DATA ELABORATION and VISUALIZATION for ADRIACLIM and CASCADE

AdriaClim| PP11 | ARPA FVG

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European Regional Development Fund

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CDO
(**C**limate **D**ata **O**perator)

- The Climate Data Operator software is a collection of many operators for standard processing of climate and forecast model data.
- Supported data formats are GRIB 1/2, netCDF 3/4, SERVICE, EXTRA and IEG. There are more than 700 operators available.

Main CDO features

- More than 700 operators available
- Fast processing of large datasets
- Very simple UNIX command line interface
- Modular design and easily extendable with new operators

https://code.mpimet.mpg.de/projects/cdo/embedded/cdo.pdf

CDO sintax:

```
cdo [ Options ] Operator1 [ -Operator2 [ -OperatorN ] ]  input.nc   output.nc
```

For example:

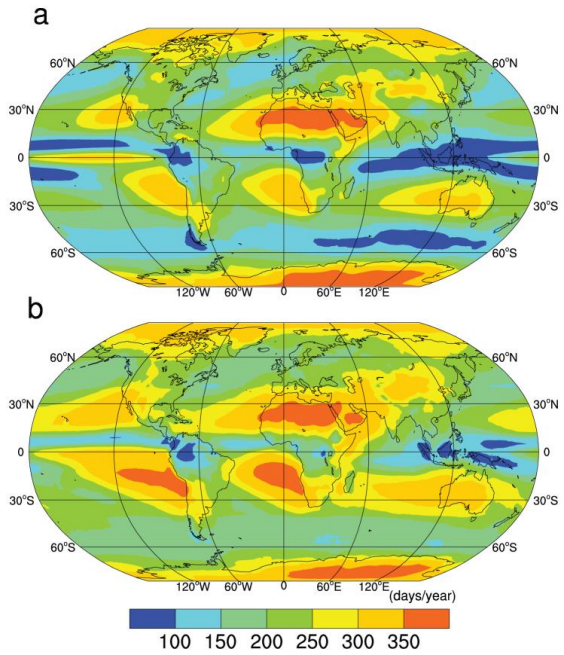
cdo sellonlatbox,12.5,14,45,45.8 input.nc output.nc

NCAR-NCL

NCL (**N**ational center for atmospheric research **C**ommand **L**anguage)

NCL is an interpreted language designed specifically for scientific data analysis and visualization

- It is a powerful language for reading, writing, manipulating, and visualizing scientific data
- Supports NetCDF 3-4, GRIB 1-2, HDF 4-5, ASCII, binary …
- Numerous analysis functions are built-in
- High-quality graphics are easily created and customized
- Complete and useful user guide
- NCL Home page: http://www.ncl.ucar.edu/



