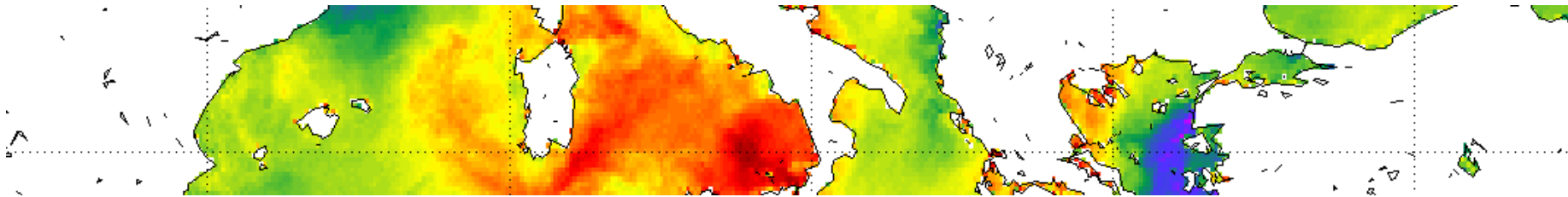


Producing gap-free analyzed sea surface temperature data from L3 products using web-based Data INterpolation Empirical Orthogonal Functions (DINEOF) technique



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2014 GHRSSST Science Meeting, 02-07. June 2014, Cape Town, South Africa

Outline

- DINEOF
- webDINEOF
 - UI + engine
- Examples
- Future development
- Summary

DINEOF - description

- EOF based technique to fill in missing (satellite) data
- Informations are extraced from spatio-temporal varaiability within the data
- Optimal number of EOFs derived by cross-validation
- Non-parametric, no a priori information (corr. length, cov.)
- Noise reduction due to the trancated EOF series
- Iterative method
- Problem
 - Only repeating structures are retained (no transient features) → requires longer time series

DINEOF – a bit detailed I

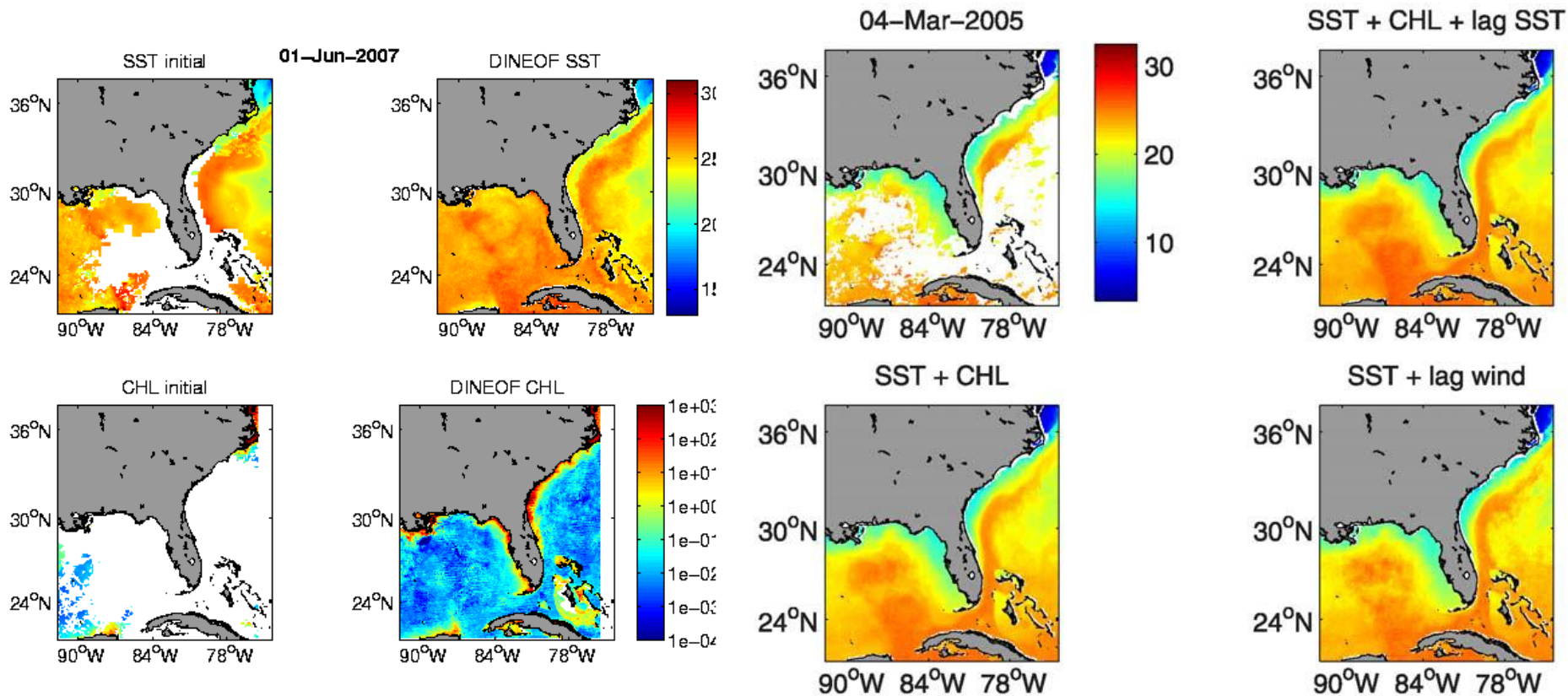
- **X** – data matrix $[X_1 X_2 \dots X_N]$
 - data stored as columns
 - N data
- Initial matrix demeaned (working on anomalies)
- Missing data set to zero
- ~3-5% of valid data set for cross-validation (as missing)

DINEOF – a bit detailed II

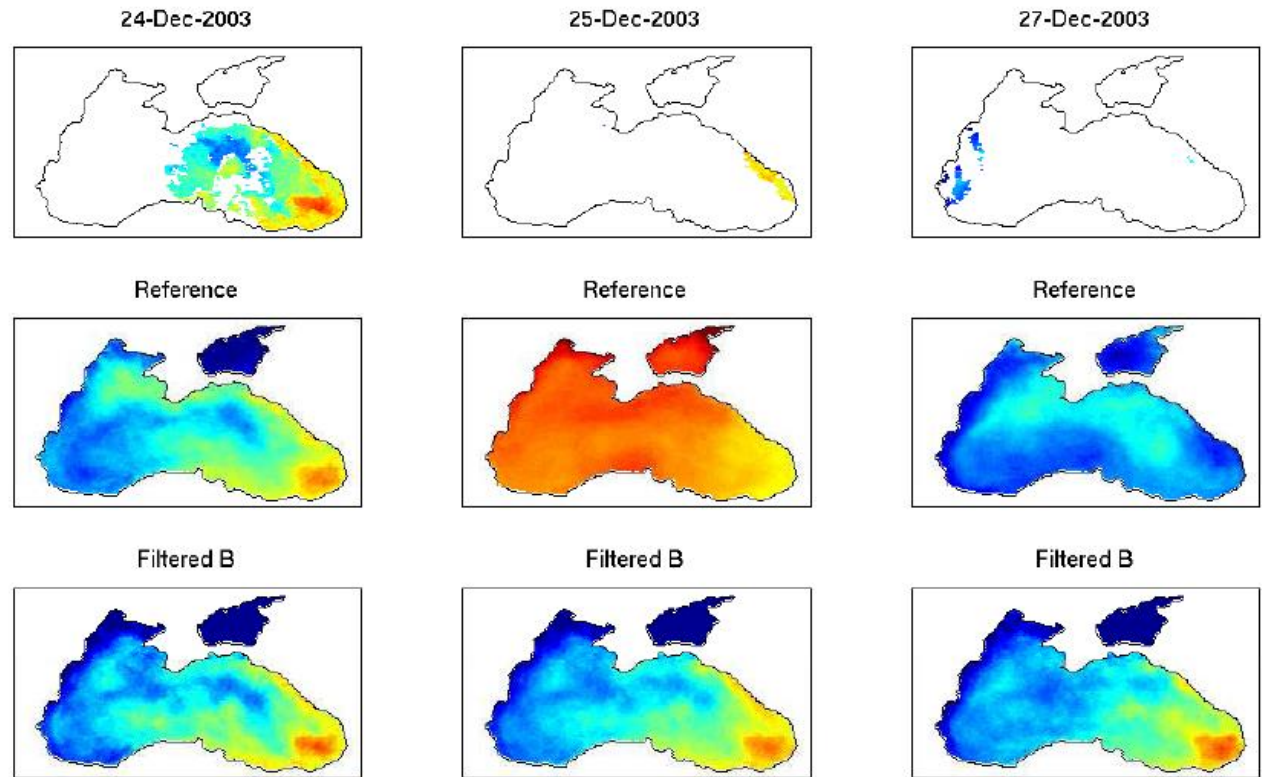
- $i=1:N_{max_EOF_modes}$ {
 Until error with cross validation < THRESH{
 - Perform SVD decomposition ($\mathbf{X}=\mathbf{U}\mathbf{\Sigma}\mathbf{V}^T$)
 - Lanczos solver, Toumazou and Cretaux (2001)
 - Calc missing values using i EOF mode(s)
 - Improve guess with calc. missing values
 - check using cross validation (rms) }
 }
- Beckers and Rixen, 2003
- Alvera-Azcárate et al., 2005

DINEOF – multivariate analysis

- Alvera-Azcárate et al. (2007). Multivariate reconstruction of missing data in sea surface temperature, chlorophyll and wind satellite fields. *Journal of Geophysical Research*, 112:C03008, 2007. doi:10.1029/2006JC003660.



