

NOAA Ocean Heat Content product

Presenting William Skirving¹, Eileen Maturi²

¹ NOAA Coral Reef Watch

² NOAA STAR

EUMETSAT series of short courses: Warming oceans: using satellites to monitor sea surface temperature, ocean heat content and marine heatwaves; 07.2023





Satellite-derived Ocean Heat Content product

The NOAA Satellite derived Ocean Heat Content product suite can be found at:

https://www.ospo.noaa.gov/Products/ocean/ocean_heat.html

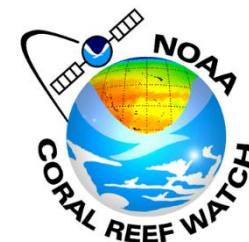
Current regions:

- North Atlantic
- North Pacific
- South Pacific

Product suite contains:

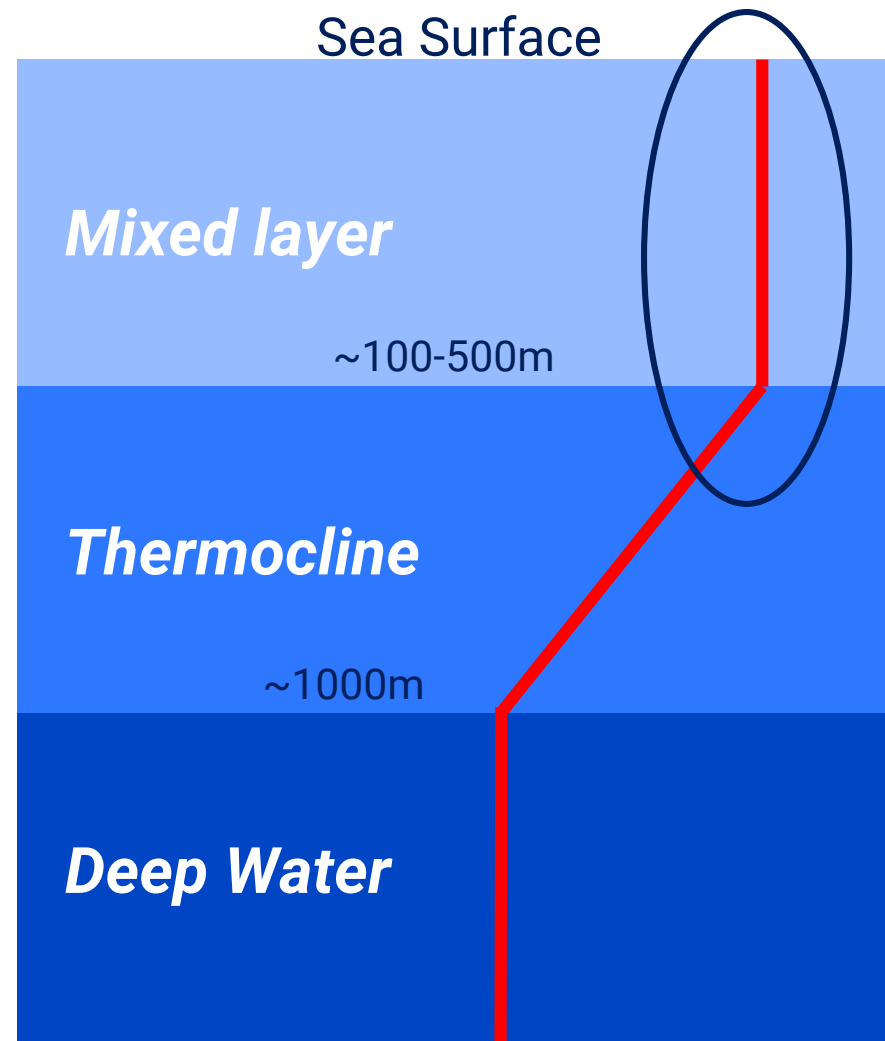
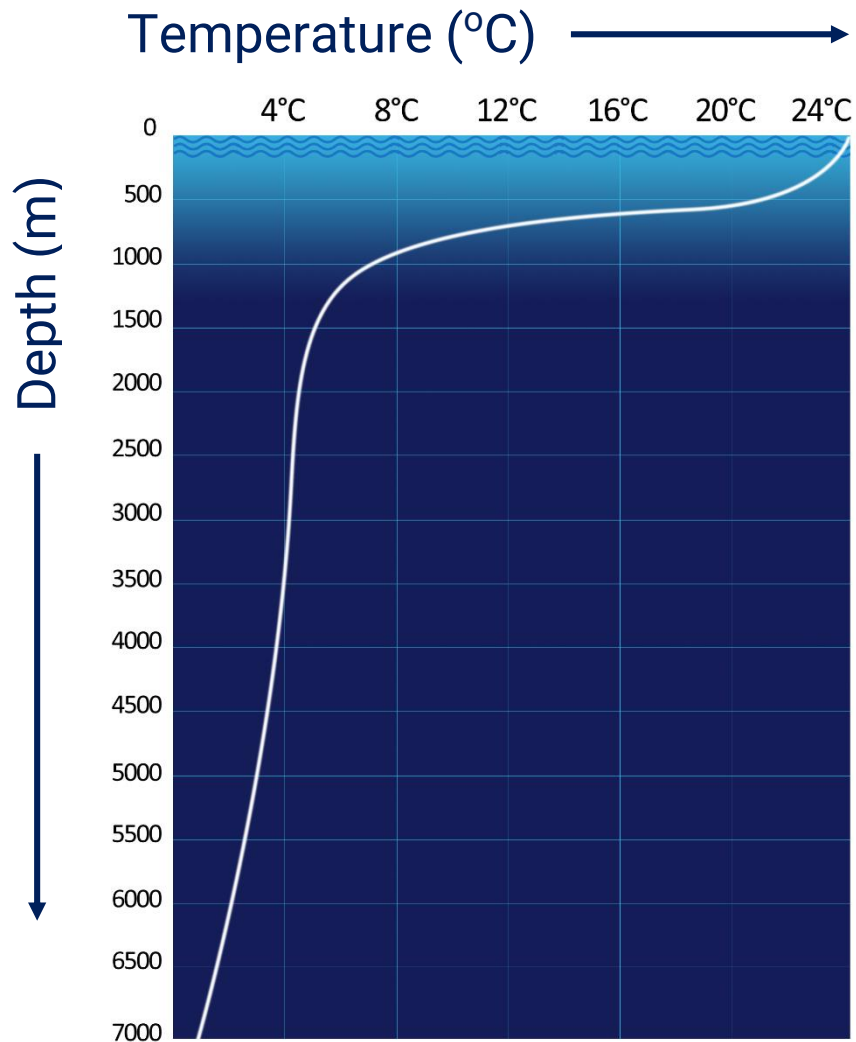
- Sea Surface Temperature (SST)
- Mixed Layer Depth (MLD)
- Ocean Heat Content (OHC)
- Sea Surface Height Anomaly (SSHA)
- Depth of 20°C Isotherm (D20)
- Depth of 26°C Isotherm (D26)

Main purpose: to improve forecasts of tropical storms

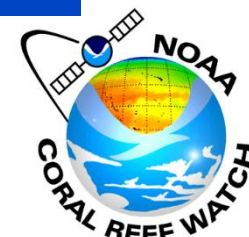
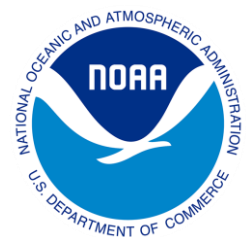