NCL
NCAR Command Language

NCAR
NATIONAL CENTER FOR ATMOSPHERIC RESEARCH

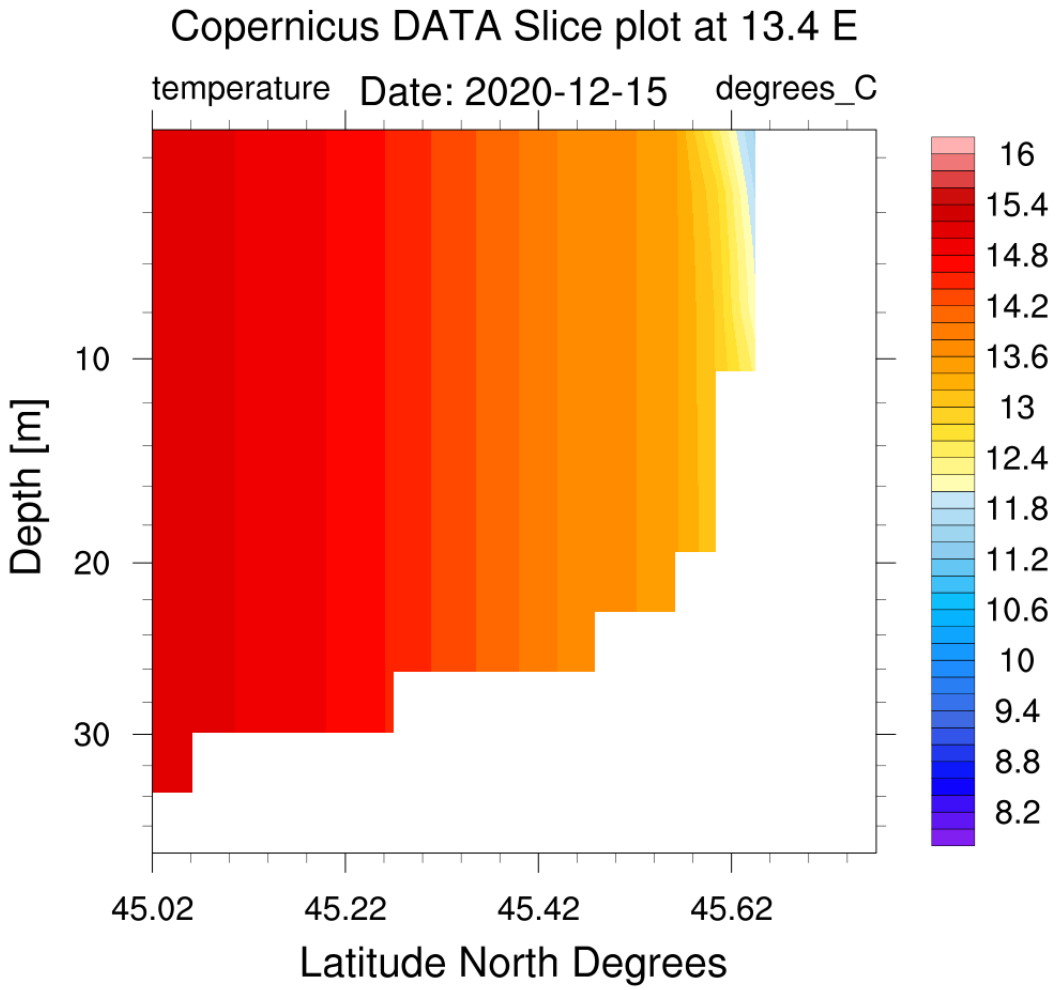
Interreg Italy - Croatia AdriaClim
European Regional Development Fund