DINEOF – temporal filtering



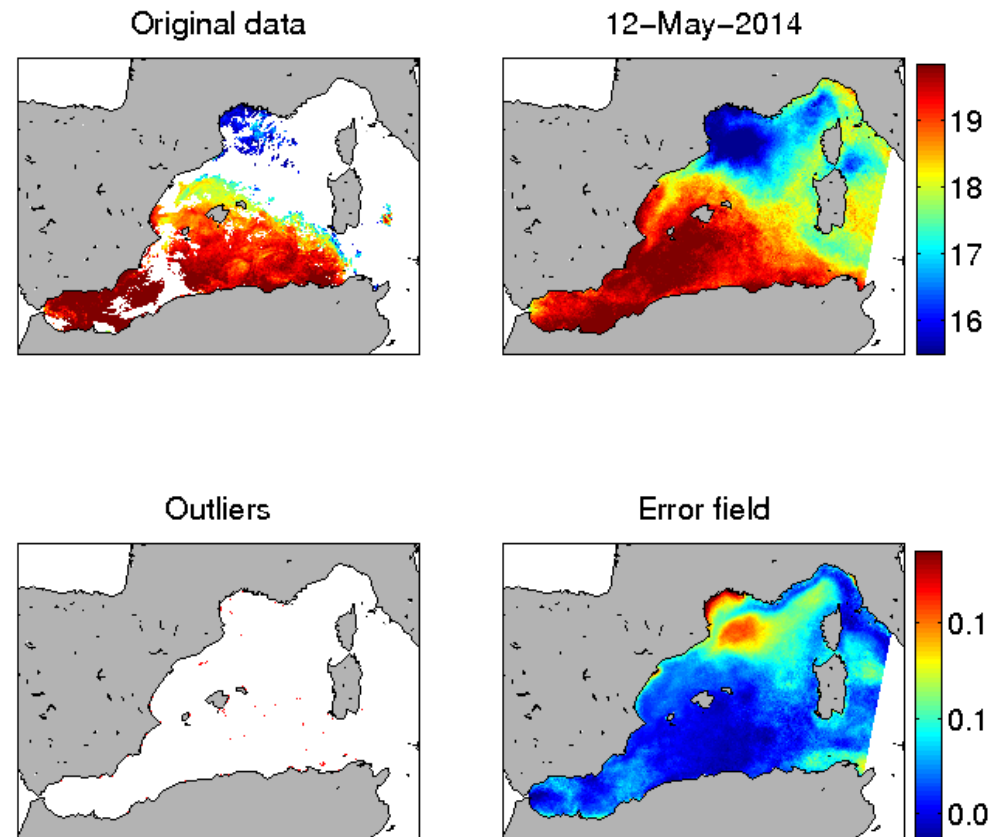
Alvera-Azcárate et al., 2009

- Filtering of covariance matrix (Laplacian)
- Applied iteratively – cut off frequency based on number of iterations

DINEOF - outliers

Alvera-Azcárate et al. (2012). Outlier detection in satellite data using spatial coherence. *Remote Sensing of Environment*, 119:84–91.

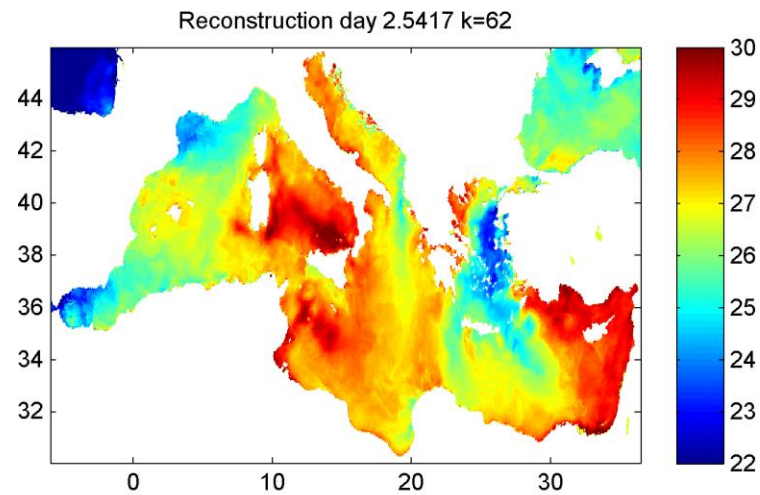
- Local median test
- Proximity test
- EOF basis test:
difference (analysis – obs)
larger than statistically
expected misfit calculated
during analysis



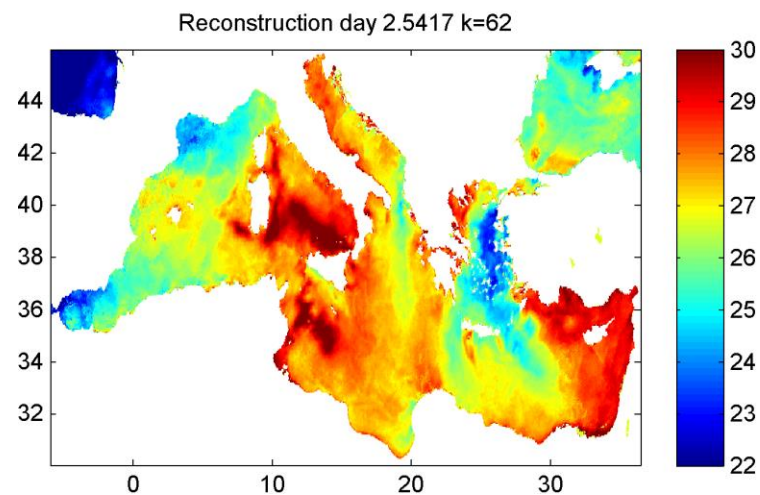
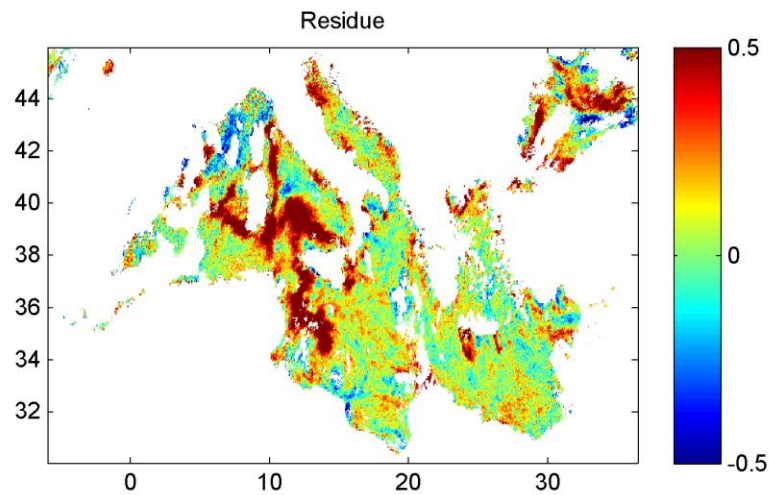
DINEOF + OI

- DINEOF –larger scales
- OI – smaller scales
- <http://www.ocean-sci-discuss.net/11/895/2014/osd-11-895-2014.html>
- Beckers et al. (2014). Multi-scale optimal interpolation: application to DINEOF analysis spiced with a local optimal interpolation, 11, 895-941, Ocean Science Discussions (under review).