Temperature Profile and Thermocline

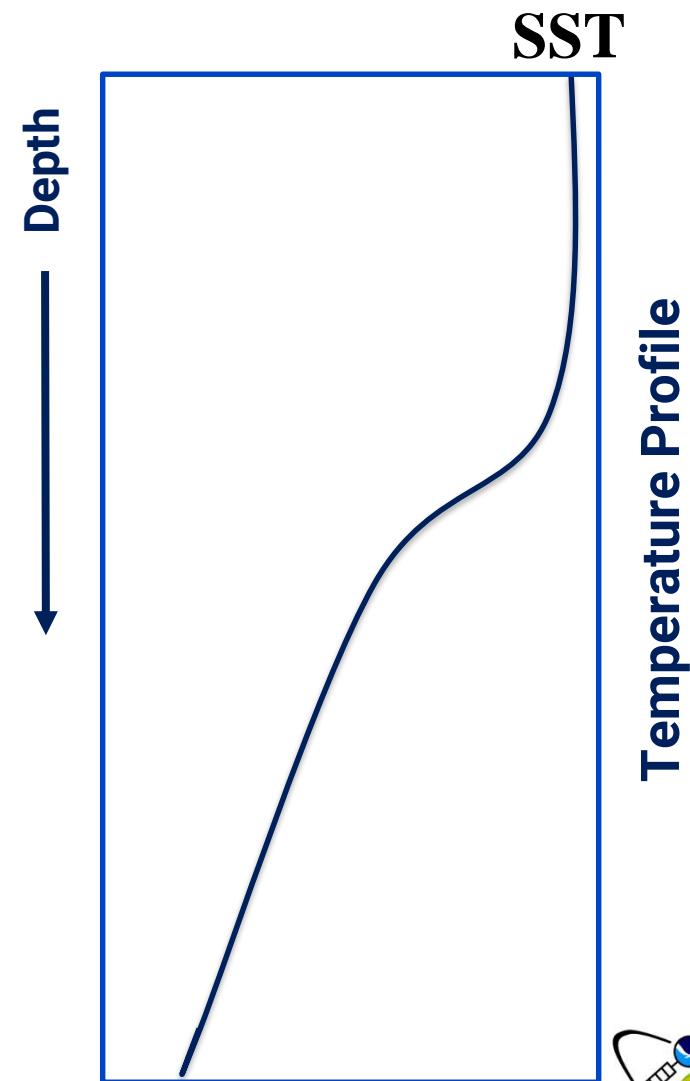


Temperature →



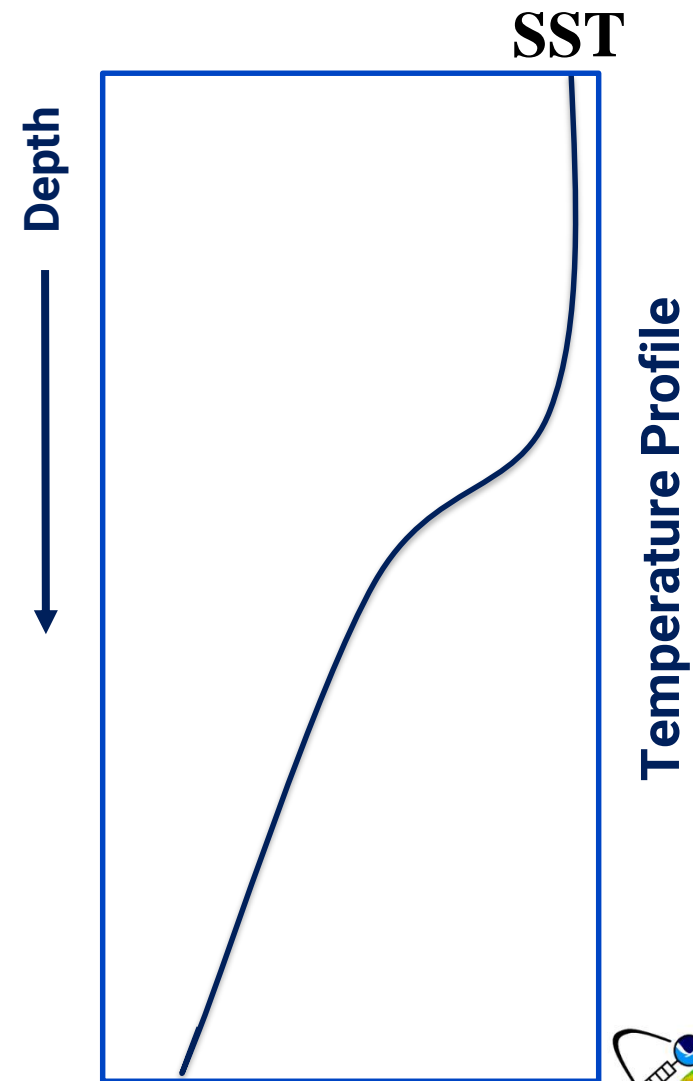
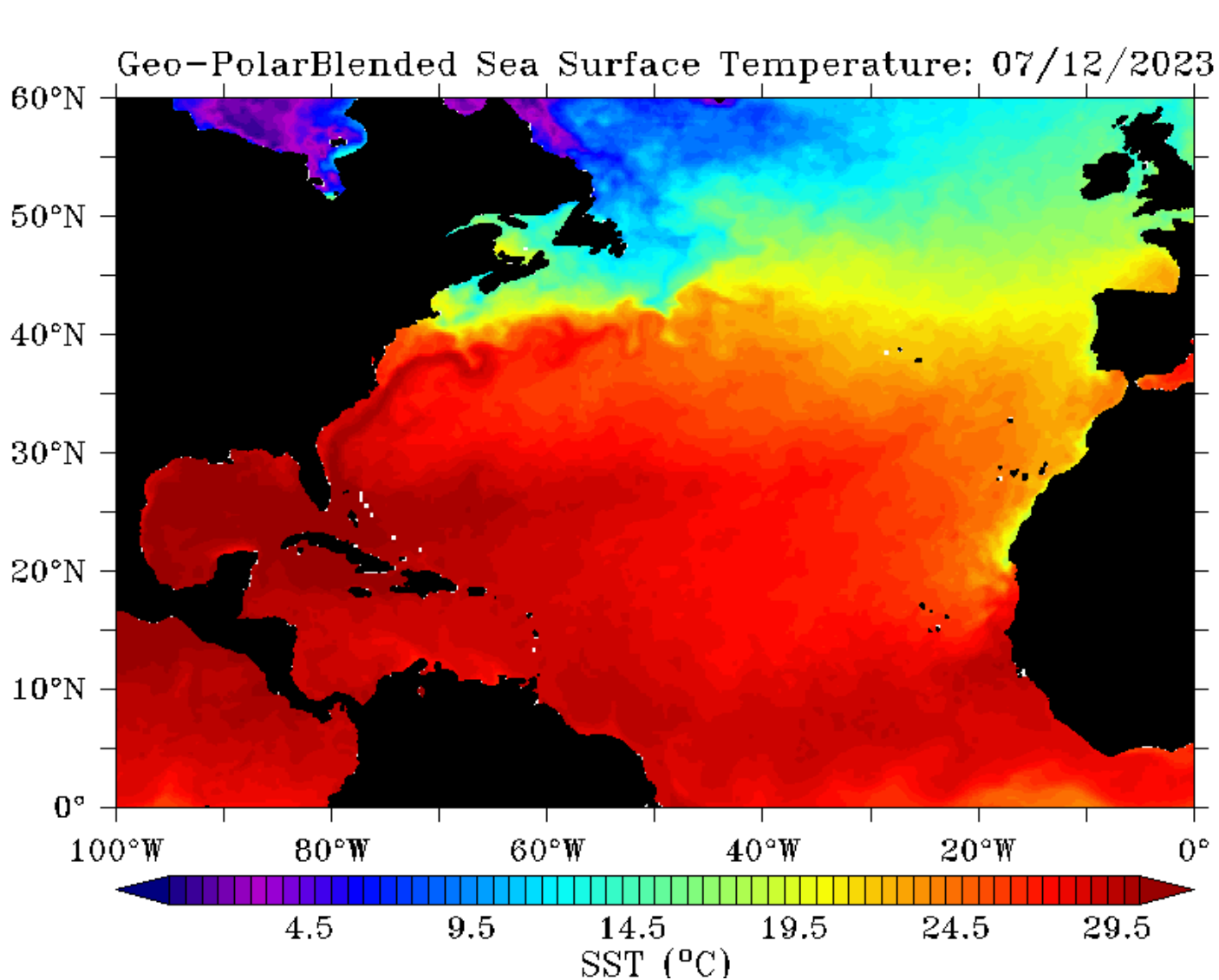