EUROPEAN UNION

ARPA FVG
AGENZIA REGIONALE PER LA PROTEZIONE DELL'AMBIENTE DEL FRIULI VENEZIA GIULIA

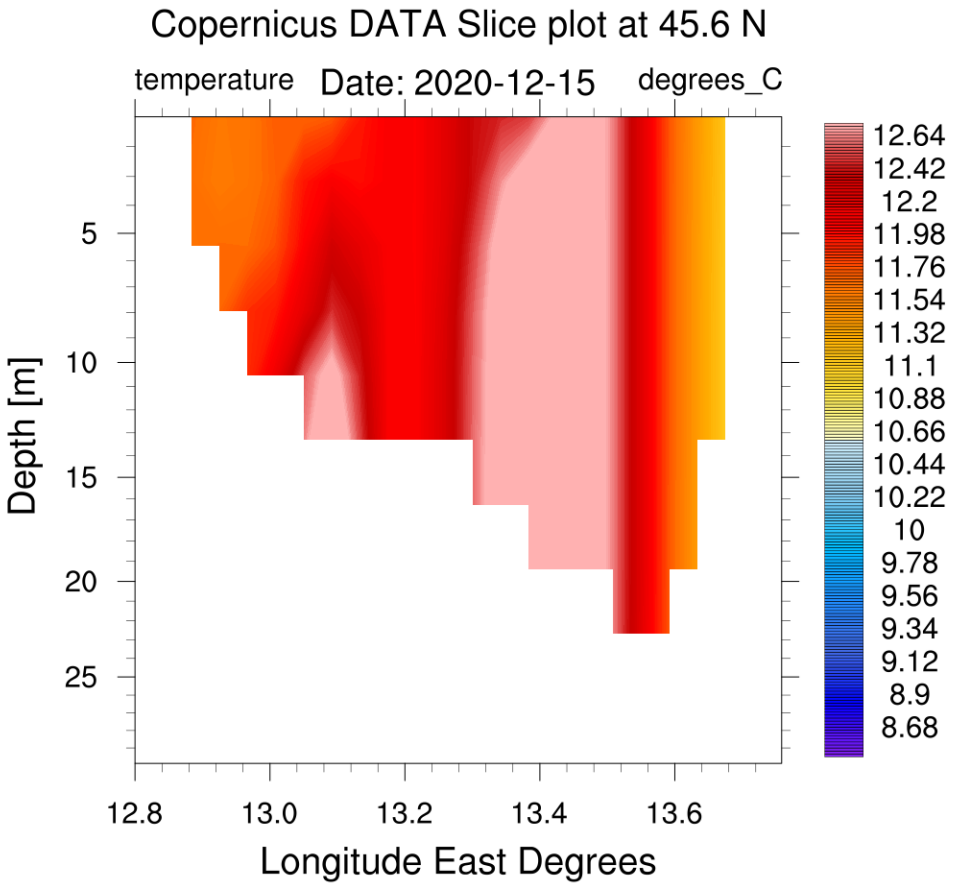
NCL scripts

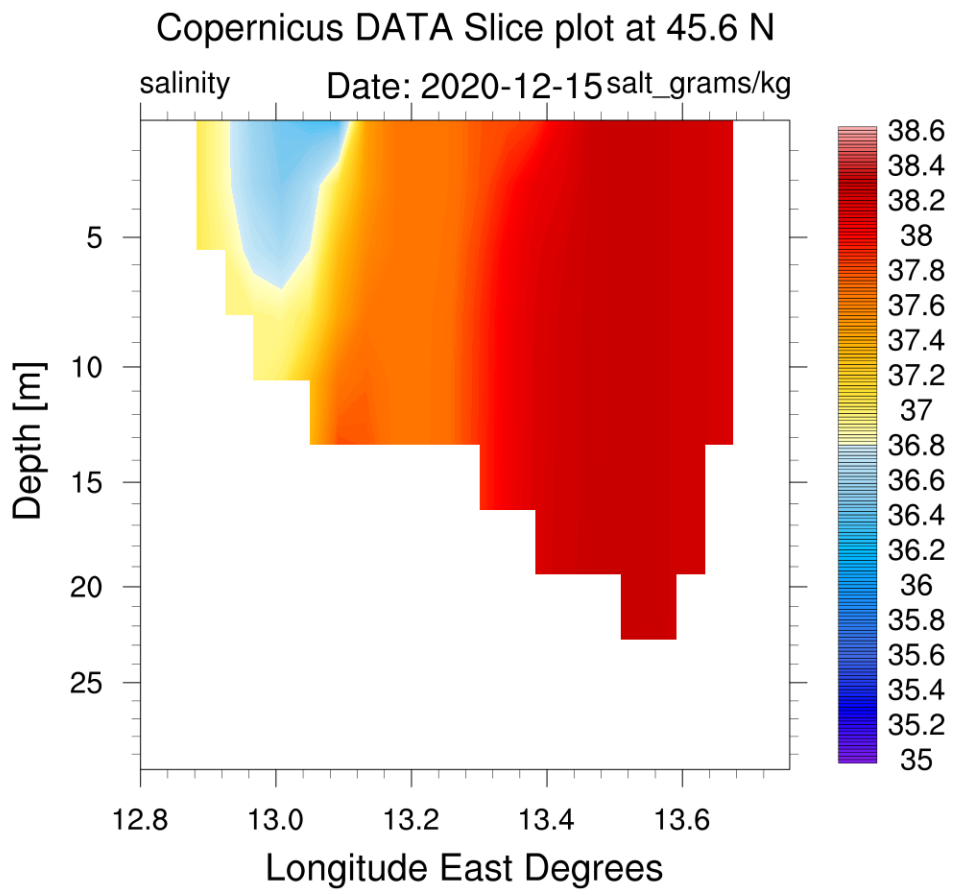
```
;     plot parameters
;==========================

wks = gsn_open_wks("png","section_adriatic_plot_13.4_constant_long

 res                = True
 res@gsnMaximize    = True            ; Maximize plot in frame
 res@cnFillOn       = True            ; Turn on contour fill
 res@tiMainString   = "Copernicus DATA Slice plot at 13.4 E"
 res@gsnCenterString = "~Z120~"+"Date: "+(date_plot)
 res@trYReverse                =  True
 res@lbOrientation             = "vertical"
 res@tiYAxisString             =  " Depth [m]"
 res@tiXAxisString             =  "Latitude North Degrees"

 res@cnLevelSelectionMode = "ManualLevels"
 res@cnMaxLevelValF =  16
 res@cnMinLevelValF =  8
 res@cnLevelSpacingF =  0.2

 res@tmXBMode          = "Manual"
 res@trXMaxF           =  max(lat_t)
 res@trXMinF           =  min(lat_t)

; res@tmXBTickSpacingF  =   4
; res@tmXBMajorLengthF     =  0.2
; res@tmXBMinorLengthF     =  0.1
 res@tmXBMinorPerMajor =   4
 res@cnLinesOn       = False


 plot = gsn_csm_contour(wks, var, res )    ; Plot command
```



