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Validazione modello SHYFEM e sviluppo grafico di scenari climatici nel golfo di Trieste

(SHYFEM model validation and graphic development of climate scenarios in the Gulf of Trieste)

AdriaClim|PP4 | Alex Pividori

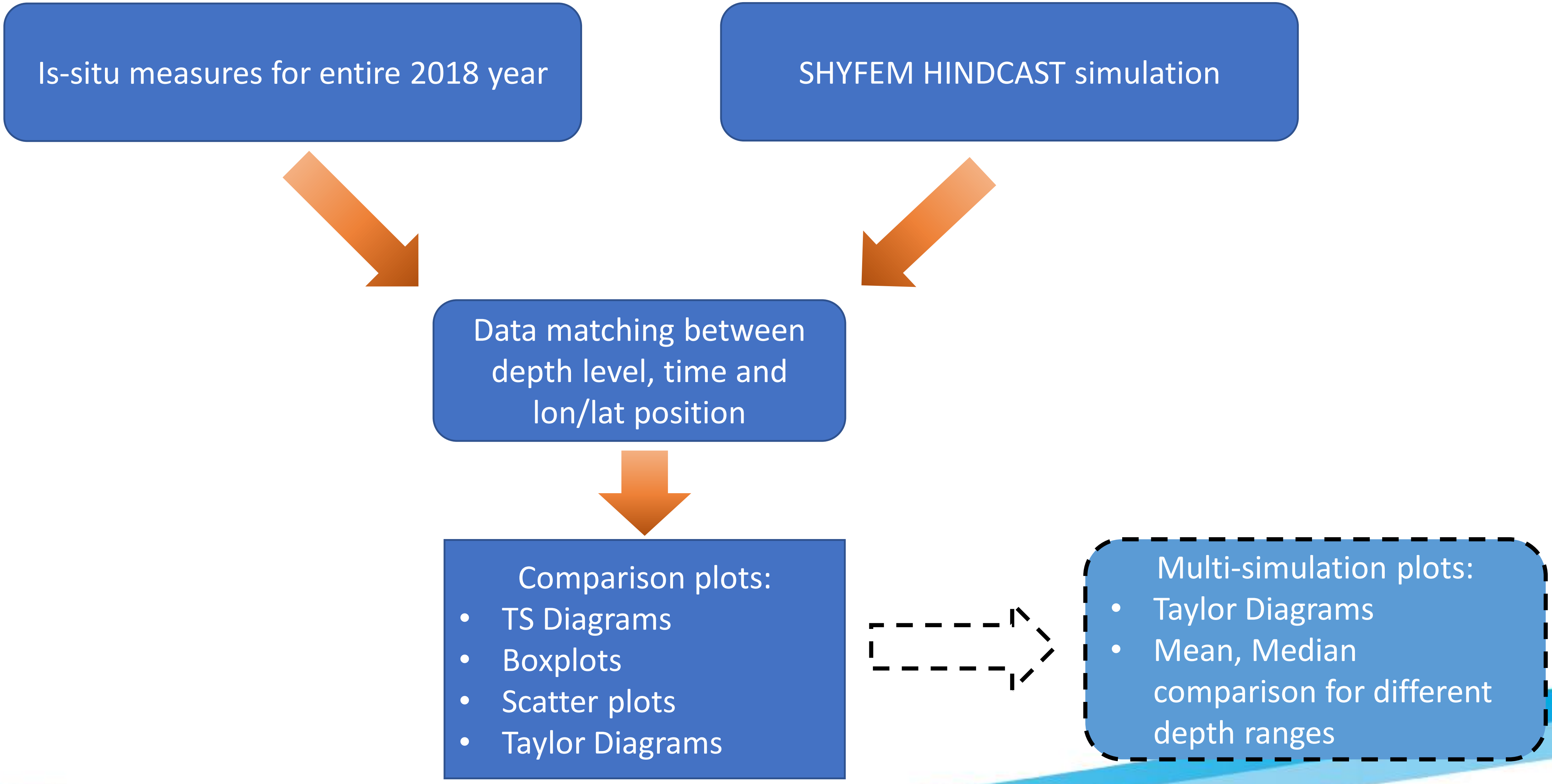
Palmanova | 15th December 2021

European Regional Development Fund

Table of contents:

- SHYFEM model validation
- Scenarios analysis by Med-CORDEX data

Collected data: in-situ measures and SHYFEM hindcast



Is-situ measures for entire 2018 year

SHYFEM HINDCAST simulation

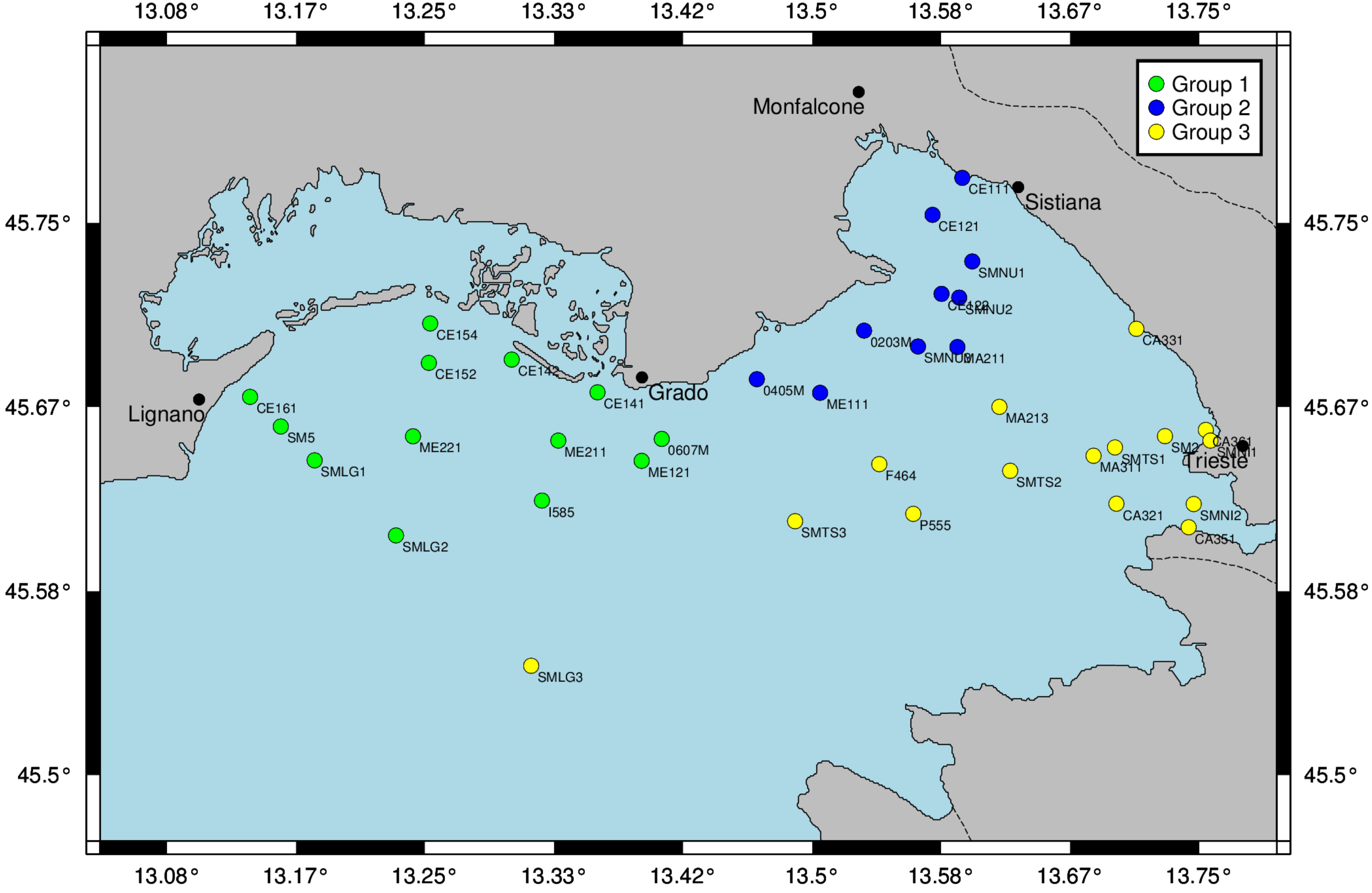
Data matching between depth level, time and lon/lat position

Comparison plots:
- TS Diagrams
- Boxplots
- Scatter plots
- Taylor Diagrams

Multi-simulation plots:
- Taylor Diagrams
- Mean, Median comparison for different depth ranges

Entire set of monitored points from 01/2018 to 12/2018

Groups splitting for monitoring stations (2018) in SHYFEM model validation


13.08°
13.17°
13.25°
13.33°
13.42°
13.5°
13.58°
13.67°
13.75°
45.75°
45.67°
45.58°
45.5°
Group 1
Group 2
Group 3
Monfalcone
Sistiana
Grado
Lignano
Trieste
CE111
CE121
SMNU1
CE12
SMNU2
0203M
SMNU
MA211
0405M
ME111
CE154
CE152
CE142
CE141
CE161
SM5
SMLG1
ME221
ME211
0607M
ME121
I585
SMLG2
SMLG3
CA331
MA213
F464
SMTS2
SMTS3
P555
MA311
SMTS1
SM2
CA361
SMNI1
CA321
SMNI2
CA351