- Sea surface temperature (SST)





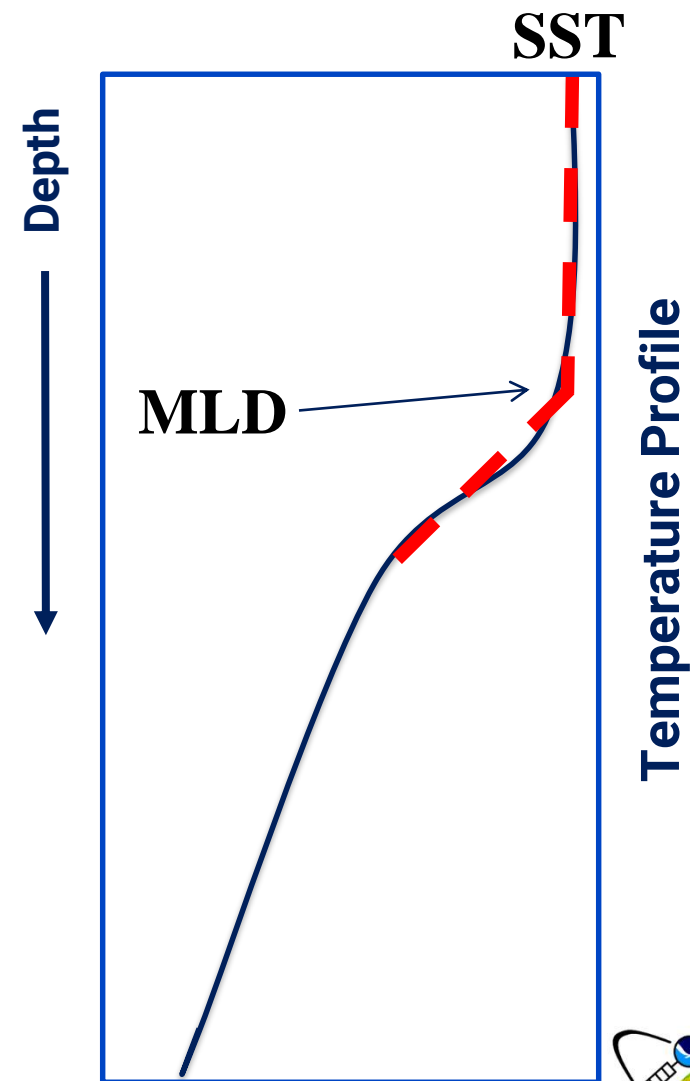
Ocean Heat Content





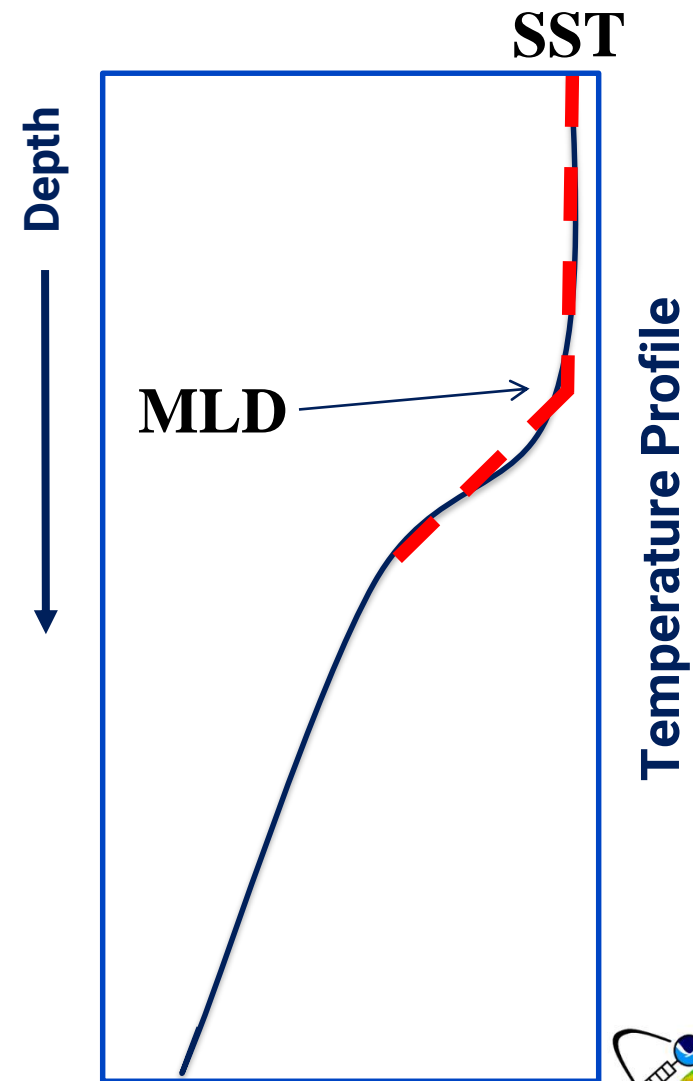
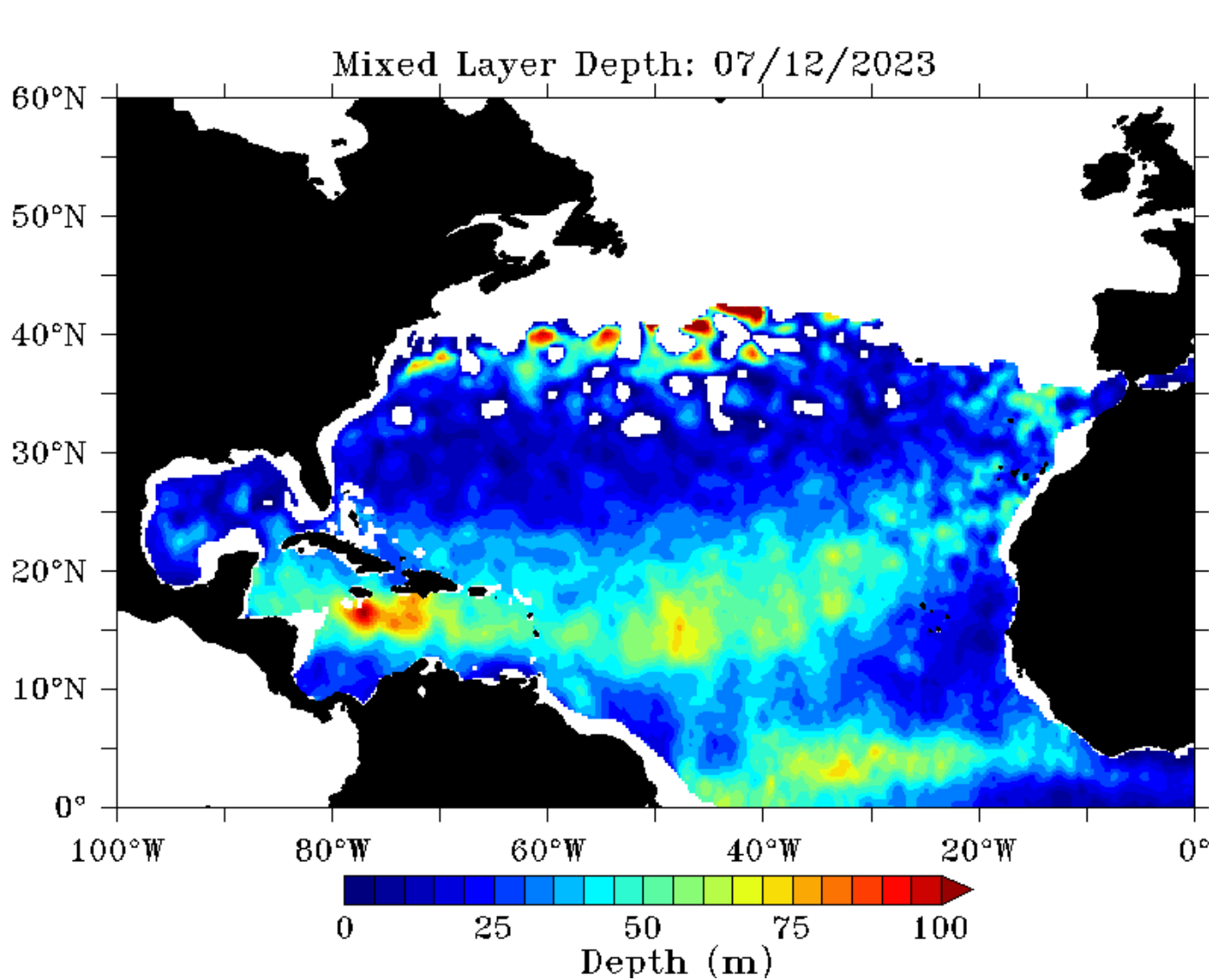
Ocean Heat Content