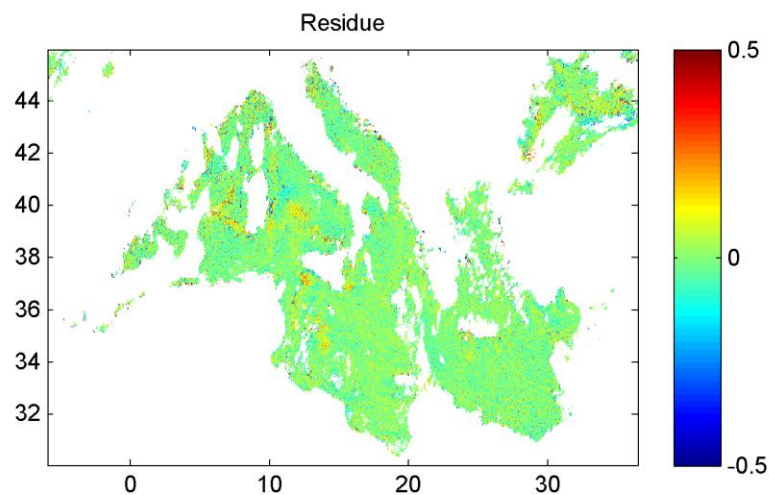
DINEOF + OI



DINEOF

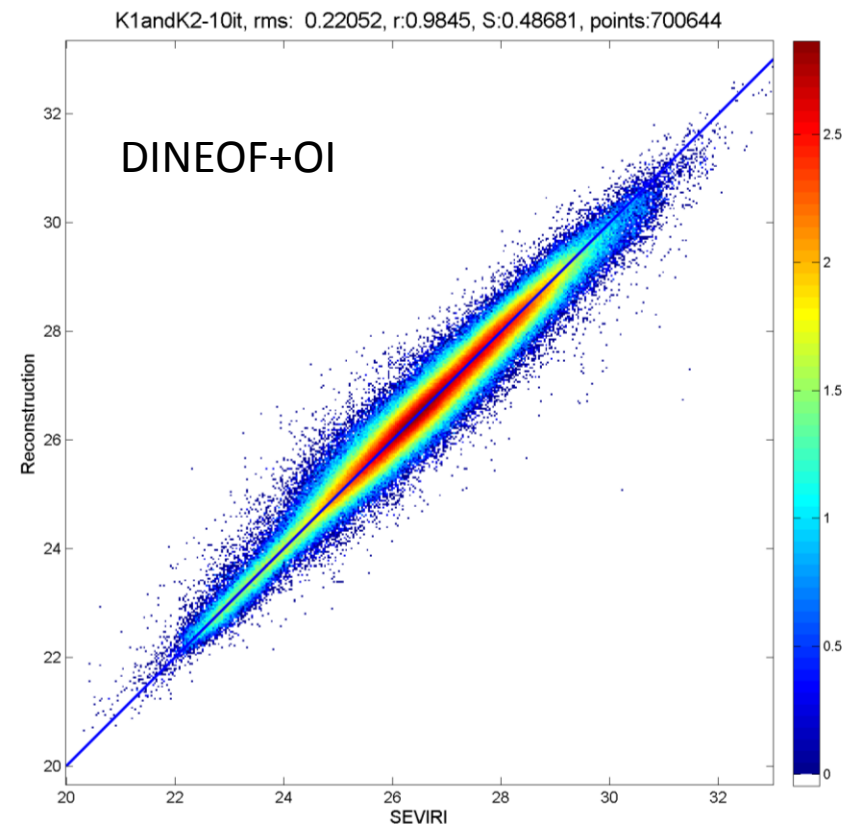
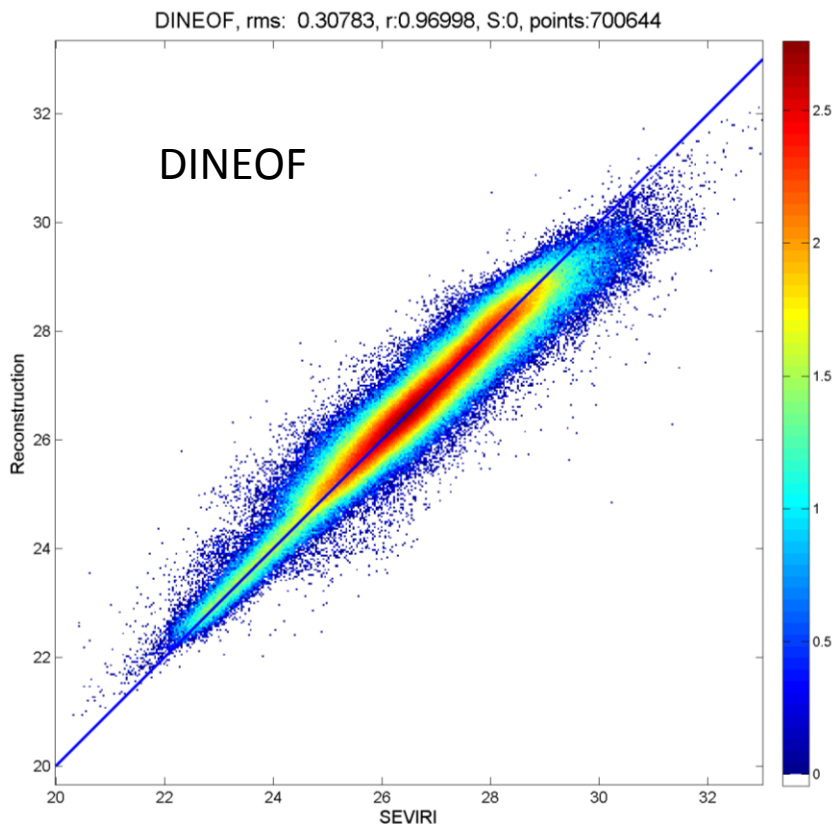


DINEOF+OI



DINEOF + OI

- 2D scatter plot (1-16. 08. 2013)




DINEOF - GHER

modb.oce.ulg.ac.be/mediawiki/index.php/DINEOF

Log in

page discussion view source history

DINEOF



DINEOF is an EOF-based method to fill in missing data from geophysical fields, such as clouds in sea surface temperature. This page contains basic instructions to download and compile DINEOF. The source code and binaries are freely available for download right here!


Download DINEOF now!

For more information on how DINEOF works, please refer to Alvera-Azcarate et al (2005) and Beckers and Rixen (2003) The multivariate application of DINEOF is explained in Alvera-Azcarate et al (2007), and in Beckers et al (2006) the error calculation using an optimal interpolation approach is explained. If you need a copy of any of these papers, don't hesitate to contact us! For more information about the Lanczos solver, see Toumazou and Cretaux (2001).

Contents [hide]

- 1 An example
- 2 Getting started
- 3 List of DINEOF References
- 4 Problems/Feedback
- 5 FAQ

An example



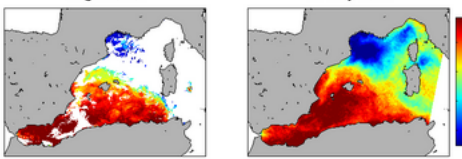
Go directly to the [DINEOF home page](#)

You can see [here](#) a daily reconstruction of the Sea Surface Temperature of the Western Mediterranean Sea, and [here](#) for the Canary-Madeira region.

Daily filled fields, error maps and outliers for the past ten days are shown in the mentioned web page. The reconstruction is done on 6 months of data, and the whole procedure takes about two hours. The steps taken are the following:

- Download cloudy data
- Run DINEOF for outlier detection
- Remove outliers from initial data set
- Re-run DINEOF on the cleaned data set
- Calculate outliers
- Make plots, and display on web page

This product is updated daily with the latest SST data from the Mediterranean Sea.



Daily Mediterranean Sea SST reconstruction using DINEOF

- Google: DINEOF
- Open source

<http://modb.oce.ulg.ac.be/mediawiki/index.php/DINEOF>

DINEOF - references

- J.-M. Beckers and M Rixen. EOF calculations and data filling from incomplete oceanographic data sets. *Journal of Atmospheric and Oceanic Technology*, 20(12):1839-1856, 2003.
- A. Alvera-Azcárate, A. Barth, M. Rixen, and J. M. Beckers. Reconstruction of incomplete oceanographic data sets using Empirical Orthogonal Functions. Application to the Adriatic Sea. *Ocean Modelling*, 9:325-346, 2005.
- J.-M. Beckers, A. Barth, and A. Alvera-Azcárate. DINEOF reconstruction of clouded images including error maps. Application to the Sea Surface Temperature around Corsican Island. *Ocean Science*, 2(2):183-199, 2006.
- A. Alvera-Azcarate, A. Barth, J. M. Beckers, and R. H. Weisberg. Multivariate reconstruction of missing data in sea surface temperature, chlorophyll and wind satellite fields. *Journal of Geophysical Research*, 112:C03008, 2007.
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- A. Alvera-Azcárate, D. Sirjacobs, A. Barth, and J.-M. Beckers. Outlier detection in satellite data using spatial coherence. *Remote Sensing of Environment*, 119:84-91, 2012.
- J.-M. Beckers, A. Barth, I. Tomazic, and A. Alvera-Azcárate, (2014). Multi-scale optimal interpolation: application to DINEOF analysis spiced with a local optimal interpolation, 11, 895-941, *Ocean Science Discussions* (under review).

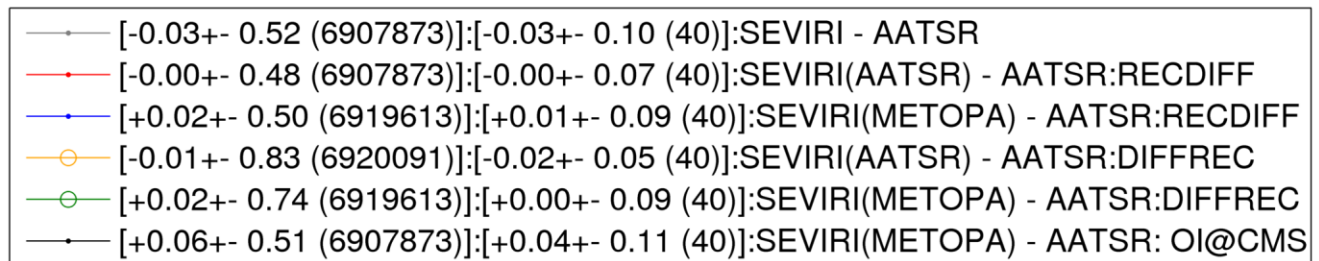
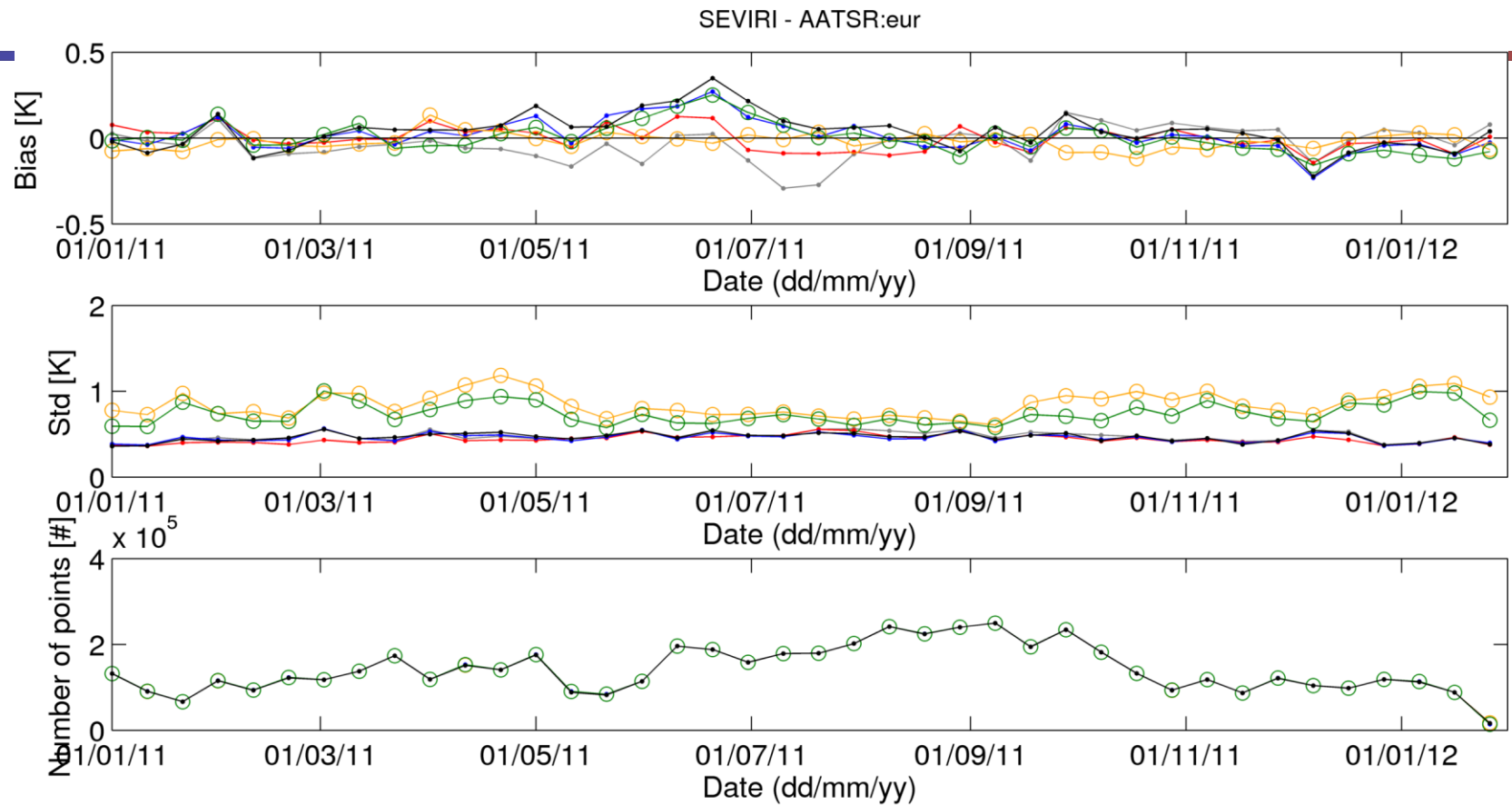
DINEOF implementations