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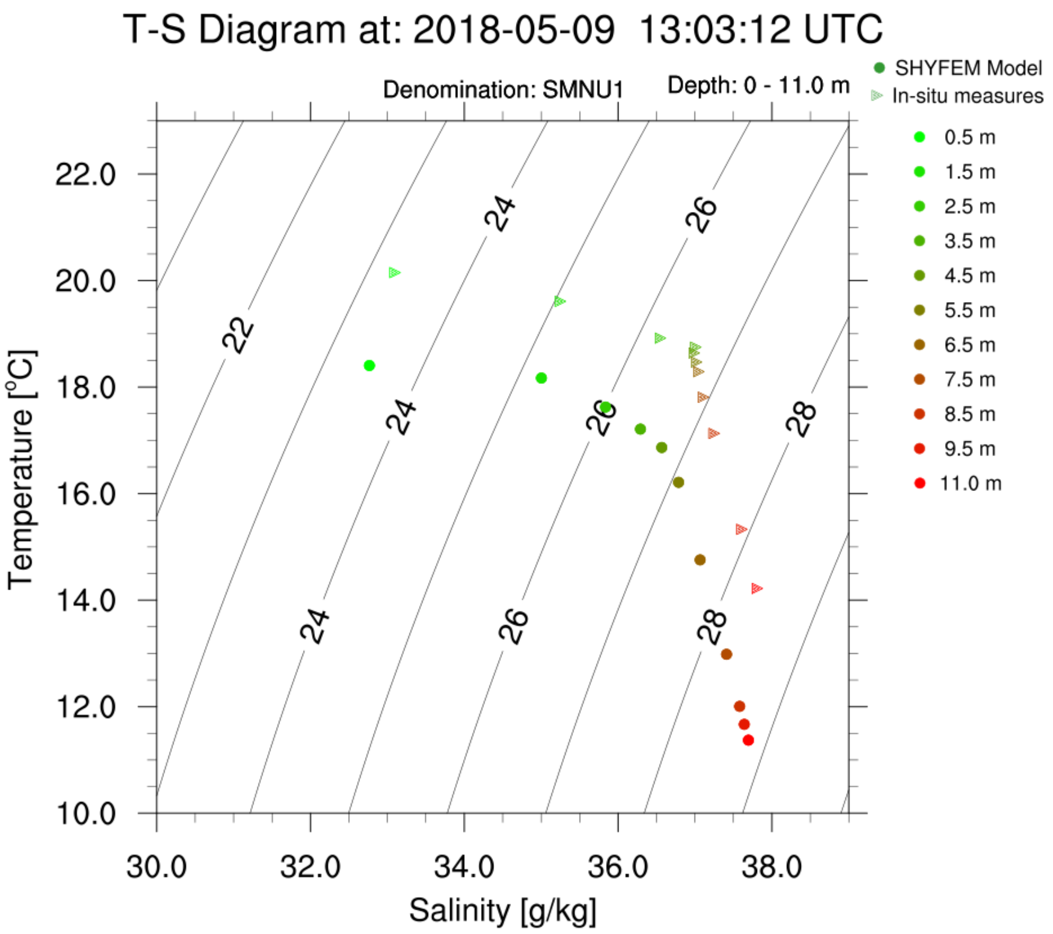
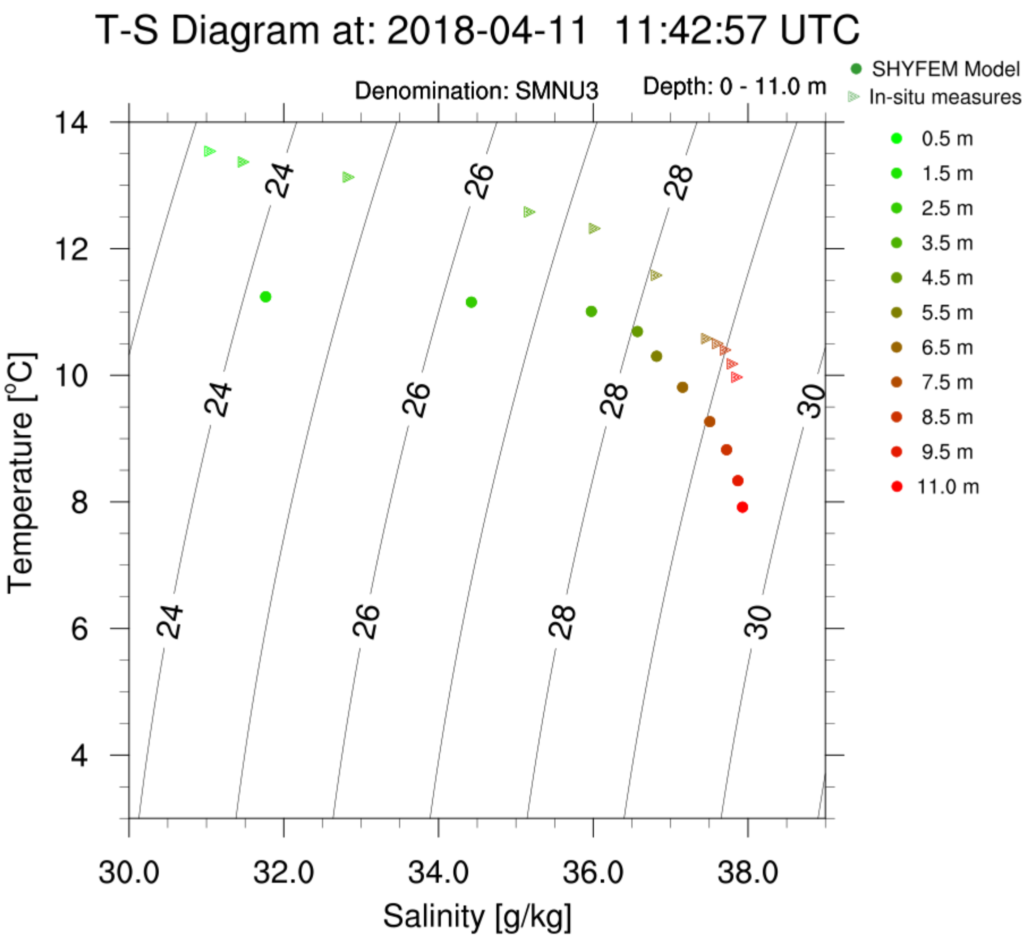
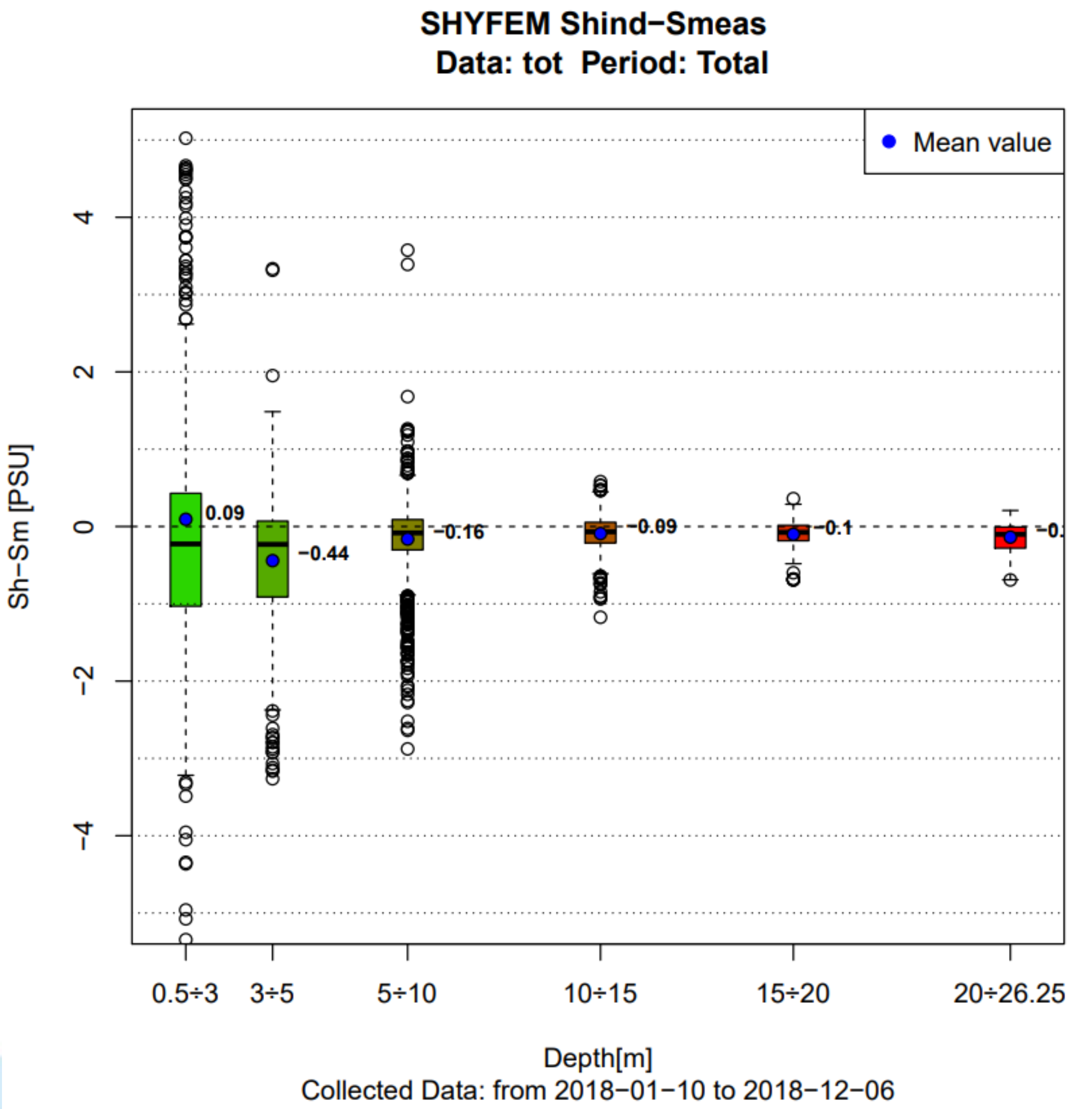
TS-Diagrams for SHYFEM validation