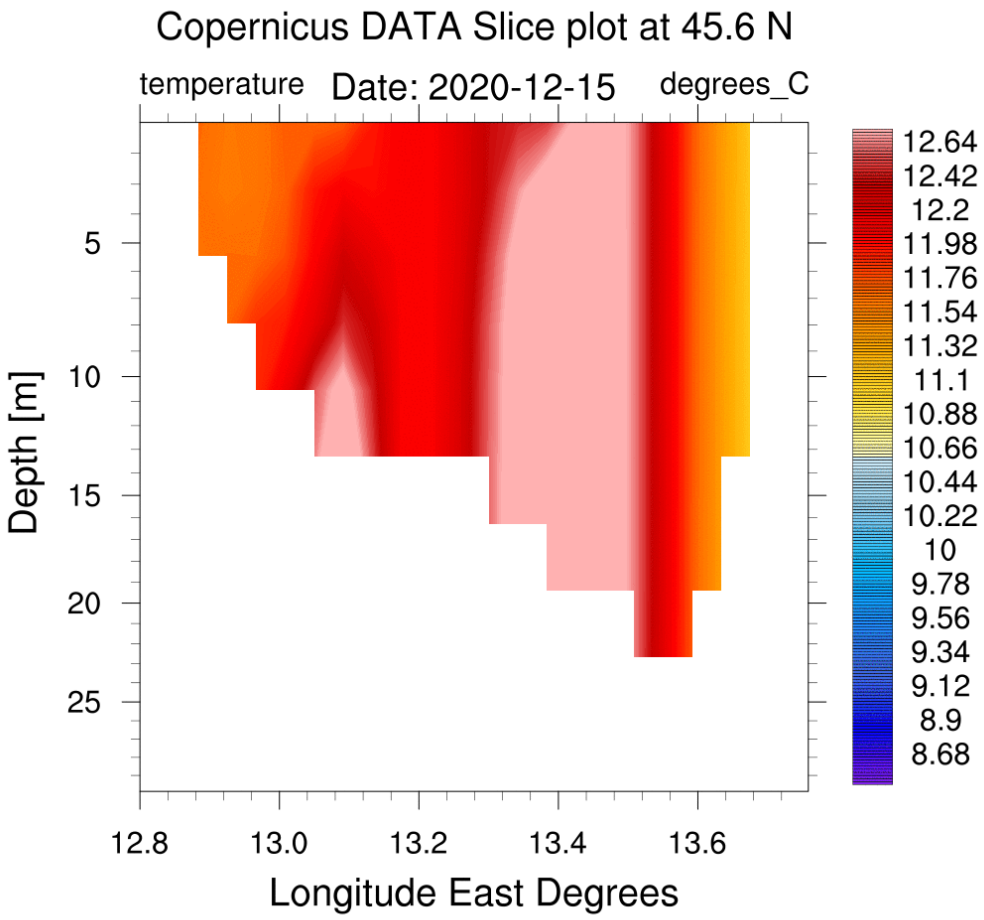
COPERNICUS Marine Data

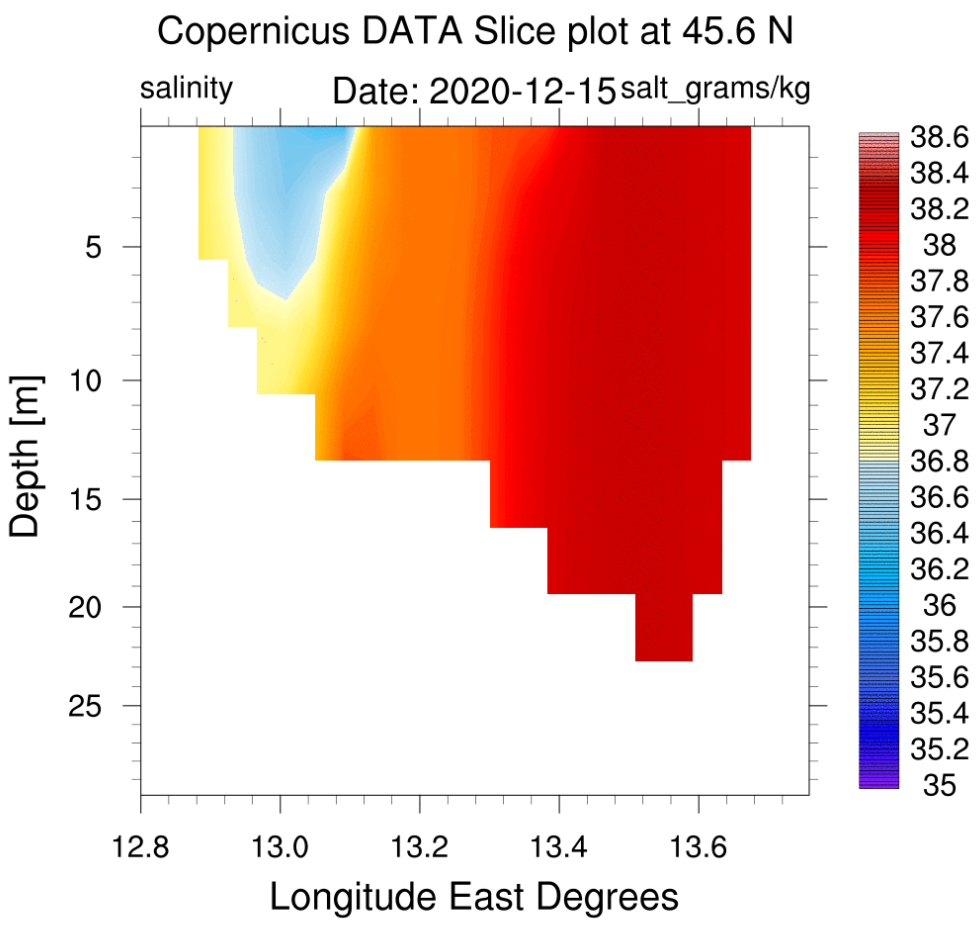
A slice of northern Adriatic Sea (45.6 °N) at constant latitude visualize temperature and salinity from 2020-12-15 to 2021-01-15 in function of depth