- B. Nechad, A. Alvera-Azcárate, K. Ruddick, and N. Greenwood. Reconstruction of MODIS total suspended matter time series maps by DINEOF and validation with autonomous platform data. *Ocean Dynamics*, 61(8):1205–1214, 2011. doi:10.1007/s10236-011-0425-4.
- Y.Z. Ding, Z.H. Wei, Z.H. Mao, X.F. Wang, D.L. Pan. Reconstruction of incomplete satellite SST data sets based on EOF method. *Acta Oceanologica Sinica*, 28 (2): 36-44 2009.
- N.P. Nezlin, K. Kamer, J. Hyde, E.D. Stein, ED. Dissolved oxygen dynamics in a eutrophic estuary, Upper Newport Bay, California. *Estuarine, Coastal and Shelf Science*, 82 (1): 139-151 MAR 20 2009.
- T.N. Miles, R. He, M. Li. Characterizing the South Atlantic Bight seasonal variability and cold-water event in 2003 using a daily cloud-free SST and chlorophyll analysis. *Geophysical Research Letters*, 36: Art. No. L02604 JAN 22 2009.
- U. Gancedo, A. Alvera-Azcárate, G. Esnaola, A. Ezcurra, and J. Saéiz. Reconstruction of Sea Surface Temperature by means of DINEOF. A case study during the fishing season in the Bay of Biscay. *International Journal of Remote Sensing*, 32 (4):933-950, 2011.
- Josue G. Martinez, Jianhua Z. Huang, Robert C. Burghardt, Rola Barhoumi, and Raymond James Carroll. Use of Multiple Singular Value Decompositions to Analyze Complex Intracellular Calcium Ion Signals. Submitted to the *Annals of Applied Statistics*. In press.
- E. Mauri, P.M. Poulain, G. Notarstefano. Spatial and temporal variability of the sea surface temperature in the Gulf of Trieste between January 2000 and December 2006. *Journal of Geophysical Research*. Vol. 113, No. C10, C10012. 2008.
- E. Mauri, P.M. Poulain, Z. Južnič-Zonta. MODIS chlorophyll variability in the northern Adriatic Sea and relationship with forcing parameters. *Journal of Geophysical Research*, vol 112, C03S11, 2007.
- D. Sirjacobs, A. Alvera-Azcárate, A. Barth, G. Lacroix, Y. Park, B. Nechad, K. Ruddick, J.-M. Beckers. Cloud filling of ocean color and sea surface temperature remote sensing products over the Southern North Sea by the Data Interpolating Empirical Orthogonal Functions methodology. *Journal of Sea Research*, 65(1):114-130. 2011.
- U. Gancedo, A. Alvera-Azcárate, G. Esnaola, A. Ezcurra, and J. Sáenz. Reconstruction of Sea Surface Temperature by means of DINEOF. A case study during the fishing season in the Bay of Biscay. *International Journal of Remote Sensing*, 32 (4):933-950, 2011.
- B. Nechad, A. Alvera-Azcárate, K. Ruddick, and N. Greenwood. Reconstruction of MODIS total suspended matter time series maps by DINEOF and validation with autonomous platform data. *Ocean Dynamics*, 61(8):1205-1214, 2011.

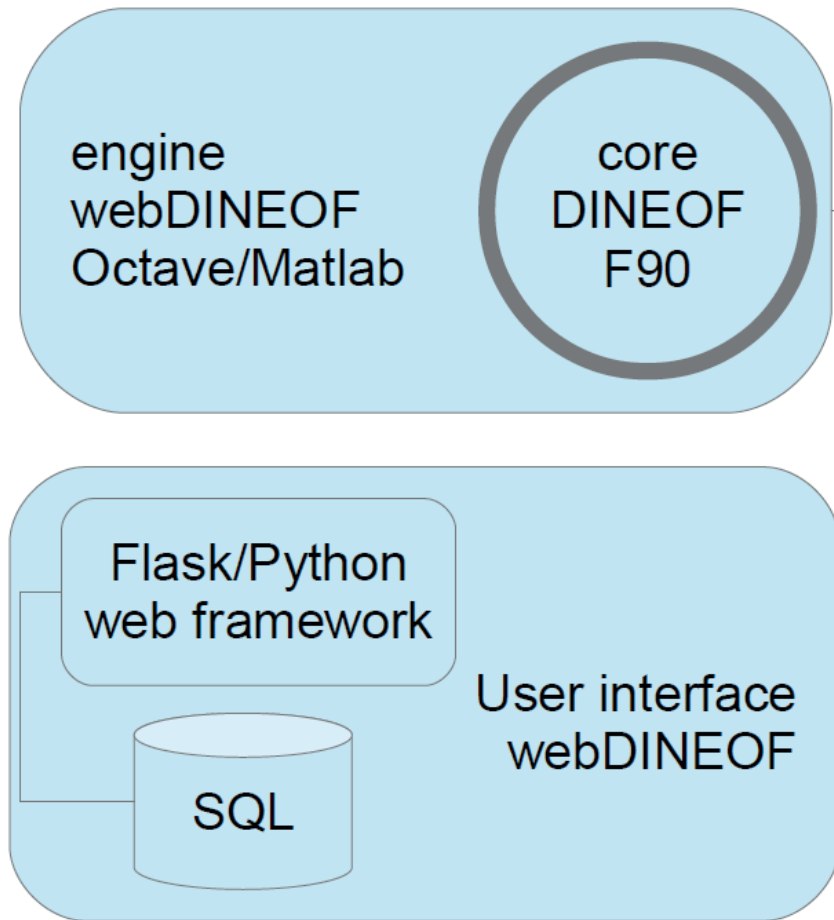
DINEOF projects

- BELSPO: BESST – Inter-sensor Bias Estimation in Sea Surface Temperature
 - Partner: Meteo-France/CMS (MyOcean)
- myOcean:
OCEANCOLOUR_BS_CHL_L4_NRT_OBSERVATIONS_009_045
- ARCLAKE

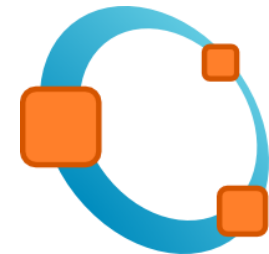
BESST



webDINEOF – User Interface+engine



Fortran90



Octave



BELSPO

webDINEOF – engine (Octave)

- Octave/command line
- Open source
- For advanced users
 - Defining dataset/variable
 - Define time range
 - Defining DINEOF parameters
 - Define area/grid size
 - Define filtering/correcting criteria

```

CTE_RUN.DATASET='PATHFINDER_DAILY_NIGHT_V52';
CTE_RUN.VARNAME='sea_surface_temperature';
CTE_RUN.VARNAME_SHORT='sst';
CTE_RUN.DATE_START=datetime('2010-01-01','yyyy-mm-dd');
CTE_RUN.DATE_END=datetime('2012-01-01','yyyy-mm-dd');
CTE_RUN.GRID_SIZE_NEW=[0.0417*1];% degrees
CTE_RUN.EXPID={ {'nev' 30} {'ncv' 40} {'alpha' 0.01} ...
               {'min_clear' 3} {'nitemax' 100}...
             };

CTE_RUN.FILTER_ARR={ { {'pathfinder_quality_level'} 'pql' [0 5] '>=,&,<=' '' ''} ...
                    };
%           { {'wind_speed'} 'w' 4 '<' '' ''} ...
%           { {'quality_level'} 'ql' [0 4] '>=,&,<=' '' ''} ...
CTE_RUN.CORRECTION_ARR={{{'sea_surface_temperature'} 'k2c' 'k2c'}};

CTE_RUN.AREA_CALC.name='adri'; %Mediterranean2
CTE_RUN.AREA_CALC.llmm_arr=mapGetLLMM_os(CTE_RUN.AREA_CALC.name);

CTE=webDineofCONSTANTS;
CTE.CALC_ERRORS=true;
CTE.CALC_OUTLIERS=true;
CTE.VERBOSE=true;
CTE.UPDATE_ALL=false;
CTE_RUN.NDAYS=CTE_RUN.DATE_END-CTE_RUN.DATE_START;
CTE.UPDATE_PICS=false;
CTE.UPDATE_GRID=false;
CTE.PLOT_RECONSTRUCTION=true;
CTE.PLOT_COMPARISON=true;
CTE.PLOT_OUTLIERS=true;
CTE.PLOT_ERRORS=true;
CTE.PLOT_SCATTERS=true;
CTE.PLOT_EOFs=true;
CTE.PLOT_RESULTS=true;
CTE.PLOT.mapping='m_map';
CTE.PLOT.projection='mercator';
CTE.PLOT_DATA_RANGE=[10 28];