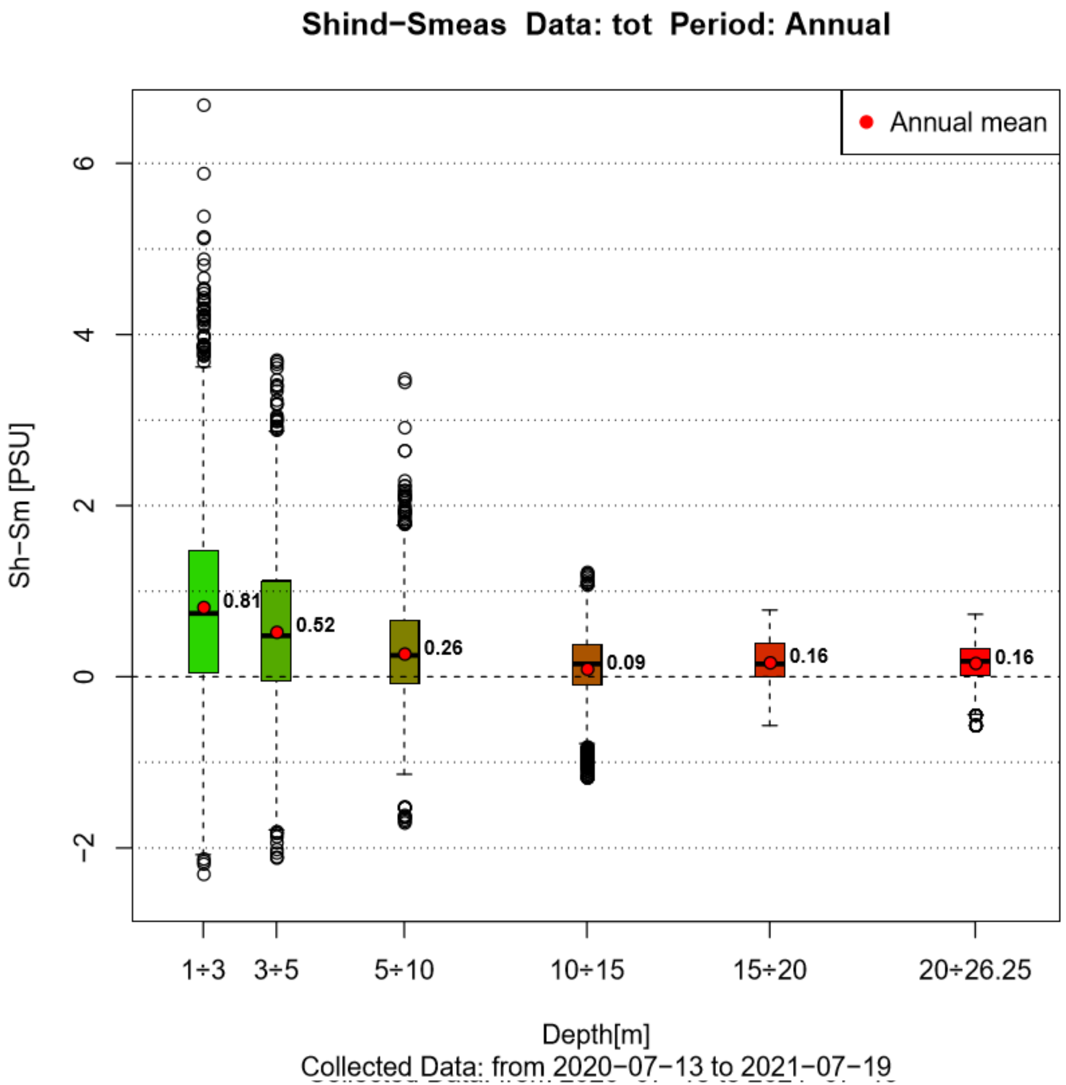




Temperature and salinity boxplots:

SHYFEM vs COPERNICUS





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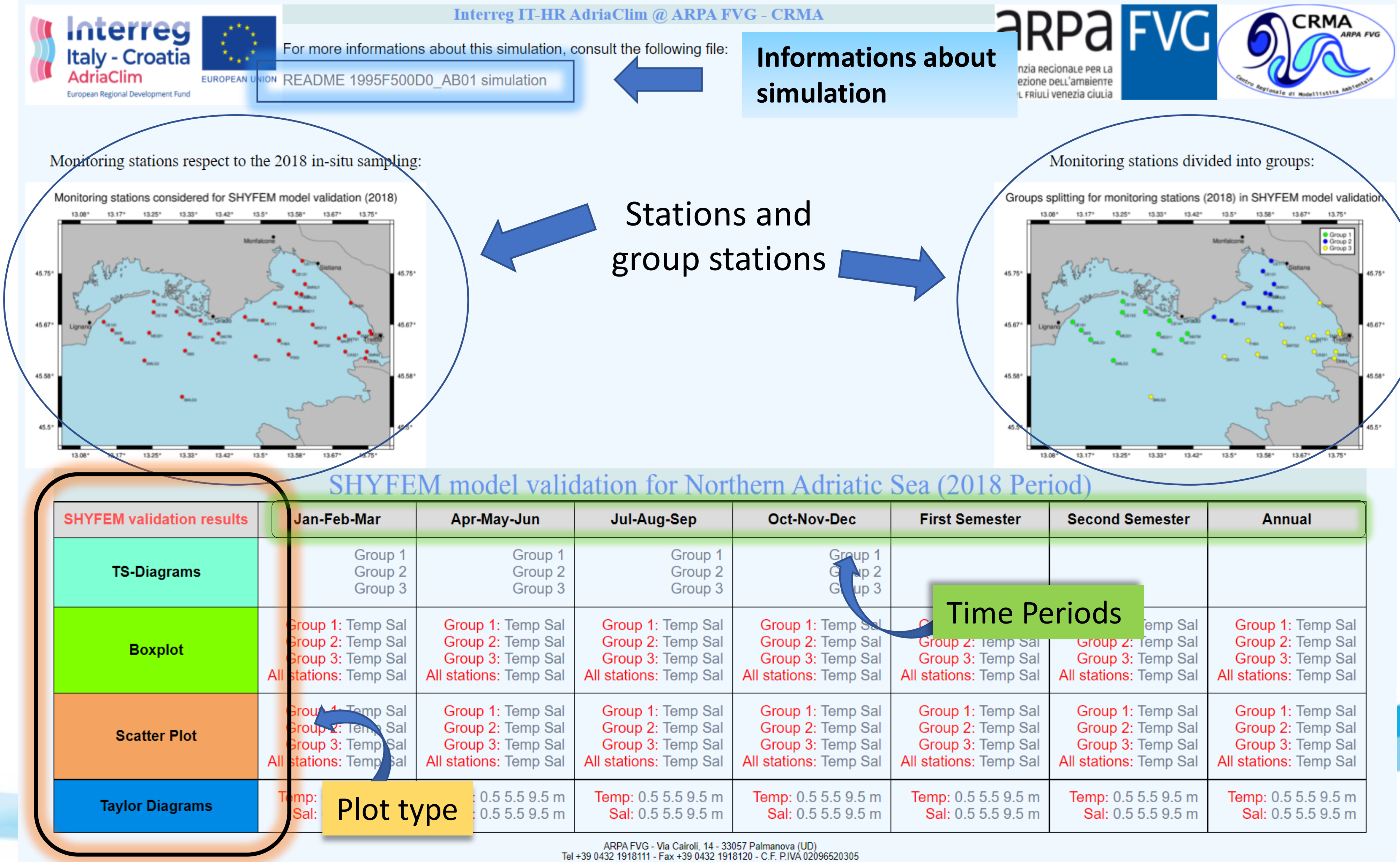
Validation plots for SHYFEM Model (Web Page link)