- Sea surface temperature (SST)
- Mixed Layer Depth (MLD)





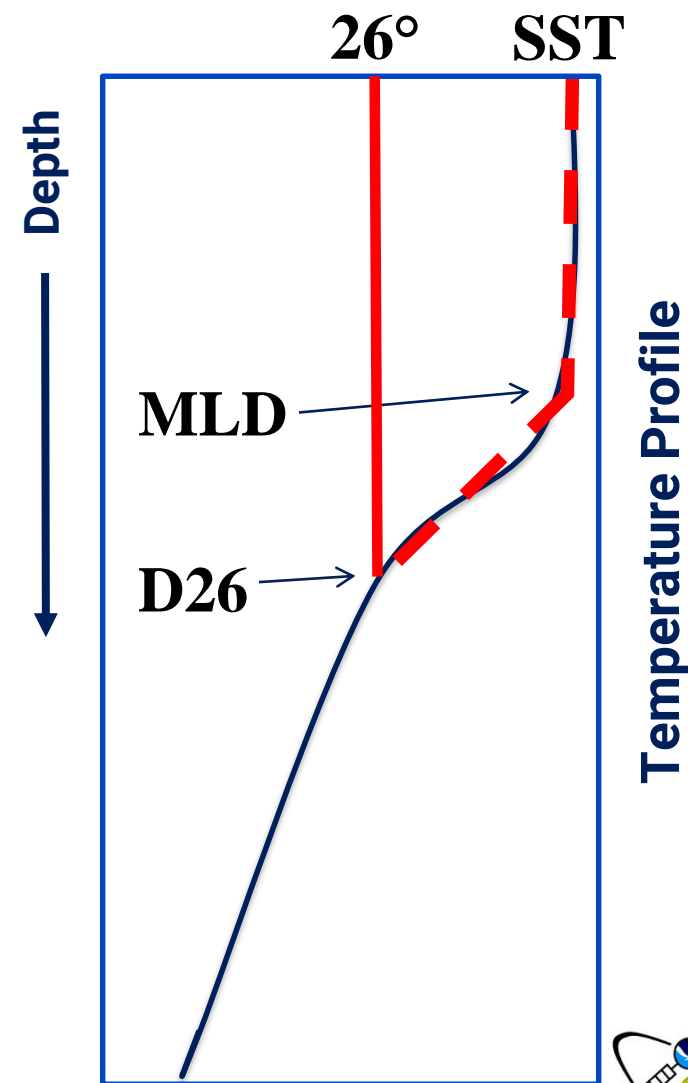
Ocean Heat Content





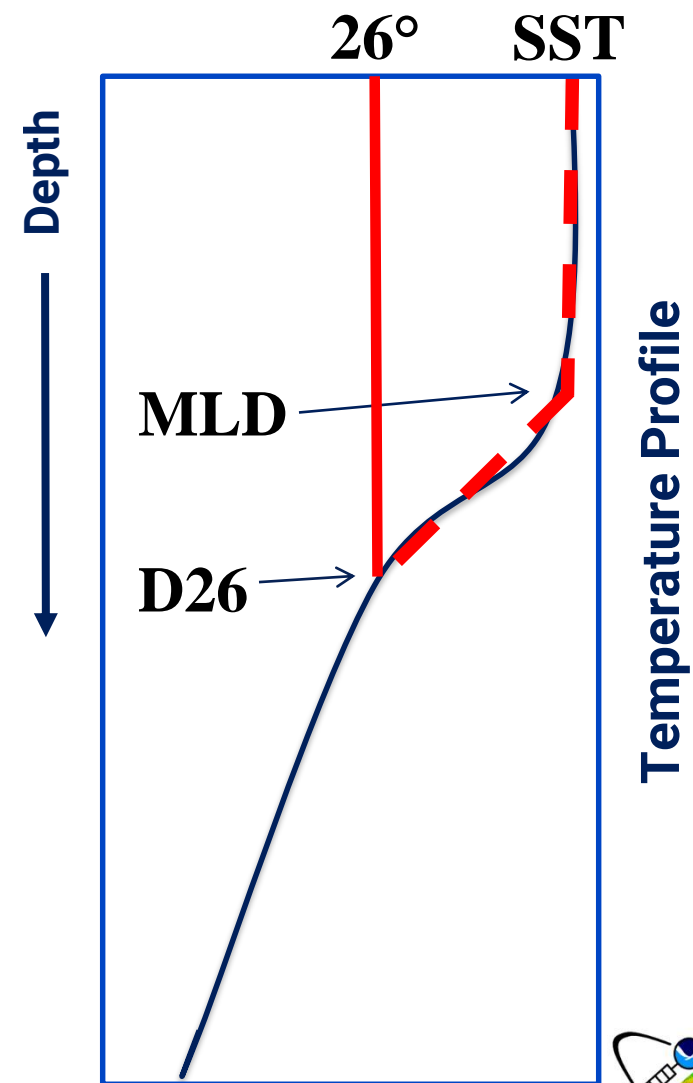
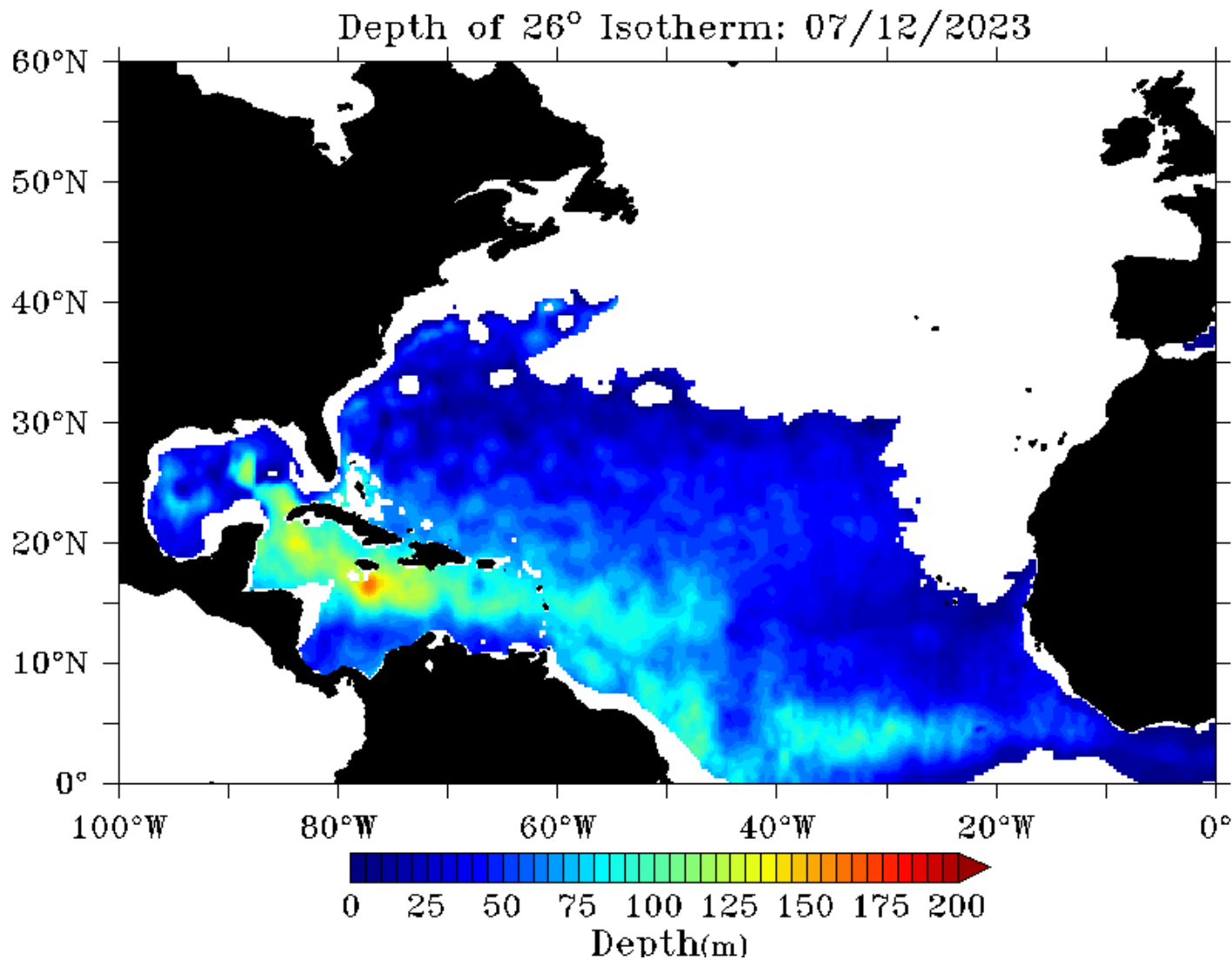
Ocean Heat Content

- Sea surface temperature (SST)
- Mixed Layer Depth (MLD)
- Minimum sea surface temperature threshold for cyclone formation is 26°C (Palmen, 1948)
- 26°C isotherm (D26)