```

webDINEOF – products definition

```
% DATASET constants
prodid=PATHFINDER_DAILY_NIGHT_V52
prodid_type=AVHRR
area_name=globe
area_llmm=[]
dir_structure=*
dir_type=yearly
fn_pattern=-NODC-L3C_GHRSSST-SSTskin-AVHRR_Pathfinder-PFV5.2_*_night-v02.0-fv01.0.nc
root_dir=/satellite/pathfinder/V52/PATHFINDER_DAILY
save_dir=/satellite/pathfinder
convertfilename2date=@(fn) datenum(fn(1:14), 'yyyymmddHHMMSS');
grid_name=glb_00417_8640x4320
grid_size=0.0417

% DATASET constants for L3C SEVIRI dataset from MYOCEAN
prodid=SEVIRI_MYOCAN_L3C_EUR
prodid_type=SEVIRI
area_name=eur
area_llmm=[]
dir_structure=*
dir_type=yearly
fn_pattern=METEOFRACTANCE-EUR-SST_L3MONOSENSOR_NRT-OBS_SEVIRI_1_1H_SST-EUR-MYOCEAN*.nc.gz
root_dir=/satellite/SEVIRI/MyOcean/METEOFRACTANCE-EUR-SST_L3MONOSENSOR_NRT-OBS_SEVIRI_1_1H_SST-EUR-MYOCEAN
save_dir=/satellite/SEVIRI
convertfilename2date=@(fn) myoceanGetFileInfo(fn)
grid_name=eur_005_1900x1000_svri60
grid_size=0.05
```

webDINEOF - UI

- Access over UI/ for standard users
- Extra functionality for verifying inputs
- Select dataset/variable
- Select area/gridsizes
- Select filtering criteria
- Select date range
- DINEOF parameters
 - Advanced mode (all available parameters)
 - Standard mode (only the most important)

webDINEOF – UI (test version)

Applications Places Mon Jun 2, 11:38 PM

- webDINEOF - Google Chrome

gher-dineof01.phys.ulg.ac.be:8081/dineof

DINEOF web DINEOF v0.3.5 Signed in as igor.tomazic@gmail.com Admin Help Sign out

Please define all parameters for running DINEOF analysis:

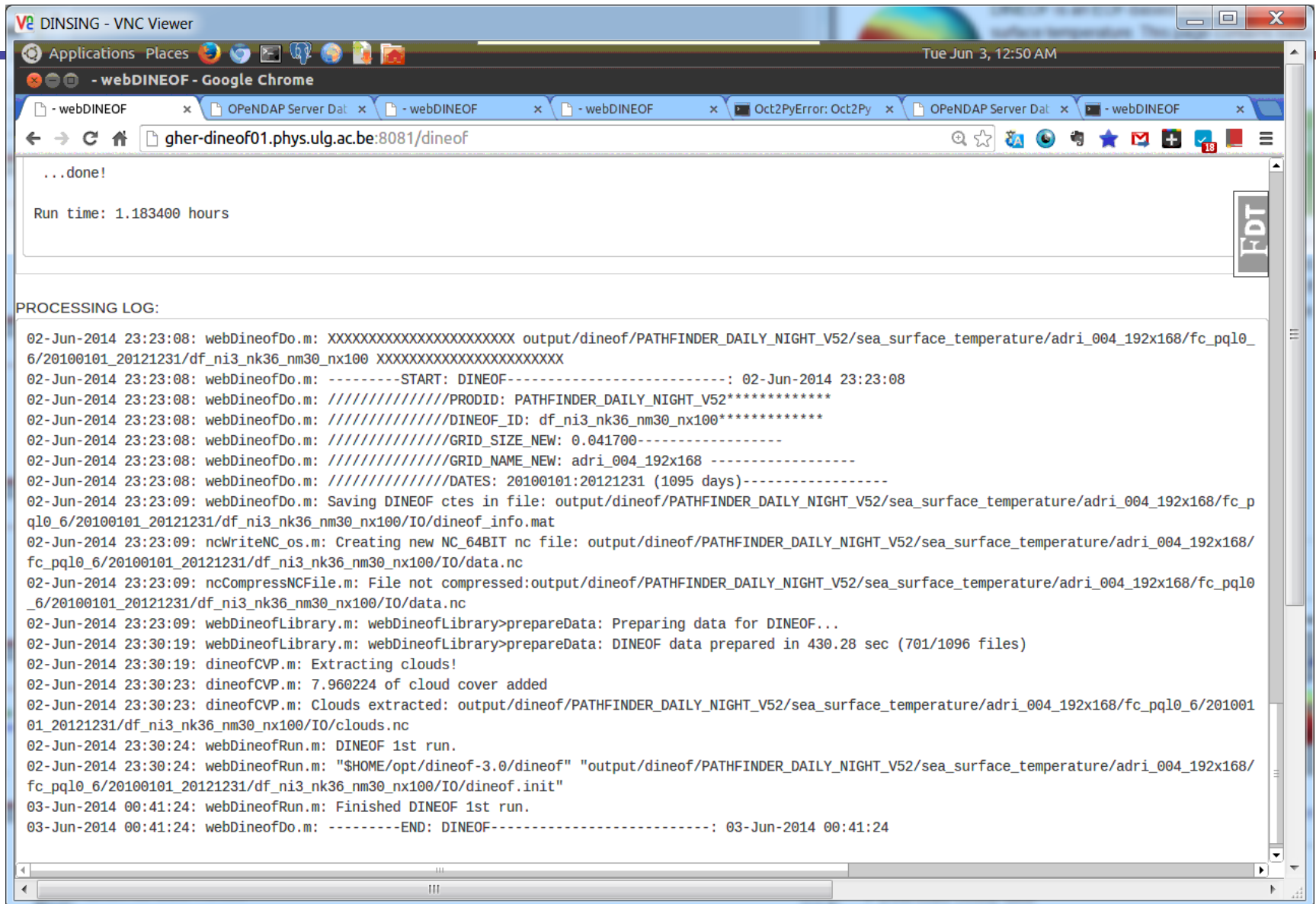
Select dataset:	PATHFINDER_DAILY_NIGHT_V52	DINEOF processing parameters	
Select variable:	sea_surface_temperature [kelvin]	Strength of the filter (alpha) ?	0.01
Select grid size:	0.0417	Number of iterations of the filter (numit) ?	3
Select region:	Adriatic Sea	Max number of modes (nev) ?	30
Select filtering:	pathfinder_quality_level [N/A]	Max number of iterations (nitemax) ?	100
Define filtered out values between: 0 and 7		Min % of clear data from the whole scene (min_clear) ?	3.0
Min: [>=]	0		
Max: [≤]	6		
Define date range between: 2010-01-01 and 2012-12-31			
Define starting date/time:	2010-01-01		
Define ending date/time:	2012-12-31		
Your email address:	igor.tomazic@gmail.com		

Waiting for gher-dineof01.phys.ulg.ac.be... Proceed

webDINEOF - output

- NetCDF (GDS 2.0?)
- Processing log
- DINEOF output log
- OpenDAP

webDINEOF – processing log



The screenshot shows a VNC viewer window titled "DINSING - VNC Viewer" with a system clock of "Tue Jun 3, 12:50 AM". The browser window is "webDINEOF - Google Chrome" and displays the URL "gher-dineof01.phys.ulg.ac.be:8081/dineof". The page content includes "Run time: 1.183400 hours" and a "PROCESSING LOG:" section. The log contains the following entries:

```
02-Jun-2014 23:23:08: webDineofDo.m: XXXXXXXXXXXXXXXXXXXXXXXX output/dineof/PATHFINDER_DAILY_NIGHT_V52/sea_surface_temperature/adri_004_192x168/fc_pql0_6/20100101_20121231/df_ni3_nk36_nm30_nx100 XXXXXXXXXXXXXXXXXXXXXXXX
02-Jun-2014 23:23:08: webDineofDo.m: -----START: DINEOF-----: 02-Jun-2014 23:23:08
02-Jun-2014 23:23:08: webDineofDo.m: ////////////////PROPID: PATHFINDER_DAILY_NIGHT_V52*****
02-Jun-2014 23:23:08: webDineofDo.m: ////////////////DINEOF_ID: df_ni3_nk36_nm30_nx100*****
02-Jun-2014 23:23:08: webDineofDo.m: ////////////////GRID_SIZE_NEW: 0.041700-----
02-Jun-2014 23:23:08: webDineofDo.m: ////////////////GRID_NAME_NEW: adri_004_192x168 -----
02-Jun-2014 23:23:08: webDineofDo.m: ////////////////DATES: 20100101:20121231 (1095 days)-----
02-Jun-2014 23:23:09: webDineofDo.m: Saving DINEOF ctes in file: output/dineof/PATHFINDER_DAILY_NIGHT_V52/sea_surface_temperature/adri_004_192x168/fc_pql0_6/20100101_20121231/df_ni3_nk36_nm30_nx100/IO/dineof_info.mat
02-Jun-2014 23:23:09: ncWriteNC_os.m: Creating new NC_64BIT nc file: output/dineof/PATHFINDER_DAILY_NIGHT_V52/sea_surface_temperature/adri_004_192x168/fc_pql0_6/20100101_20121231/df_ni3_nk36_nm30_nx100/IO/data.nc
02-Jun-2014 23:23:09: ncCompressNCFile.m: File not compressed:output/dineof/PATHFINDER_DAILY_NIGHT_V52/sea_surface_temperature/adri_004_192x168/fc_pql0_6/20100101_20121231/df_ni3_nk36_nm30_nx100/IO/data.nc
02-Jun-2014 23:23:09: webDineofLibrary.m: webDineofLibrary>prepareData: Preparing data for DINEOF...
02-Jun-2014 23:30:19: webDineofLibrary.m: webDineofLibrary>prepareData: DINEOF data prepared in 430.28 sec (701/1096 files)
02-Jun-2014 23:30:19: dineofCVP.m: Extracting clouds!
02-Jun-2014 23:30:23: dineofCVP.m: 7.960224 of cloud cover added
02-Jun-2014 23:30:23: dineofCVP.m: Clouds extracted: output/dineof/PATHFINDER_DAILY_NIGHT_V52/sea_surface_temperature/adri_004_192x168/fc_pql0_6/20100101_20121231/df_ni3_nk36_nm30_nx100/IO/clouds.nc
02-Jun-2014 23:30:24: webDineofRun.m: DINEOF 1st run.
02-Jun-2014 23:30:24: webDineofRun.m: "$HOME/opt/dineof-3.0/dineof" "output/dineof/PATHFINDER_DAILY_NIGHT_V52/sea_surface_temperature/adri_004_192x168/fc_pql0_6/20100101_20121231/df_ni3_nk36_nm30_nx100/IO/dineof.init"
03-Jun-2014 00:41:24: webDineofRun.m: Finished DINEOF 1st run.
03-Jun-2014 00:41:24: webDineofDo.m: -----END: DINEOF-----: 03-Jun-2014 00:41:24
```