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For more informations about this simulation, consult the following file:

README 1995F500D0_AB01 simulation

Informations about simulation

Monitoring stations respect to the 2018 in-situ sampling:

Monitoring stations considered for SHYFEM model validation (2018)

Monitoring stations divided into groups:

Groups splitting for monitoring stations (2018) in SHYFEM model validation

Stations and group stations

SHYFEM model validation for Northern Adriatic Sea (2018 Period)

SHYFEM validation results	Jan-Feb-Mar	Apr-May-Jun	Jul-Aug-Sep	Oct-Nov-Dec	First Semester	Second Semester	Annual
TS-Diagrams	Group 1 Group 2 Group 3	Group 1 Group 2 Group 3	Group 1 Group 2 Group 3	Group 1 Group 2 Group 3			
Boxplot	Group 1: Temp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal	Group 1: Temp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal	Group 1: Temp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal	Group 1: Temp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal	G Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal	emp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal	Group 1: Temp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal
Scatter Plot	Group 1: Temp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal	Group 1: Temp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal	Group 1: Temp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal	Group 1: Temp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal	Group 1: Temp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal	Group 1: Temp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal	Group 1: Temp Sal Group 2: Temp Sal Group 3: Temp Sal All stations: Temp Sal
Taylor Diagrams	Temp: Sal:	: 0.5 5.5 9.5 m : 0.5 5.5 9.5 m	Temp: 0.5 5.5 9.5 m Sal: 0.5 5.5 9.5 m	Temp: 0.5 5.5 9.5 m Sal: 0.5 5.5 9.5 m	Temp: 0.5 5.5 9.5 m Sal: 0.5 5.5 9.5 m	Temp: 0.5 5.5 9.5 m Sal: 0.5 5.5 9.5 m	Temp: 0.5 5.5 9.5 m Sal: 0.5 5.5 9.5 m

Time Periods

Plot type

ARPA FVG - Via Cairoli, 14 - 33057 Palmanova (UD)
Tel +39 0432 1918111 - Fax +39 0432 1918120 - C.F. P.IVA 02096520305

Med-CORDEX download and editing data

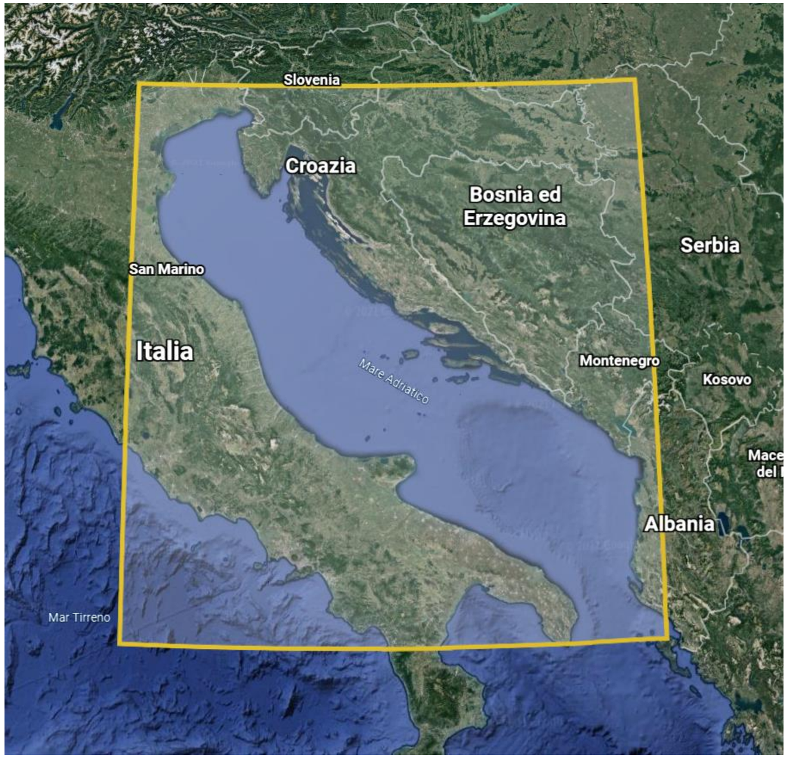
Download from Med-CORDEX official site

Cut files along Adriatic Sea

Regrid on a lon/lat 0,06° x 0,06° regular grid

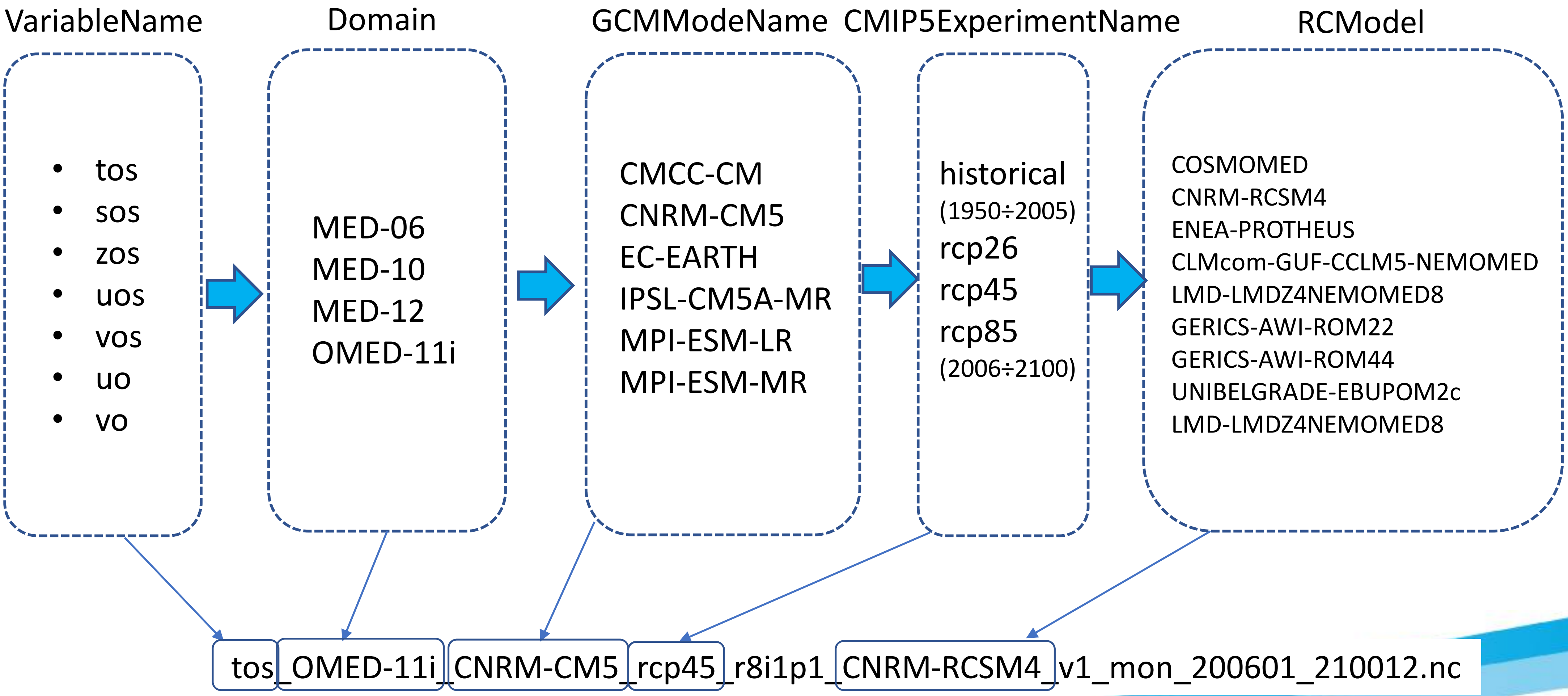
Time merging files

Archiviation files


Slovenia
Croazia
Bosnia ed Erzegovina
Serbia
San Marino
Italia
Mare Adriatico
Montenegro
Kosovo
Albania
Mar Tirreno

Physical Dimension	Memory Occupied	
	Historical	Scenario
Superficial Scalar field: tos, sos, zos (monthly)	38 Mb	65 Mb
Multi-level scalar field: uo, vo (monthly)	1,6 Gb	2,7 Gb
Superficial scalar field: uos, vos (daily)	1,2 Gb	2 Gb

Med-CORDEX files description



VariableName

- tos
- sos
- zos
- uos
- vos
- uo
- vo

Domain

MED-06
MED-10
MED-12
OMED-11i

GCMModeName

CMCC-CM
CNRM-CM5
EC-EARTH
IPSL-CM5A-MR
MPI-ESM-LR
MPI-ESM-MR

CMIP5ExperimentName

historical
(1950÷2005)
rcp26
rcp45
rcp85
(2006÷2100)