Ocean Heat Content

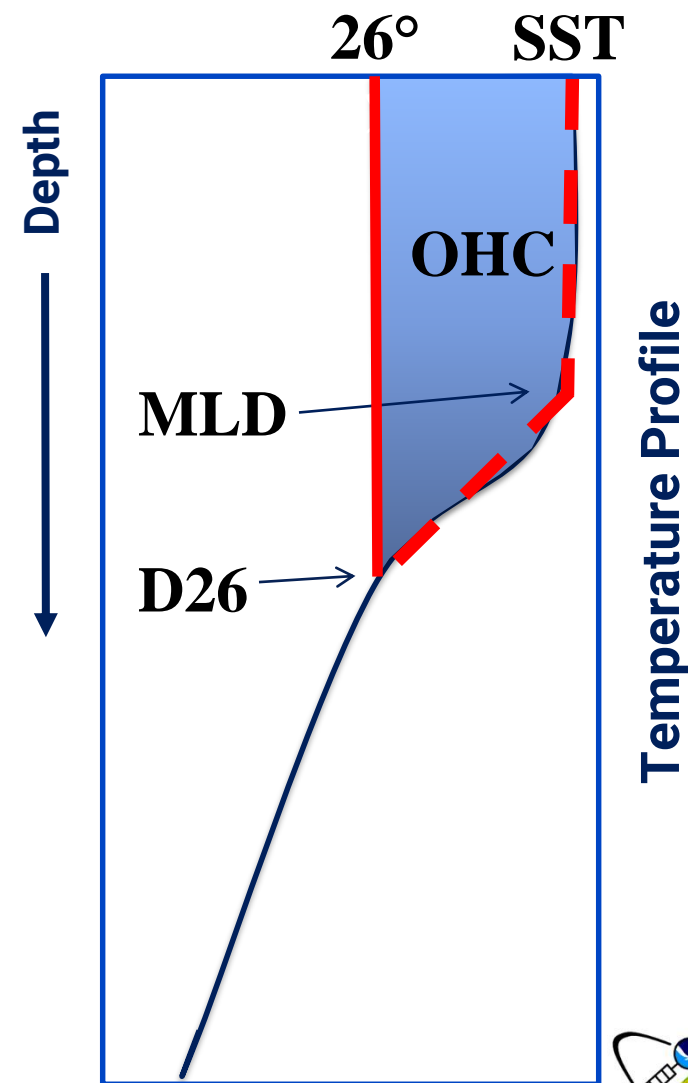




Ocean Heat Content

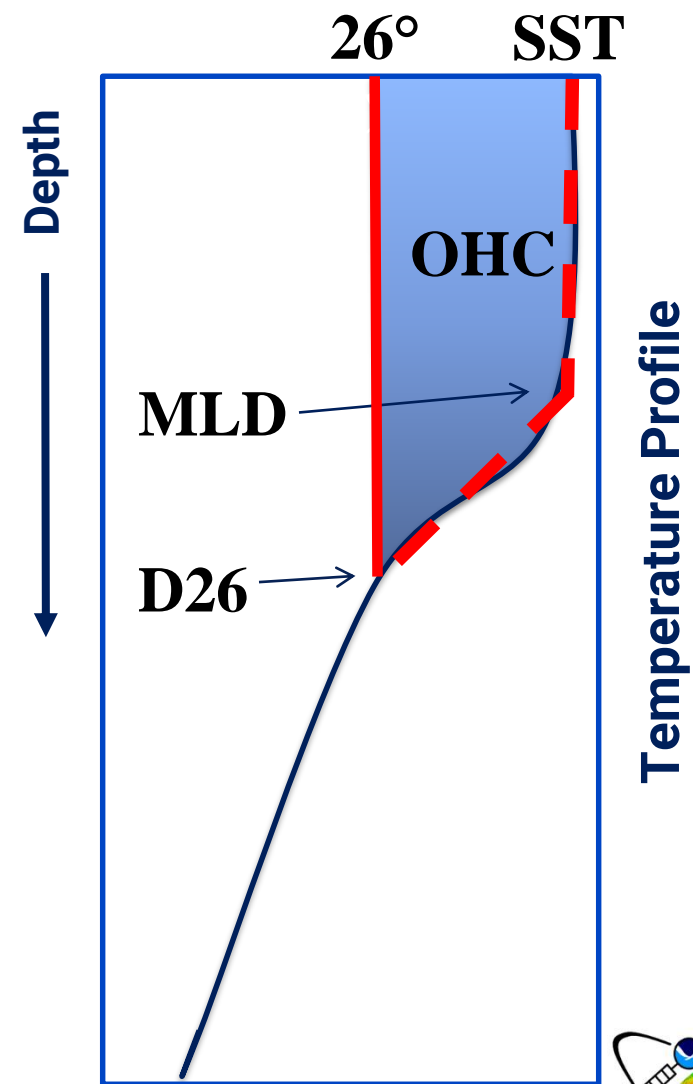
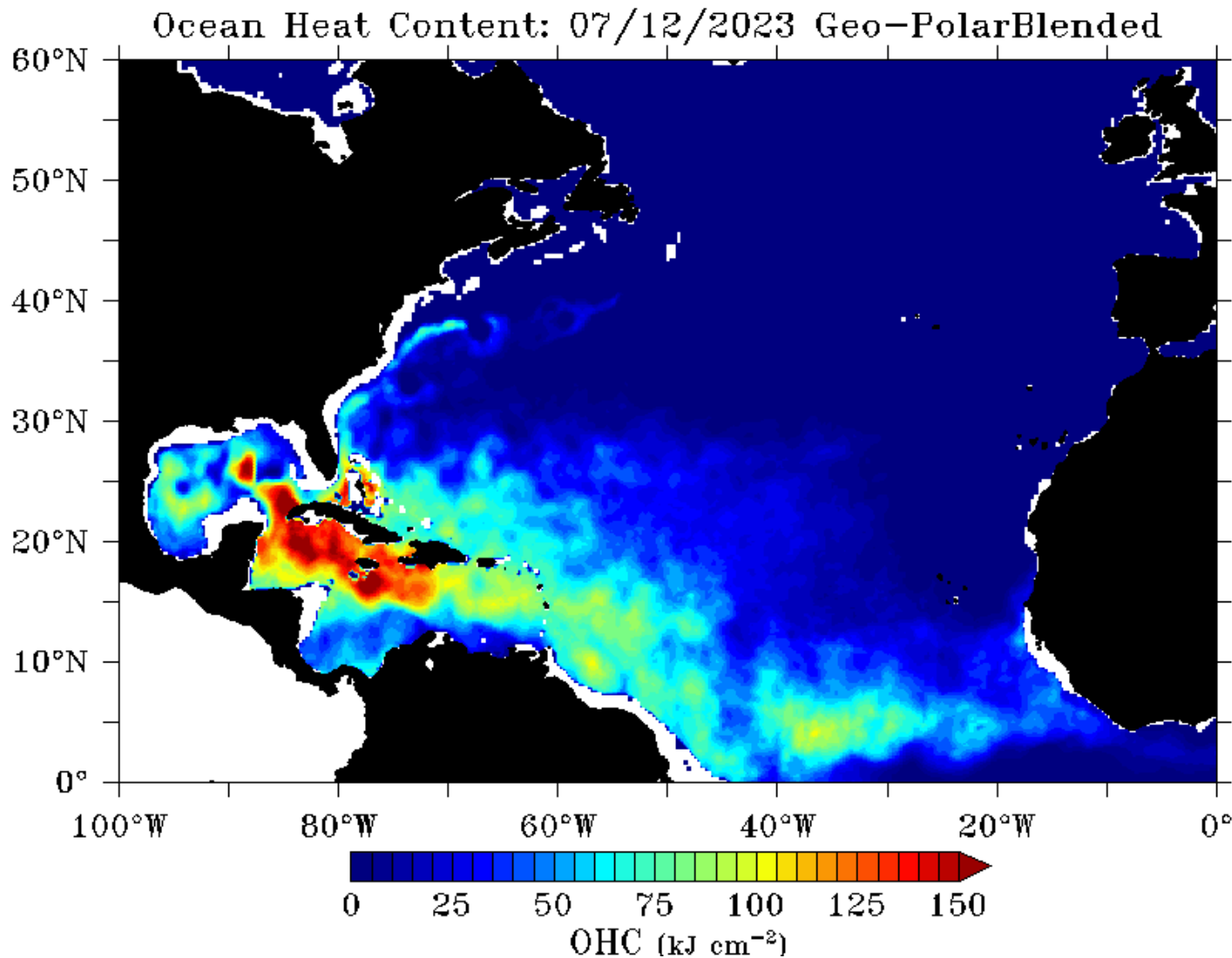
- Sea surface temperature (SST)
- Mixed Layer Depth (MLD)
- Minimum sea surface temperature threshold for cyclone formation is 26°C (Palmen, 1948)
- 26°C isotherm (D26)
- Ocean Heat Content (OHC) is the integrated thermal energy from surface to the 26°C isotherm:

$$OHC = c_p \rho \int_{D26}^{\eta} (T_z - 26^\circ) dz$$





Ocean Heat Content



The NOAA Ocean Heat Content product is derived using:

Near real time satellite data:

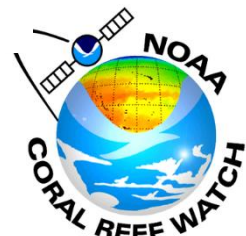
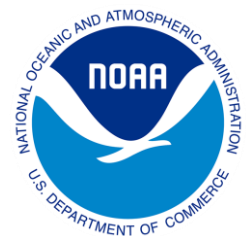
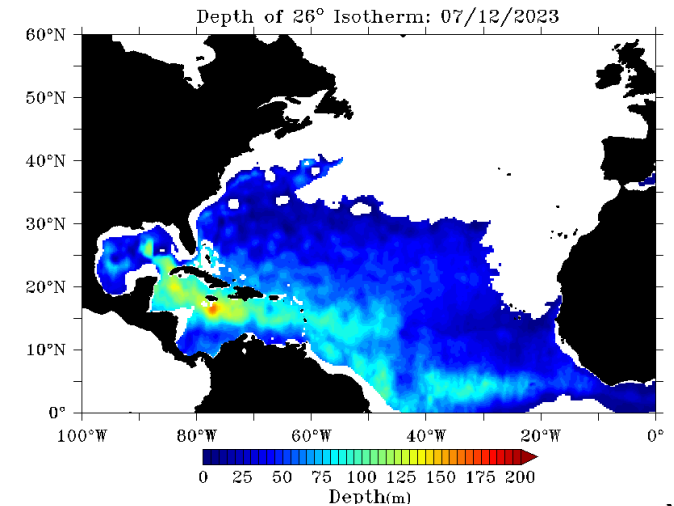
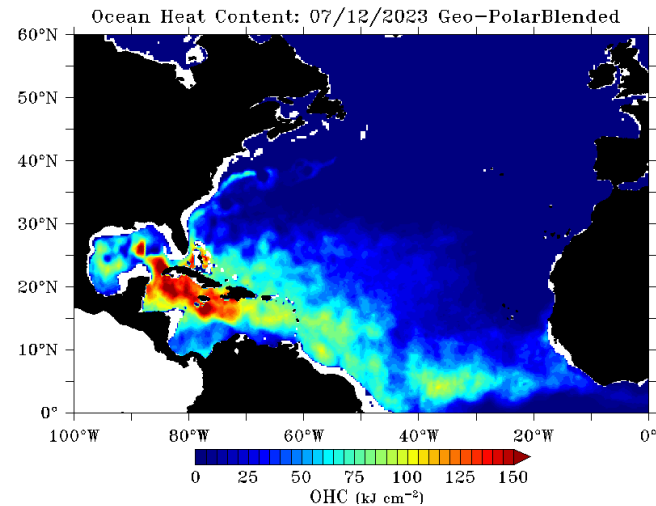
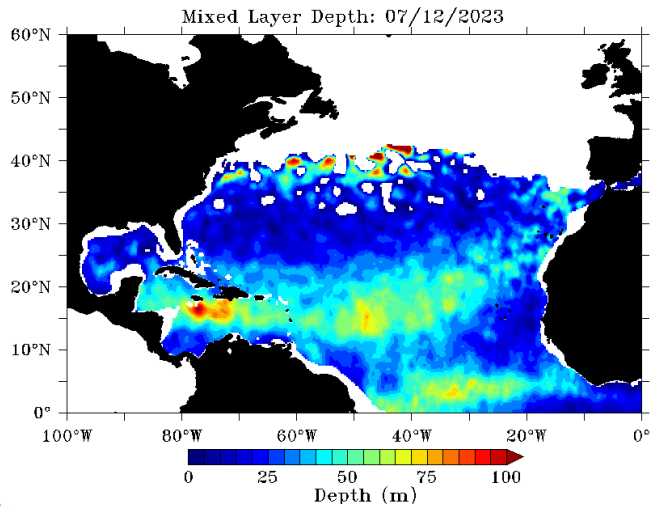
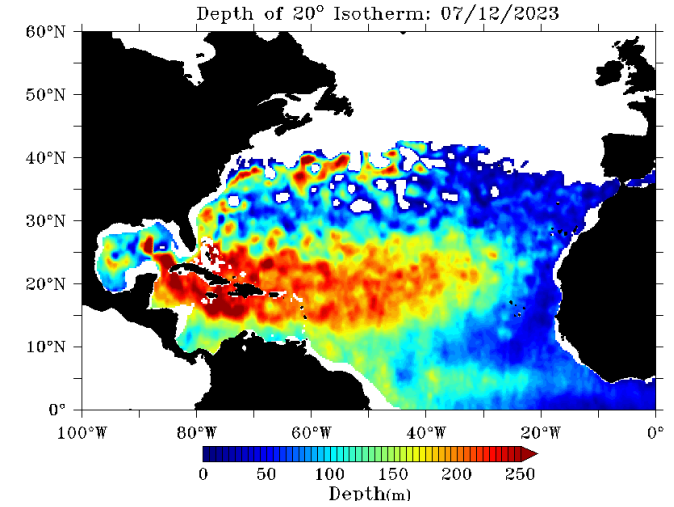
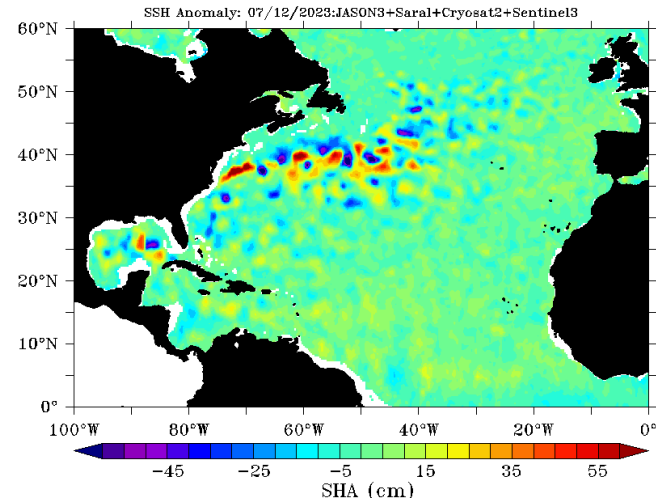
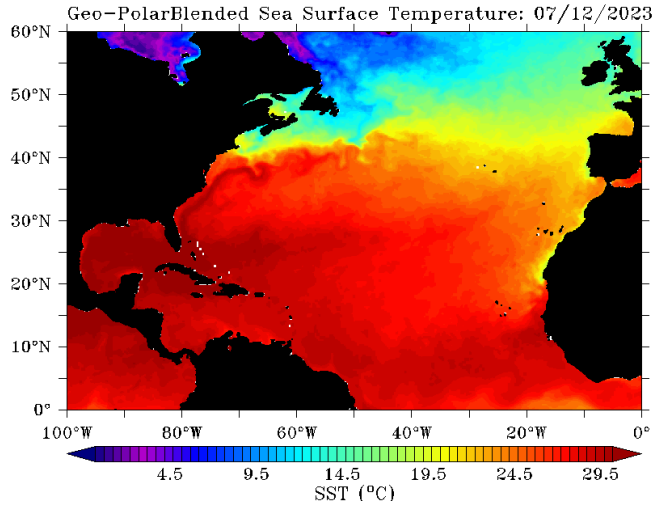
- NOAA Sea Surface Temperature (SST)
- NOAA Sea Surface Height Anomaly (SSHA)

Three climatologies:

- Systematically Merged Atlantic Regional Temperature and Salinity (SMARTS)
- Systematically merged Pacific Ocean Temperature and Salinity (SPORTS)
- South Pacific Ocean Climatology (SPOC)