- DINEOF log

web DINEOF v0.3.5 Not signed in! Help Sign in Sign up

DINEOF processing:
igor.tomazic@gmail.com!

OUTPUT:

0.0: Finished DINEOF 1st run.

RESULTS:

[Link to result file \(NetCDF\)](#)

[Link to results over opendap](#)

[Link to IO directory](#)

DINEOF OUTPUT LOG:

```
maskfile output/dineof/TEST_WEBDINEOF/sea_surface_temperature/adri_005_160x140/fc_q11_3/20140501_20140517/df/IO/data.nc#mask
yes maskfile
*****
Numerical data read
You entered the values:
number of EOF modes you want to compute      5
maximal size for the Krylov subspace         11

VALEX:  0.0000000000000000
You asked not to normalise the input matrices

The right and left EOFs will be written in directory output/dineof/TEST_WEBDINEOF/sea_surface_temperature/adri_005_160x140/fc_q11_3/20140501_20140517/df/IO/data.nc#mask
*****

You entered filenames output/dineof/TEST_WEBDINEOF/sea_surface_temperature/adri_005_160x140/fc_q11_3/20140501_20140517/df/IO/data.nc#sst
output/dineof/TEST_WEBDINEOF/sea_surface_temperature/adri_005_160x140/fc_q11_3/20140501_20140517/df/IO/data.nc#mask

initfilename: output/dineof/TEST_WEBDINEOF/sea_surface_temperature/adri_005_160x140/fc_q11_3/20140501_20140517/df/IO/dineof.init
*****

Now some statistics about your data:

Number of mask land points:                12235
Dimension of file 1:                       160 x 140 x 17

end subroutine stat

Mean:                                       290.0981
Standard deviation:                       0.8587
```

webDINEOF – OPeNDAP access

OPeNDAP Server Dataset Access Form

Action:

Data URL:

Global Attributes:

```
NC_GLOBAL.title: DINEOF analysis
NC_GLOBAL.conventions: CF-1.0
NC_GLOBAL.dataset: PATHFINDER_DAILY_NIGHT_V52
NC_GLOBAL.variable_name: sst
NC_GLOBAL.processing_level: L4
NC_GLOBAL.institution: ULg/AGO/GHER
```

Variables:

sst: Grid of Array of 32 bit Reals [time = 0..699][lat = 0..167][lon = 0..191]
time: lat: lon:

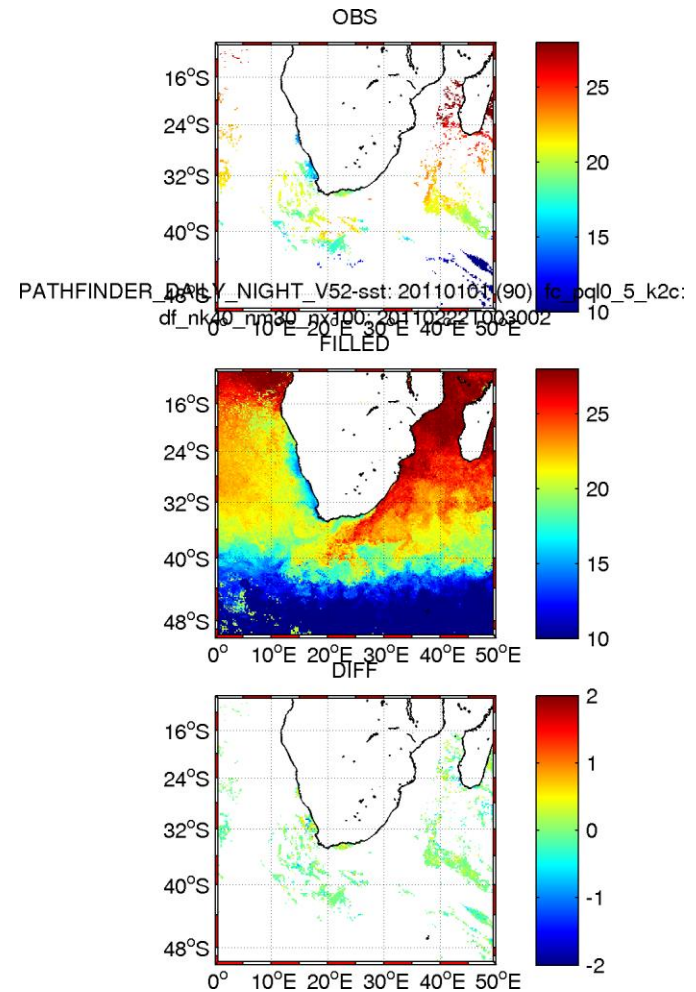
```
sst.long_name: NOAA Climate Data Record of sea surface skin temperature
sst.standard_name: sea surface skin temperature
sst.grid_mapping: Equidistant Cylindrical
sst.units: kelvin
sst.FillValue: -9999.00000
sst.comment: Skin temperature of the ocean
```

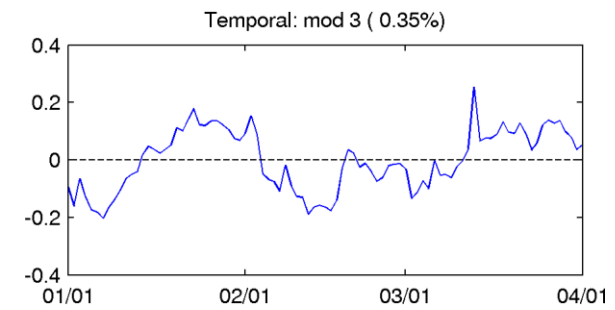
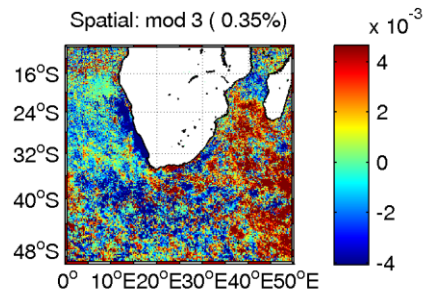
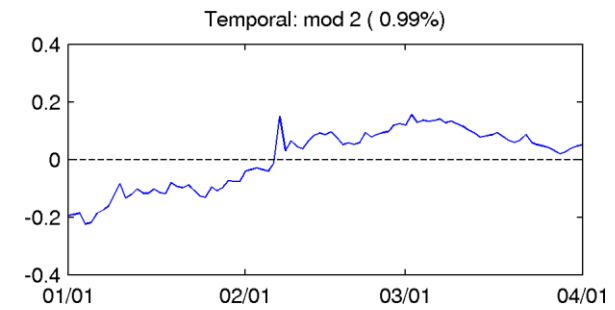
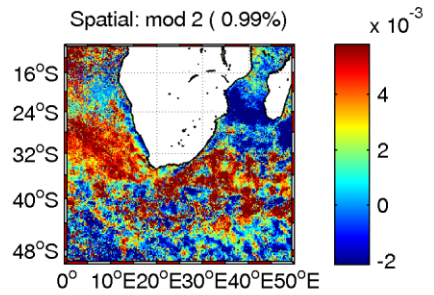
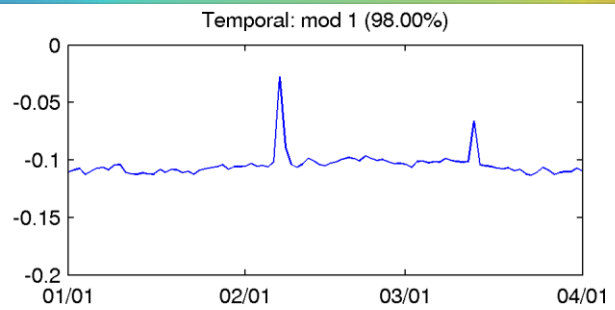
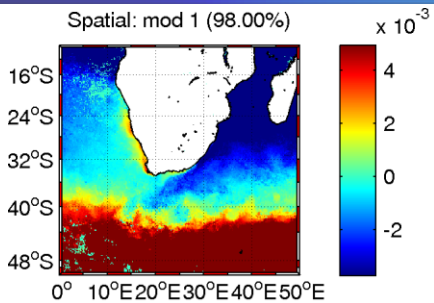
time: Array of 32 bit Integers [time = 0..699]
time:

```
long_name: reference time of sst field
standard_name: time
units: seconds since 1981-01-01 00:00:00
calendar: Gregorian
axis: T
```