RCModel

COSMOMED
CNRM-RCSM4
ENEA-PROTHEUS
CLMcom-GUF-CCLM5-NEMOMED
LMD-LMDZ4NEMOMED8
GERICS-AWI-ROM22
GERICS-AWI-ROM44
UNIBELGRADE-EBUPOM2c
LMD-LMDZ4NEMOMED8

tos_OMED-11i_CNRM-CM5_rcp45_r8i1p1_CNRM-RCSM4_v1_mon_200601_210012.nc

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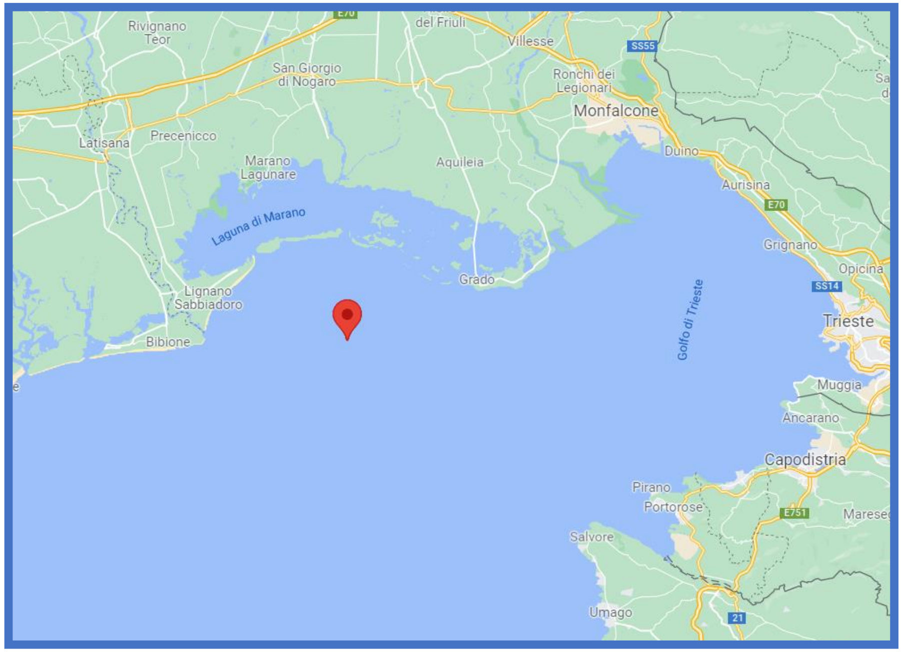
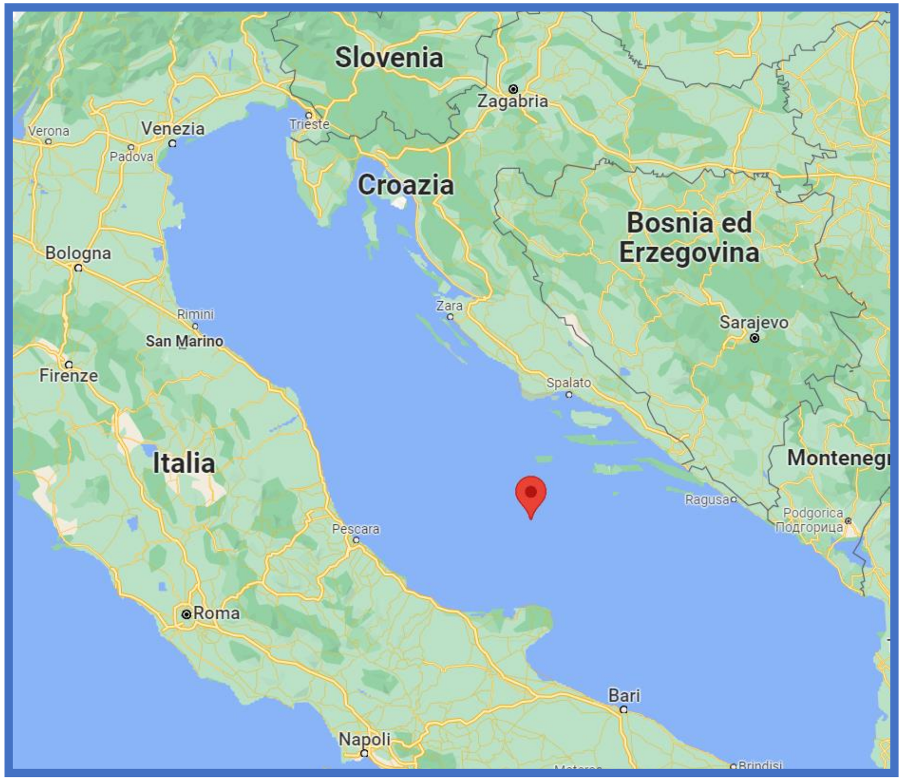
Surface temperature and salinity scenario for middle Adriatic Sea and near Marano-Grado Lagoon

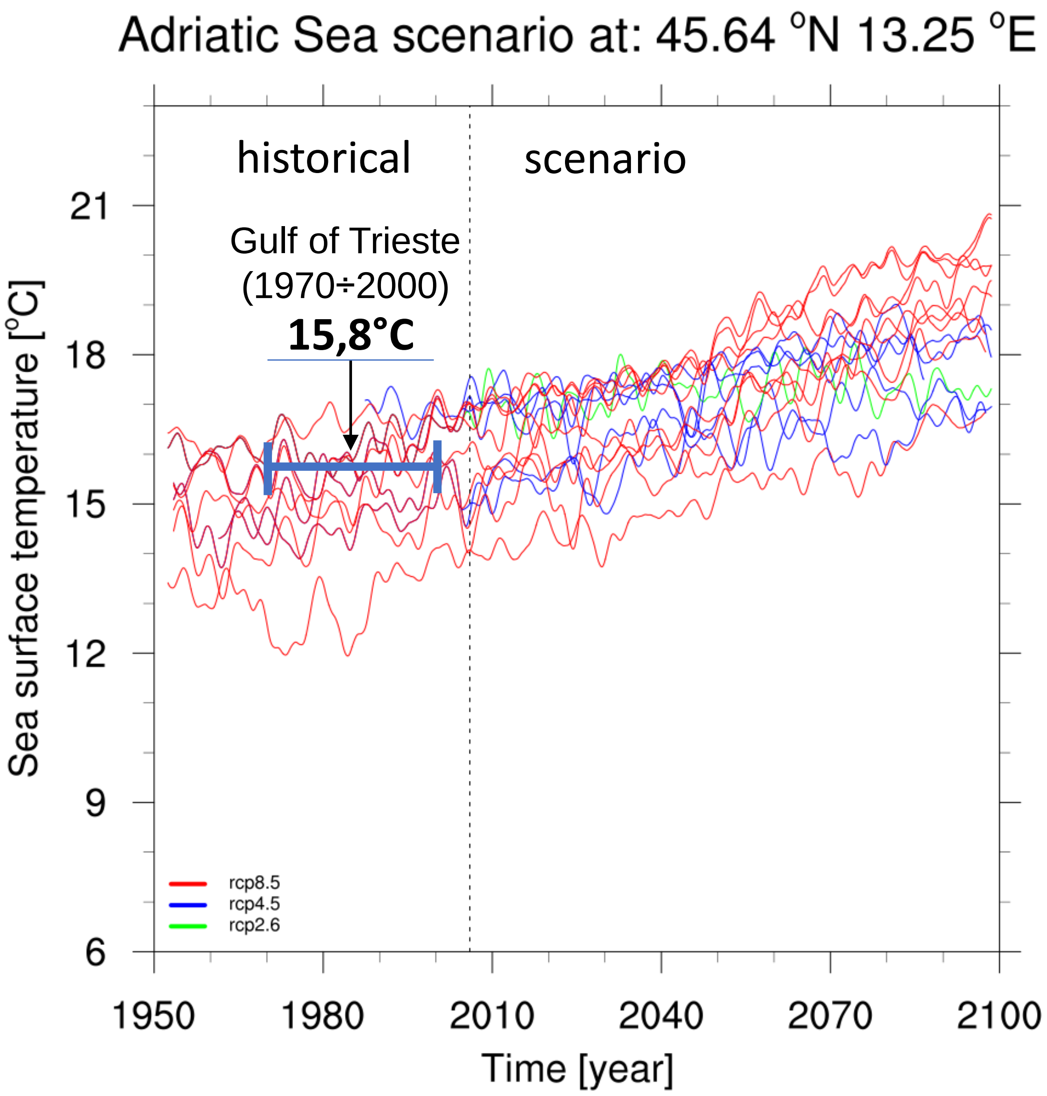

Rivignano Teor
San Giorgio di Nogaro
Villesse
Ronchi dei Legionari
Monfalcone
Latisana
Precenicco
Marano Lagunare
Aquileia
Duino
Aurisina
Laguna di Marano
Grado
Grignano
Opicina
Lignano Sabbiadoro
Bibione
Trieste
Golfo di Trieste
Muggia
Ancarano
Capodistria
Pirano
Portorose
Salvore
Umago