COPERNICUS Marine Data

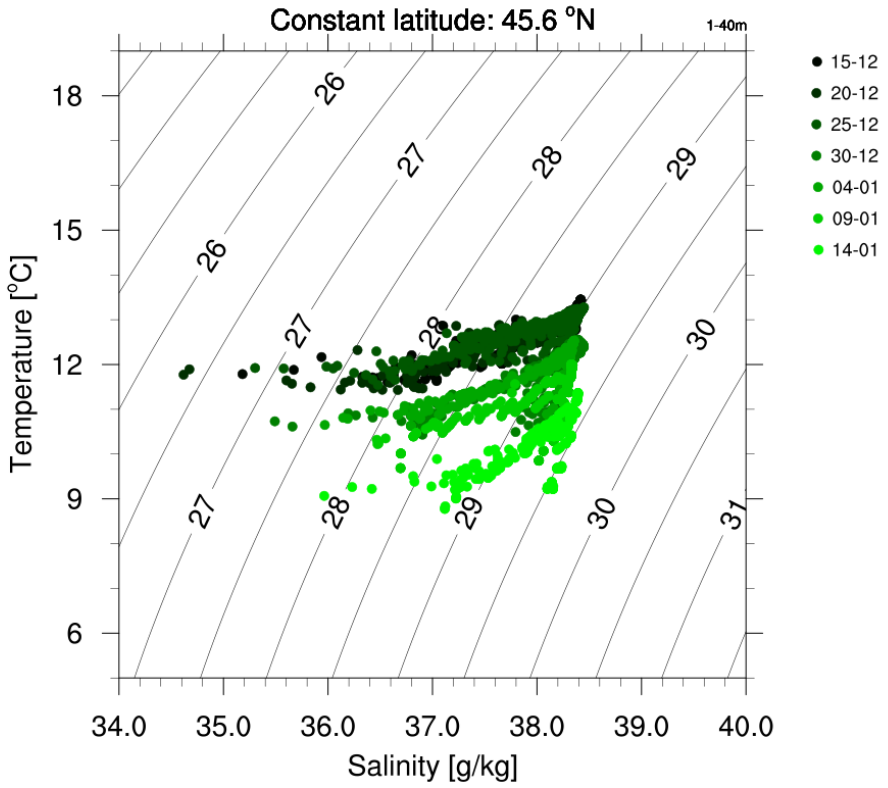




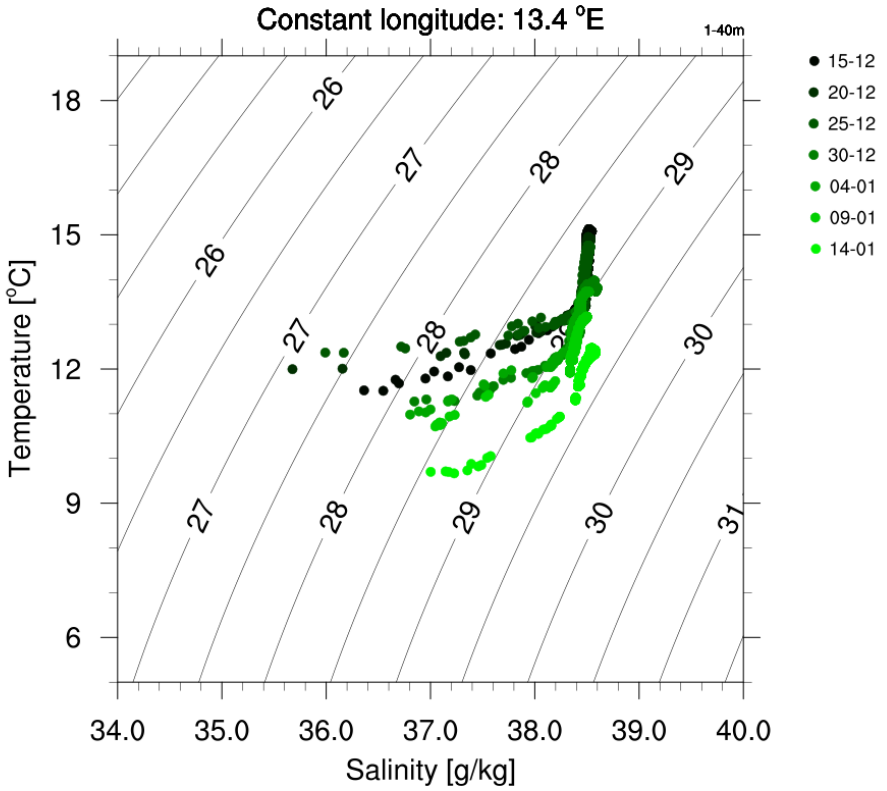
T-S Diagram

Temperature/Salinity plot for longitudinal and latitudinal slace in northern Adriatic Sea from 2020-12-15 to 2021-01-15