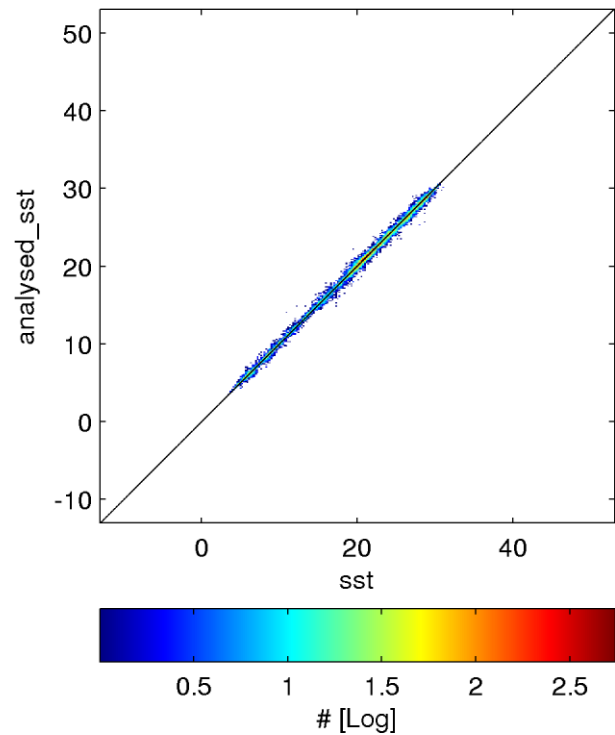
Examples

- Pathfinder SST
 - South Africa
 - Pathfinder ql 6,7
 - 2011/01/01-2011/04/01



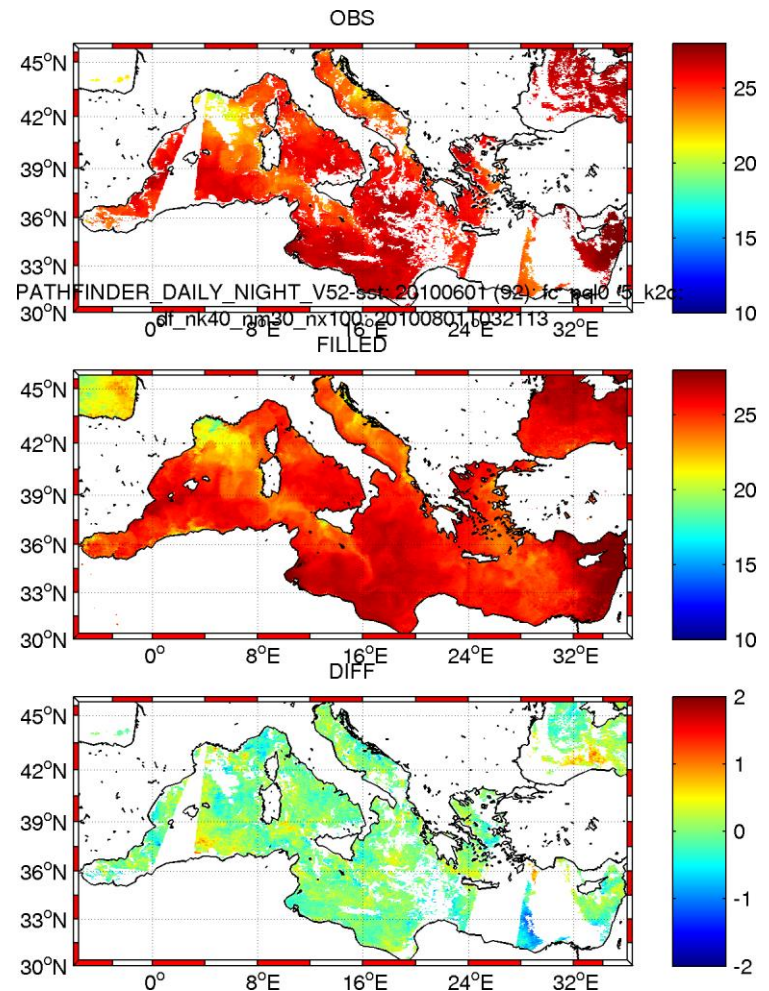


PATHFINDER_DAILY_NIGHT_V52-sst
20110101 (90)
fc_pql0_5_k2c: df_nk40_nm30_nx100
bs:-0.01 std: 0.23 rms: 0.23 (30983/30983)
Scatter clouds corr:0.9993

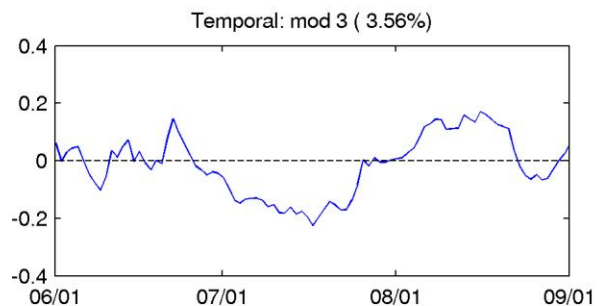
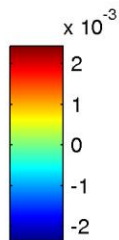
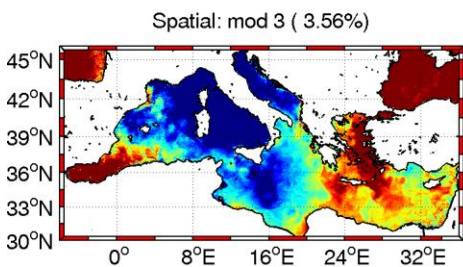
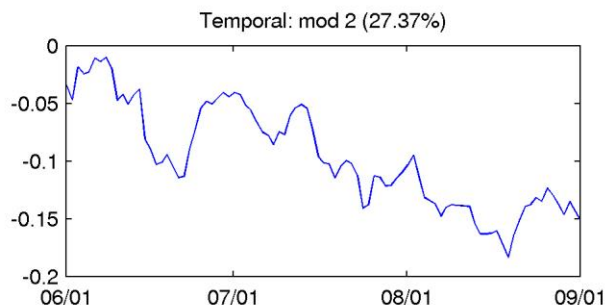
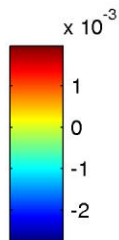
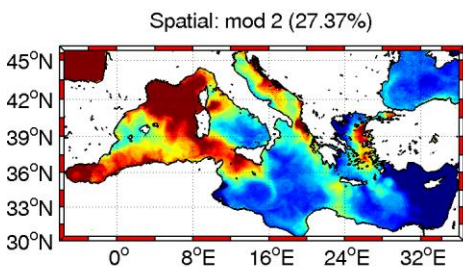
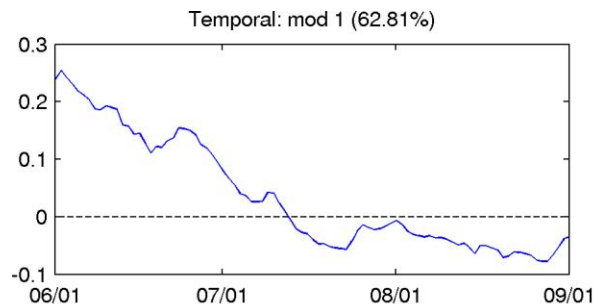
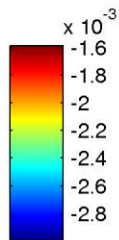
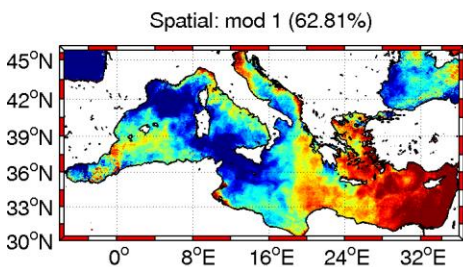


PATHFINDER_DAILY_NIGHT_V52-sst: 20110101 (90): fc_pql0_5_k2c:
df_nk40_nm30_nx100: MODES: 01 - 03

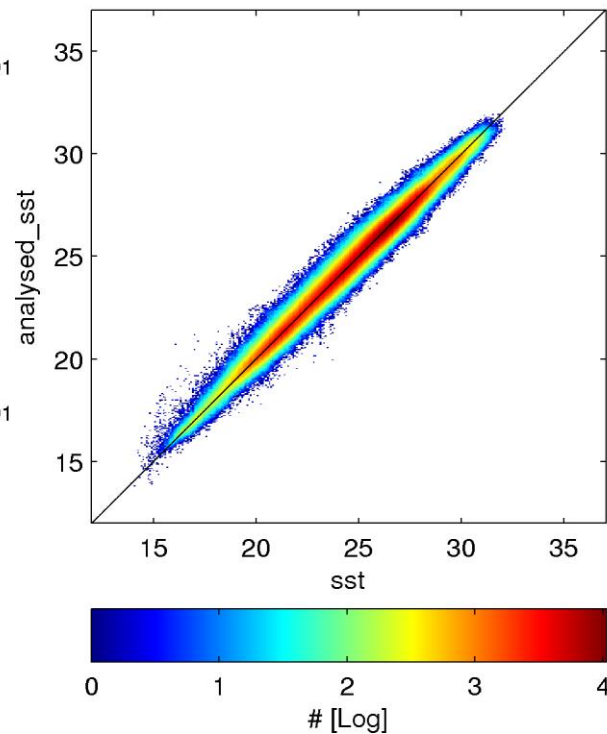
- Pathfinder SST:
 - Mediterranean Sea
 - Pathfinder ql 6,7
 - 2010/06/01-2010/09/01