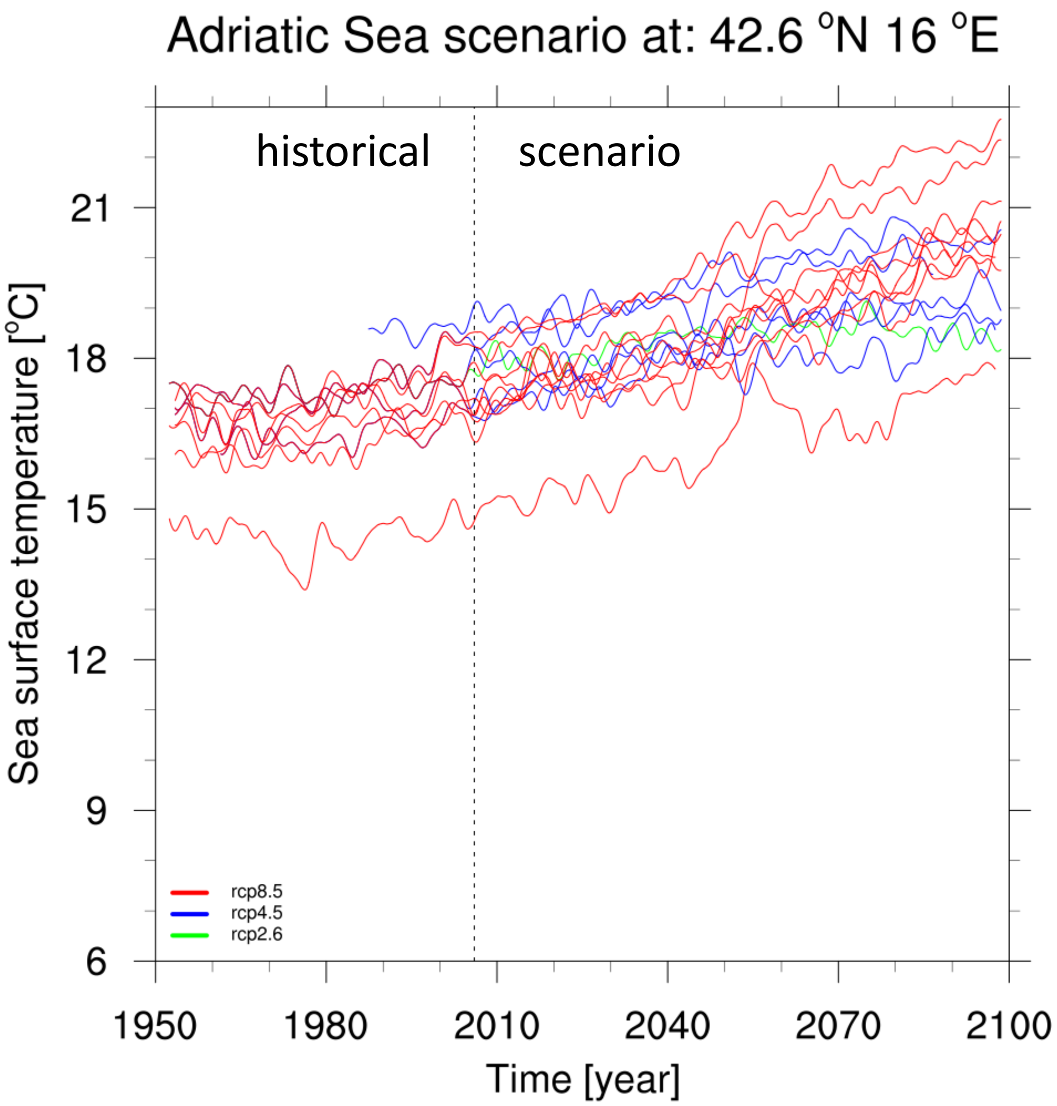
45,64° N 13,25°E


Slovenia
Zagabria
Verona
Venezia
Trieste
Padova
Croazia
Bologna
Bosnia ed Erzegovina
Rimini
Zara
San Marino
Sarajevo
Firenze
Spalato
Italia
Montenegr
Ragusa
Podgorica
Pescara
Roma
Bari
Napoli
Brindisi