Day AVG: T-S Diagram from 2020-12-15 to 2021-01-15

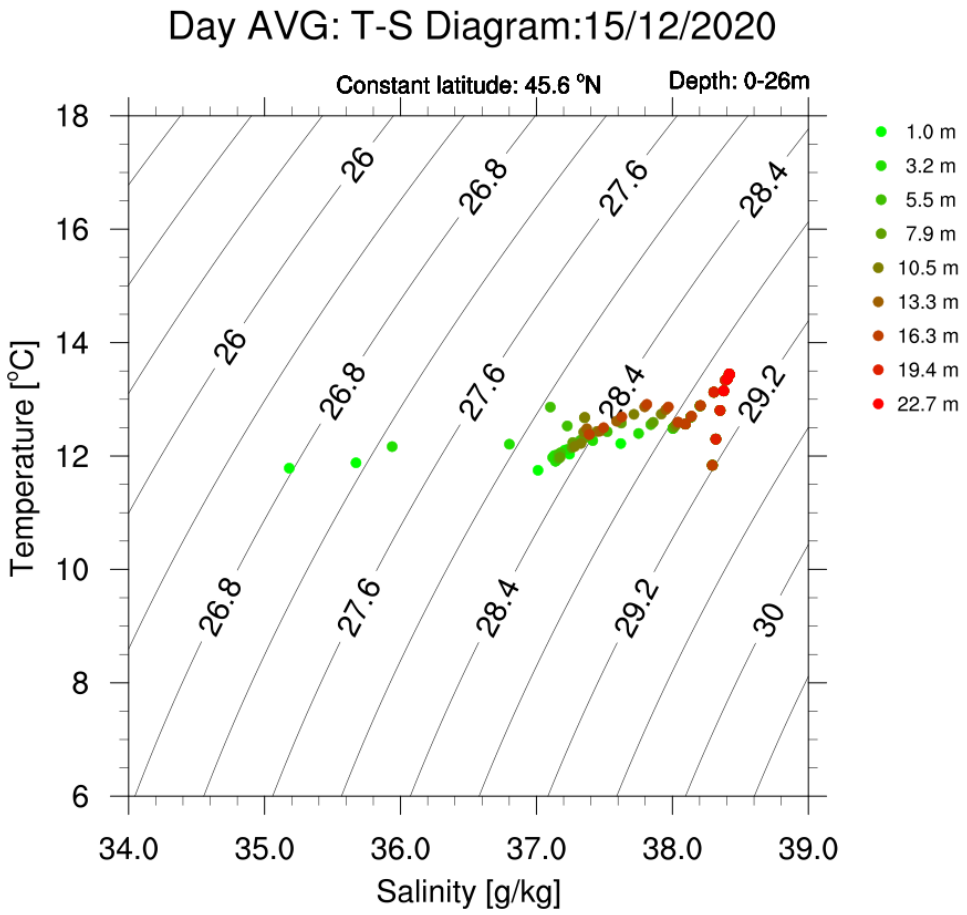


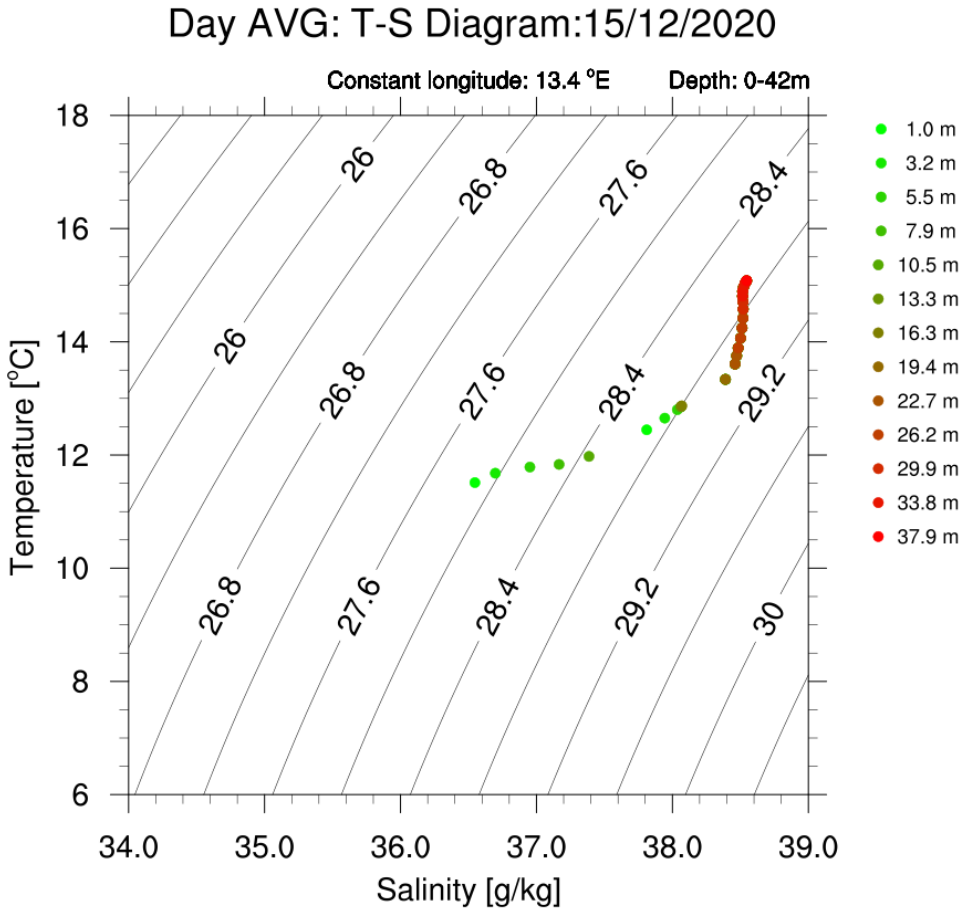
Day AVG: T-S Diagram from 2020-12-15 to 2021-01-15



T-S Diagram Color as a function of depth

Temperature/Salinity plot for longitudinal (13,4 °E) and latitudinal (45,6 °N) slice in northern





Conclusions

These scripts will be useful to achieve AdriaClim and CASCADE goals. In particular

AdriaClim

- Act 3.3 Quality control of the observations and validation of the modelling systems
- Act 3.4 Integration and assessment of information of monitoring (obs/models) components for each Pilot
- Act 3.5 Assessment of vulnerability, hazards and impacts on the Pilot Areas

CASCADE

- Act 3.2 Ecosystem characterization for each Pilot
- Act 3.3 Design of the optimal observing systems for marine coastal environment characterization
- Act 4.1 Set up and testing of the observing system
- Act 4.2 Set up and testing of the integrated modelling system
- Act 5.1 Assessment of hazards, impacts and vulnerability of endangered ecosystems
- Act 5.3 Integrated coastal/marine management systems

Istitutional activities for ARPA FVG

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