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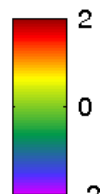
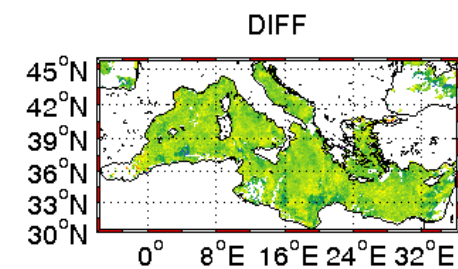
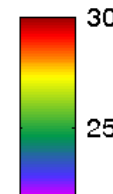
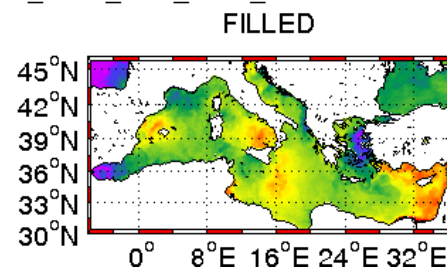
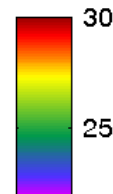
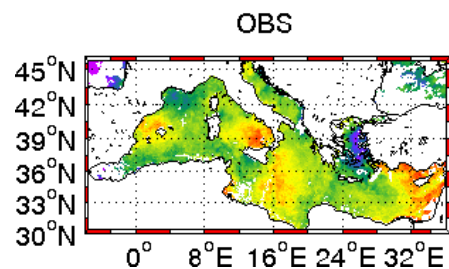
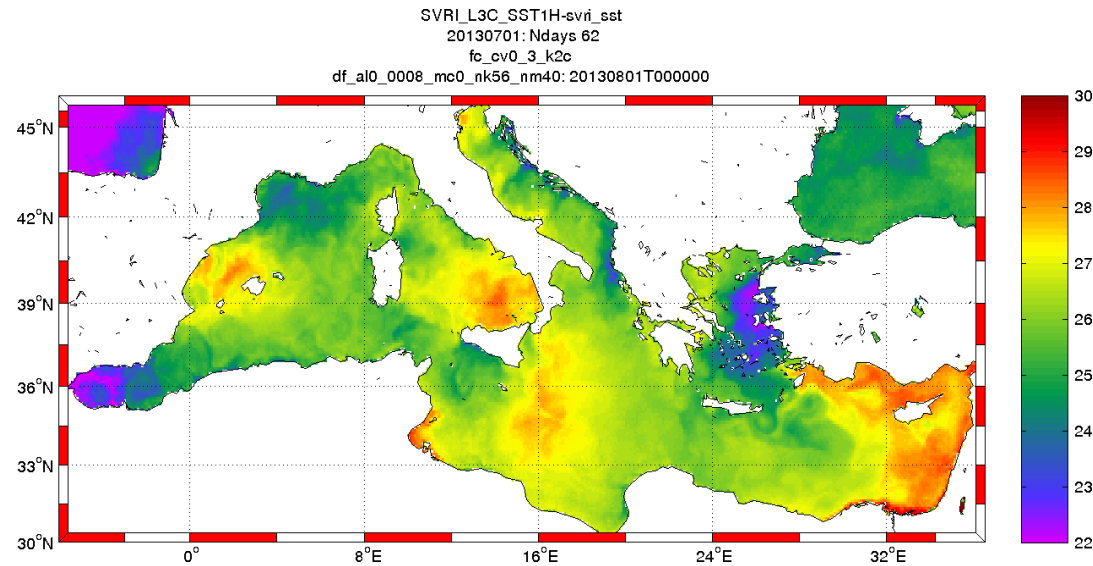


PATHFINDER_DAILY_NIGHT_V52-sst
20100601 (92)
fc_pq|0_5_k2c: df_nk40_nm30_nx100
bs: 0.00 std: 0.32 rms: 0.32 (7612214/15827539)
Scatter ALL corr:0.99184



PATHFINDER_DAILY_NIGHT_V52-sst: 20100601 (92): fc_pq|0_5_k2c:
df_nk40_nm30_nx100: MODES: 01 - 03

- SEVIRI hourly
 - Mediteranean
 - Qual 4,5
 - Start:2013/07/01
 - End: 2013/09/01



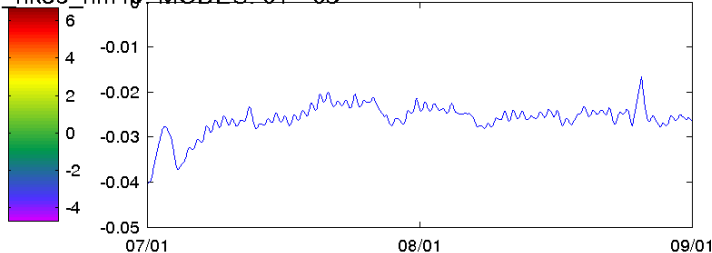
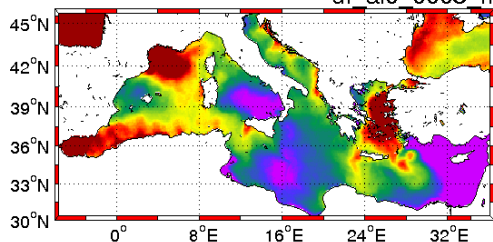


SVRI_L3C_SST1H-svri_sst

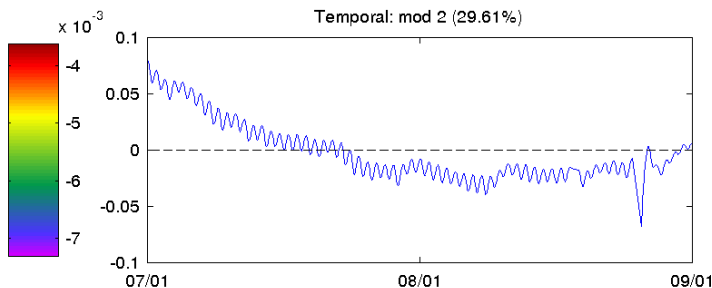
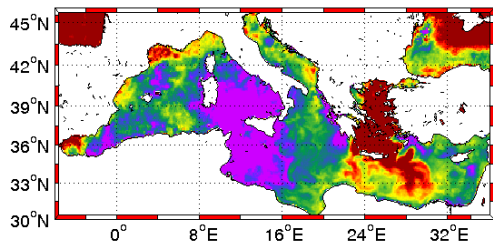
20130701: Ndays 62

fc_cv0_3_k2c

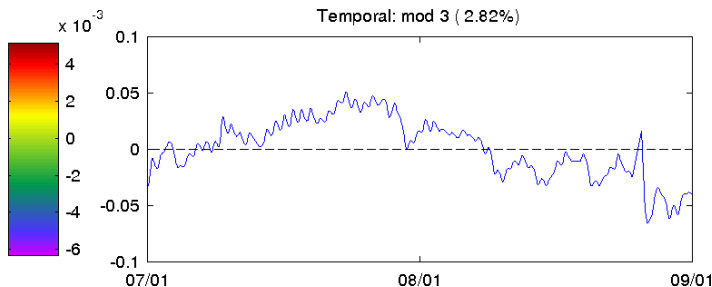
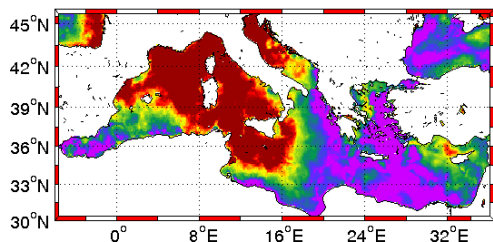
df_al0_0008_mc0_nk56_nm40 MODES: 01 - 03



Spatial: mod 2 (29.61%)



Spatial: mod 3 (2.82%)



SVRI_L3C_SST1H-svri_sst

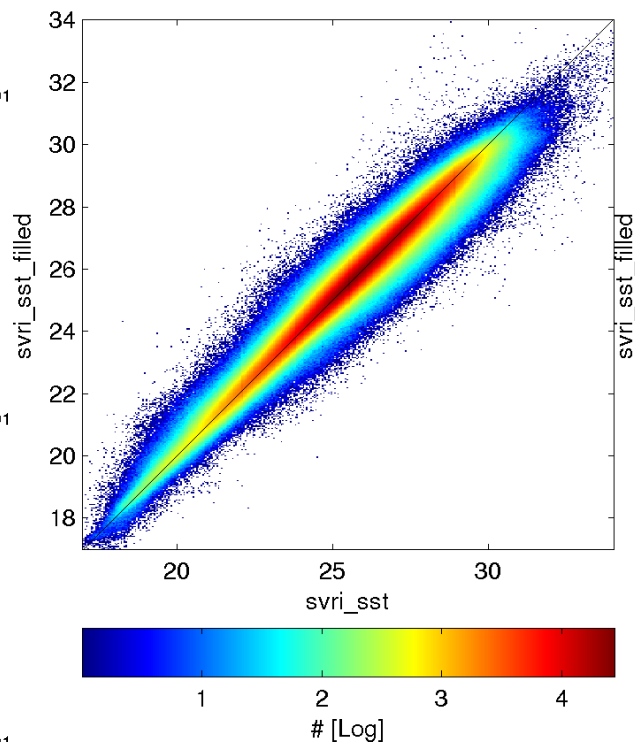
20130701: Ndays 62

fc_cv0_3_k2c

df_al0_0008_mc0_nk56_nm40

bs:-0.00 std: 0.31 rms: 0.31 (31618264/43986558)

Scatter ALL corr:0.98472

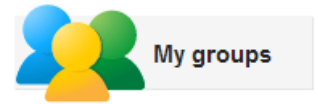


Future development

- Multivariate analysis
- DINEOF + OI
- felyx
 - access to data
- Simple visualisation of the analysis

webDINEOF

- Google: DINEOF
- <http://modb.oce.ulg.ac.be/DINEOF>
- join DINEOF group
- <http://groups.google.com/group/dineof>
- e-mail:
 - a.alvera@ulg.ac.be; i.tomazic@ulg.ac.be
- webDINEOF engine: open source
- Beta release webDINEOF (v4): June/July 2014



THANK YOU!