42,6°N 16°E

Temperature scenario comparison





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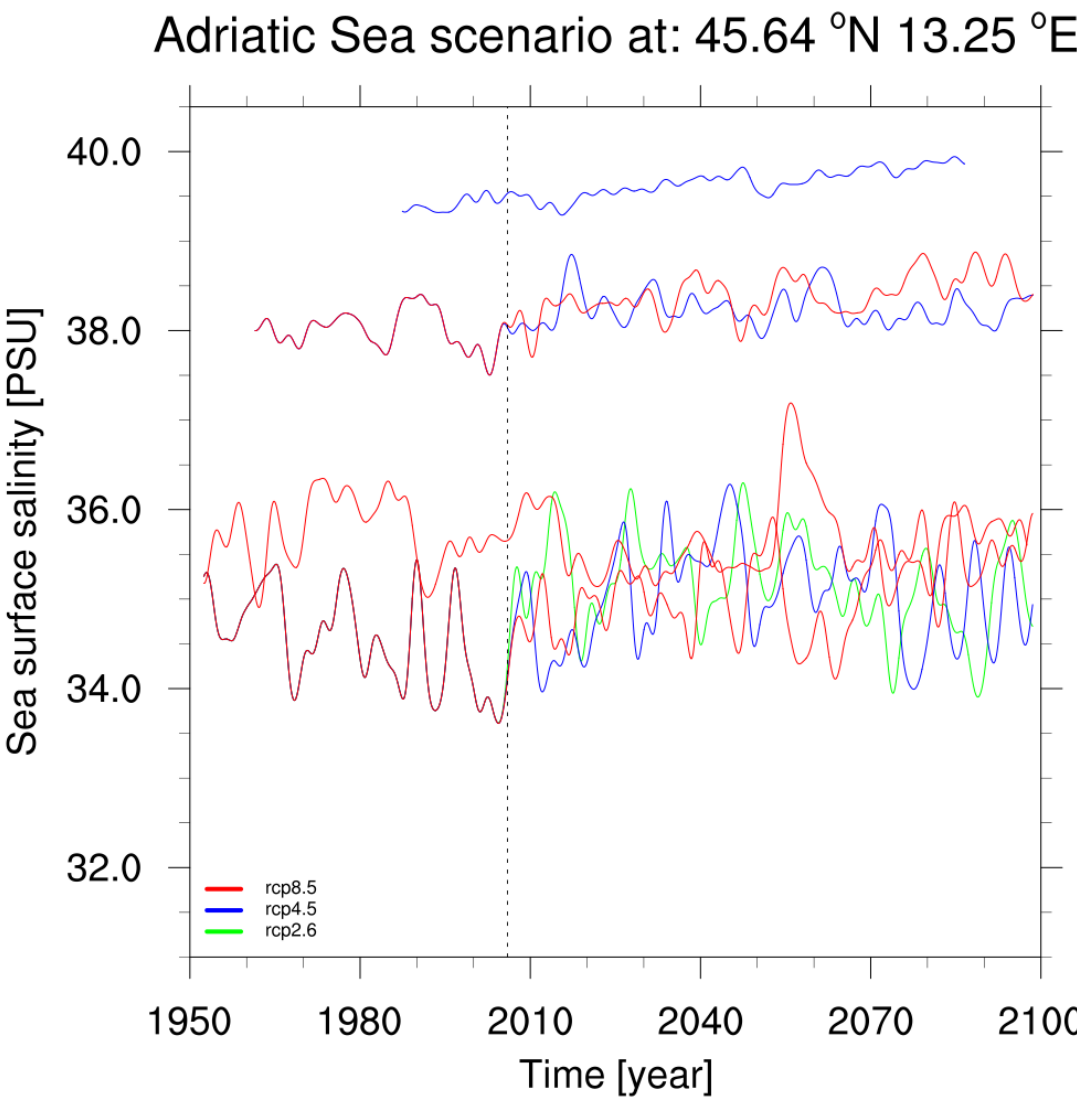
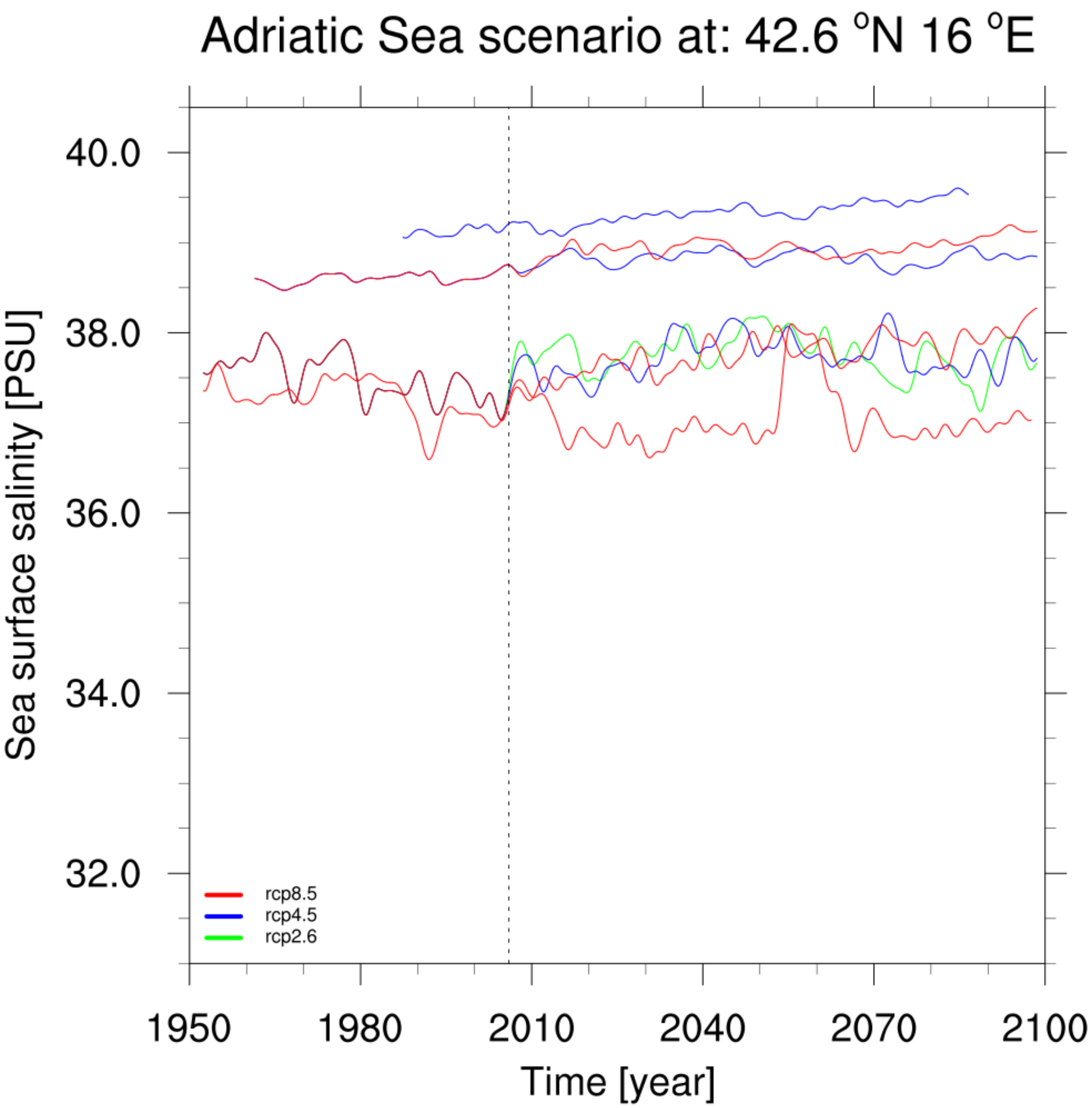
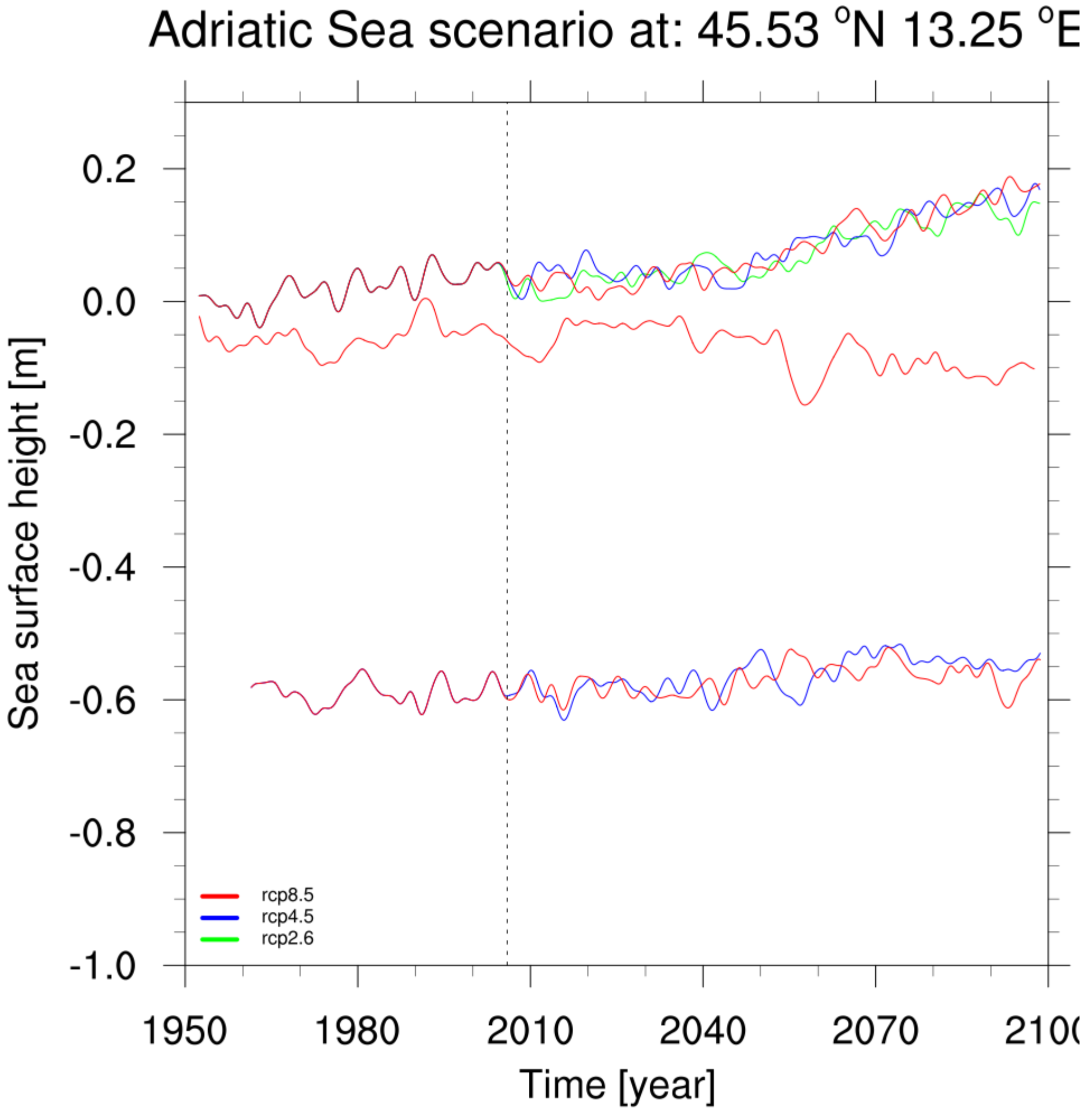
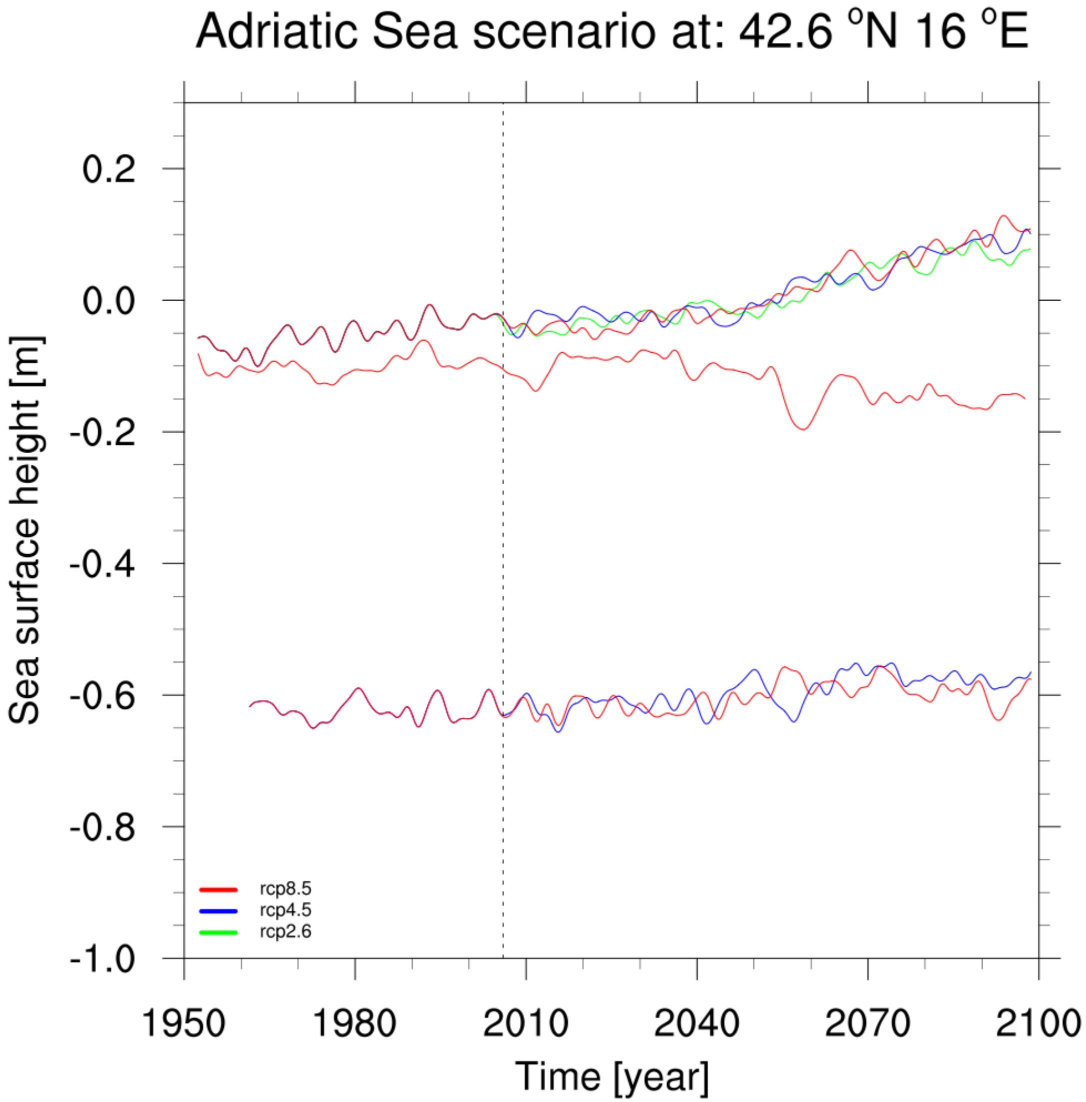
Salinity scenario comparison





