep convection

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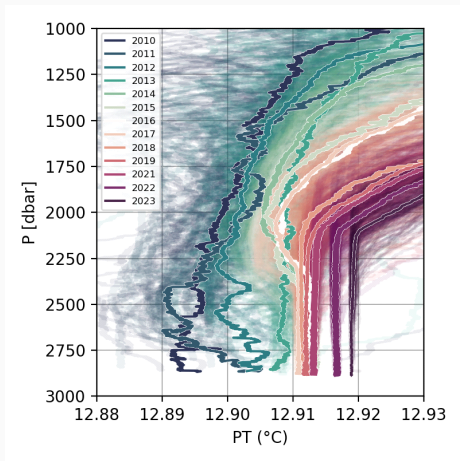
Data : MOOSE-GE yearly and monthly cruises + EMSO Ligurian Sea moorings (LION, ALBATROSS, DYFAMED) + Argo floats

Temperature@2000m (NW Med. Sea)



- **variable** during intense convection period (2009–2013)
- **stable** between 2014 and 2018 (minor convection)
- **warming** after 2018 event (and especially **after 2021**: $+0.003^{\circ}\text{C yr}^{-1}$)

Vertical structure of WMDW



MOOSE-GE cruises, full-depth CTD profiles

After 2018:

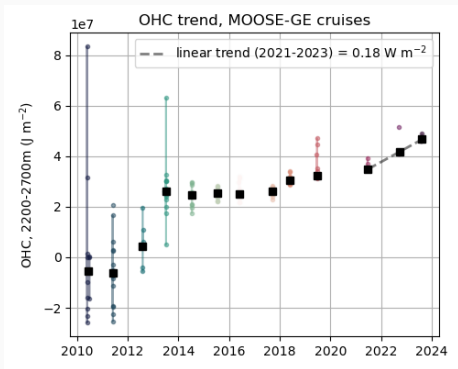
- **T gradient changes sign** above WMDW
- **WMDW homogeneous** below 2000m
- **Thickness of WMDW decreases** (-20 m yr^{-1})

After 2021:

- **warming of EIW** above WMDW ($+0.05^\circ\text{C yr}^{-1}$)

⇒ **More heat able to diffuse to vertically**

Heat budget of WMDW



After 2021:

→ WMDW (average thickness of 500m) **warm at a rate of 180 mW m^{-2}**

Sources of heat :

- Turbulent vertical heat flux : $O(100) \text{ mW m}^{-2}$ ($k_z = 10^{-4} \text{ m}^2 \text{ s}^{-2}$)
- Geothermal heating : $50\text{--}100 \text{ mW m}^{-2}$
- Horizontal advection?