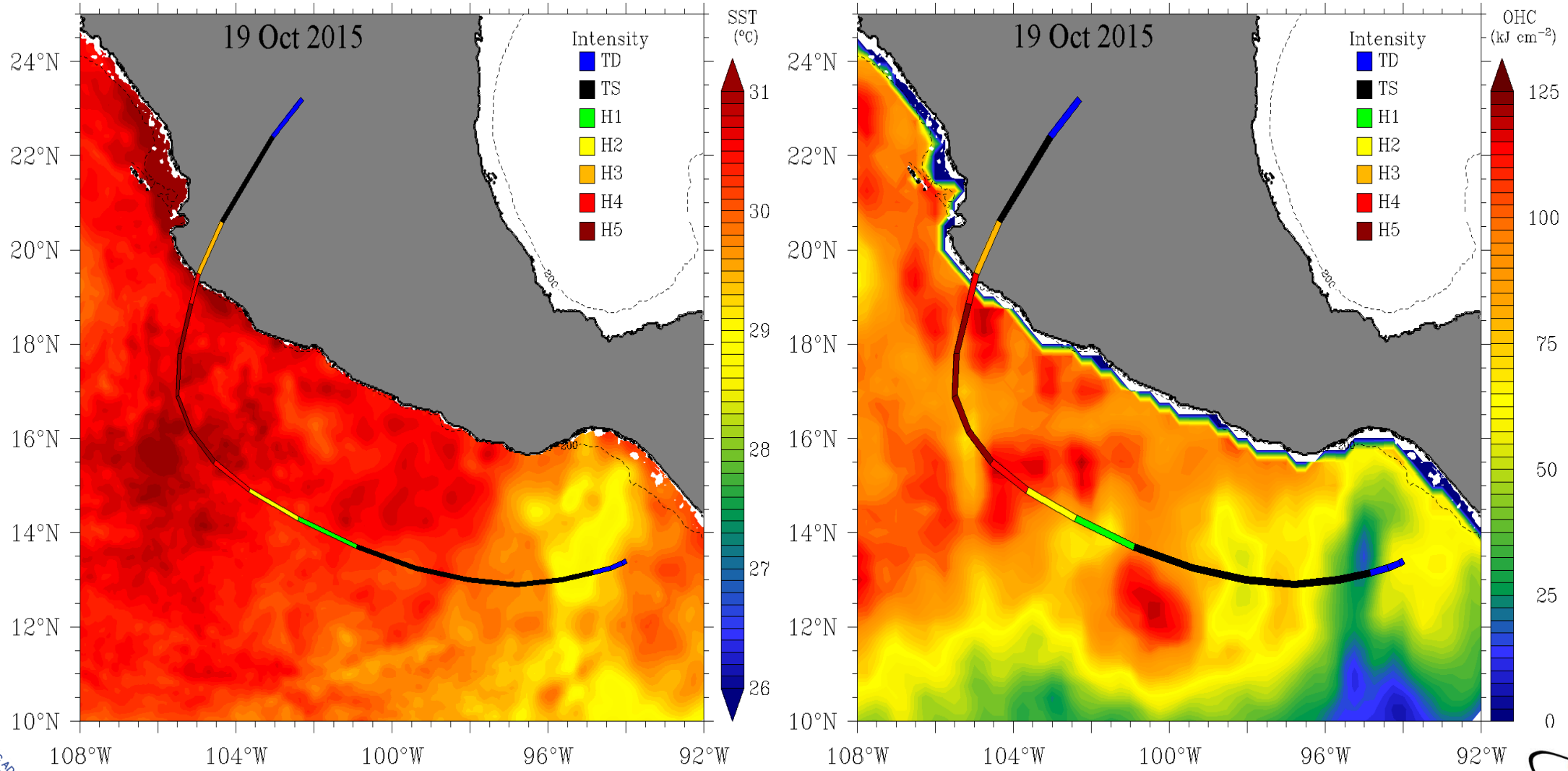


Ocean Heat Content product suite





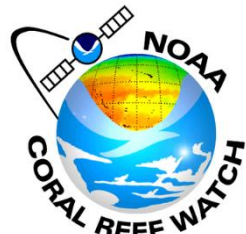
Hurricane Patricia 2015



SST

OHC

Hurricane Patricia track is for 20 to 24 October 2015

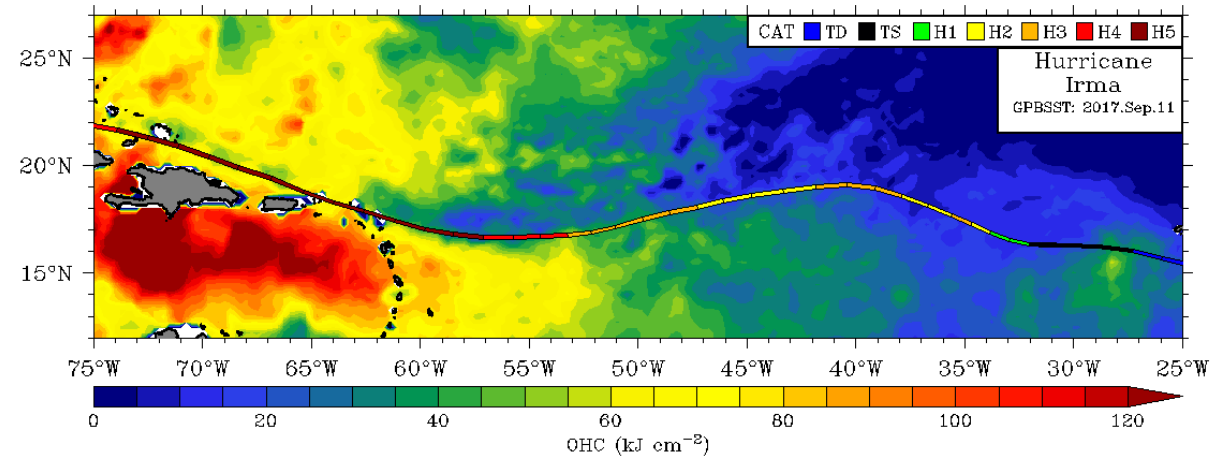