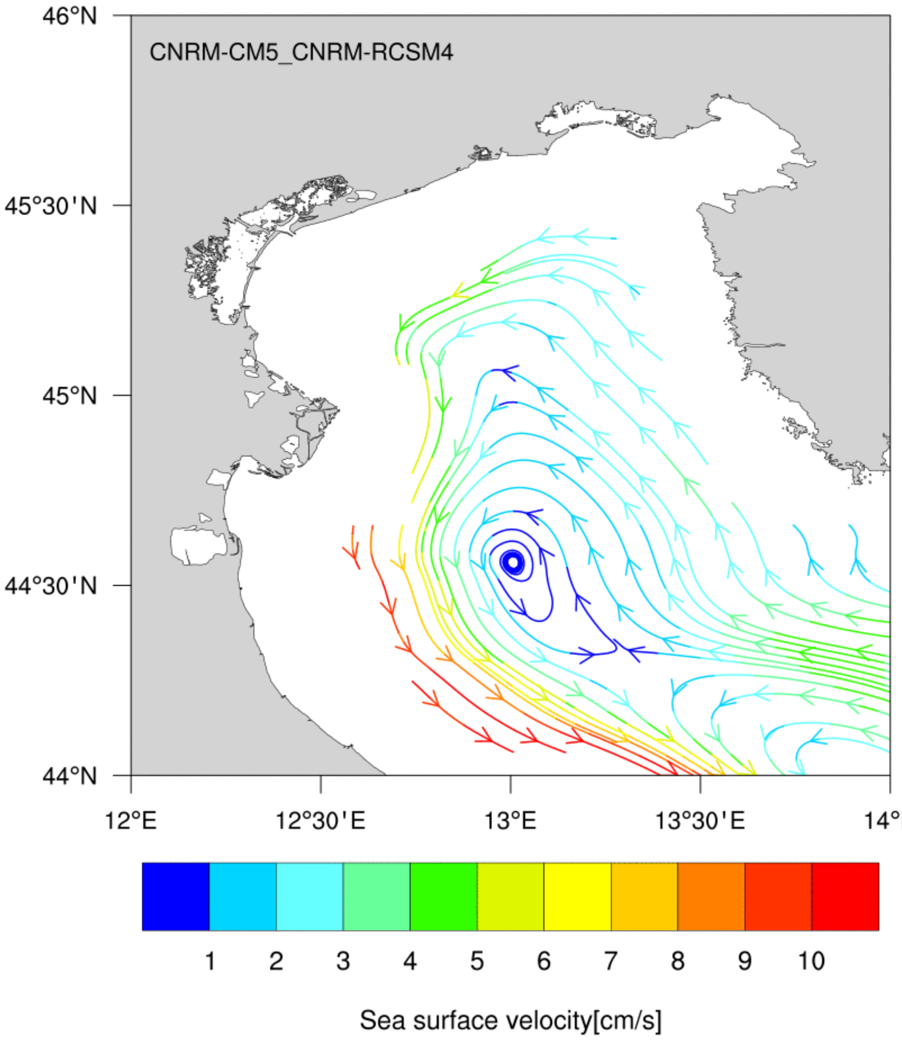
Sea surface height above geoid


Adriatic Sea scenario at: 45.53 °N 13.25 °E

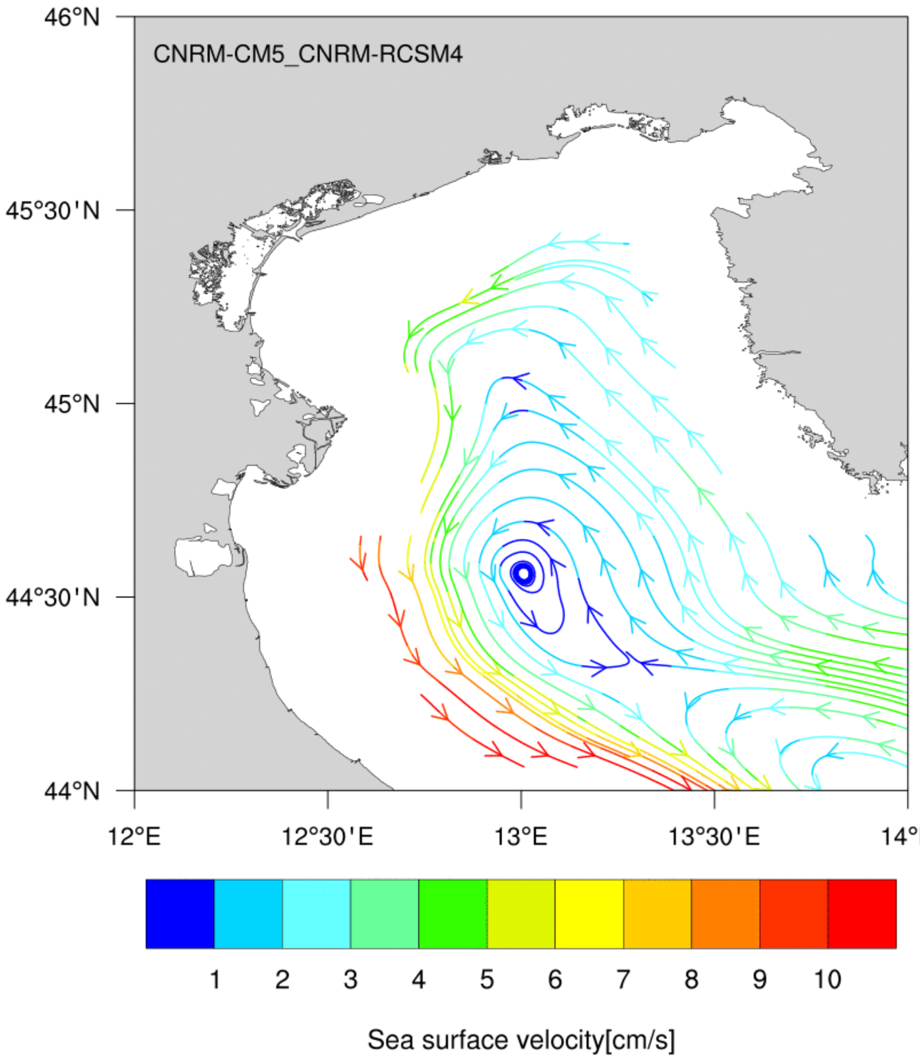

Adriatic Sea scenario at: 42.6 °N 16 °E

Surface water currents for Adriatic Sea

Velocity decade mean RCP 4.5: 1950 to 1960


CNRM-CM5_CNRM-RCSM4
46°N
45°30'N
45°N
44°30'N
44°N
12°E
12°30'E
13°E
13°30'E
14°E
1
2
3
4
5
6
7
8
9
10
Sea surface velocity[cm/s]

Velocity decade mean RCP 8.5: 1950 to 1960


CNRM-CM5_CNRM-RCSM4
46°N
45°30'N
45°N
44°30'N
44°N
12°E
12°30'E
13°E
13°30'E
14°E
1
2
3
4
5
6
7
8
9
10
Sea surface velocity[cm/s]

Foreseen next activities and further developments:

- Multi SHYFEM simulation comparison with a Public WebPage
- Scenario dataset expansion by ERDDAP files
- Further statistical analysis with scenario datasets (WP.5.3 D.5.3.3)
- Extraction of Boundary Condition for SHYFEM Model in future scenarios until 2100 (WP.3.2 D.3.2.2)

CONTACT INFORMATION

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☎

http://www.arpa.fvg.it

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