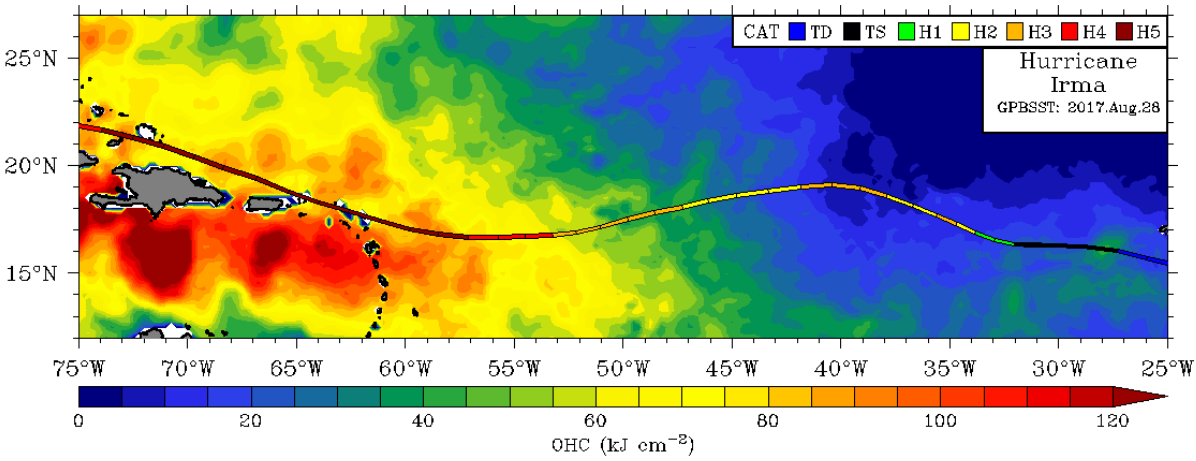




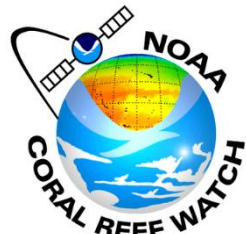
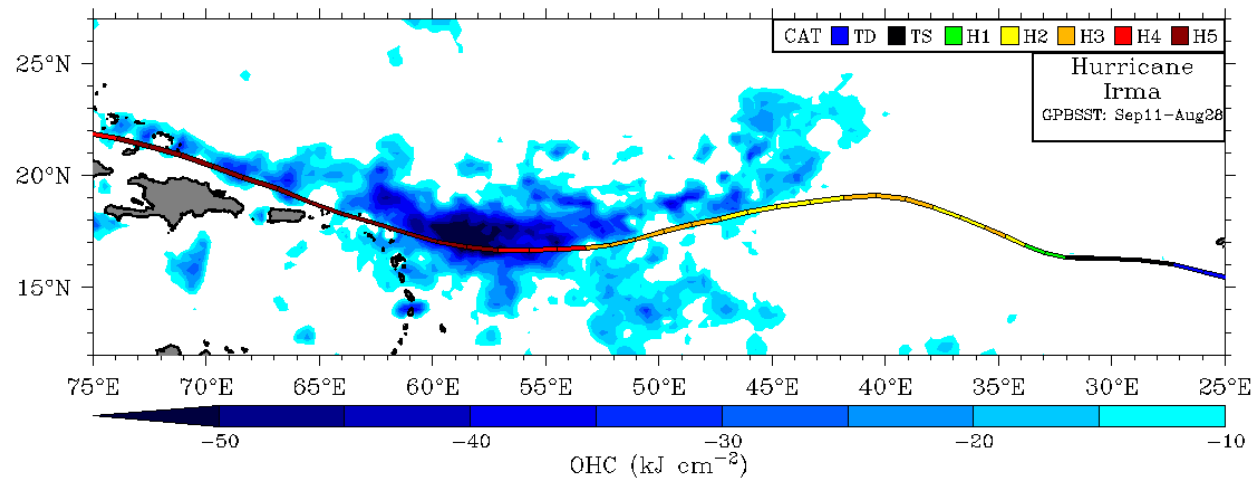
Hurricane Irma 2017

Pre-Storm

Post-Storm



Difference





https://www.ospo.noaa.gov/Products/ocean/ocean_heat.html

