KNMI

The Climate Explorer

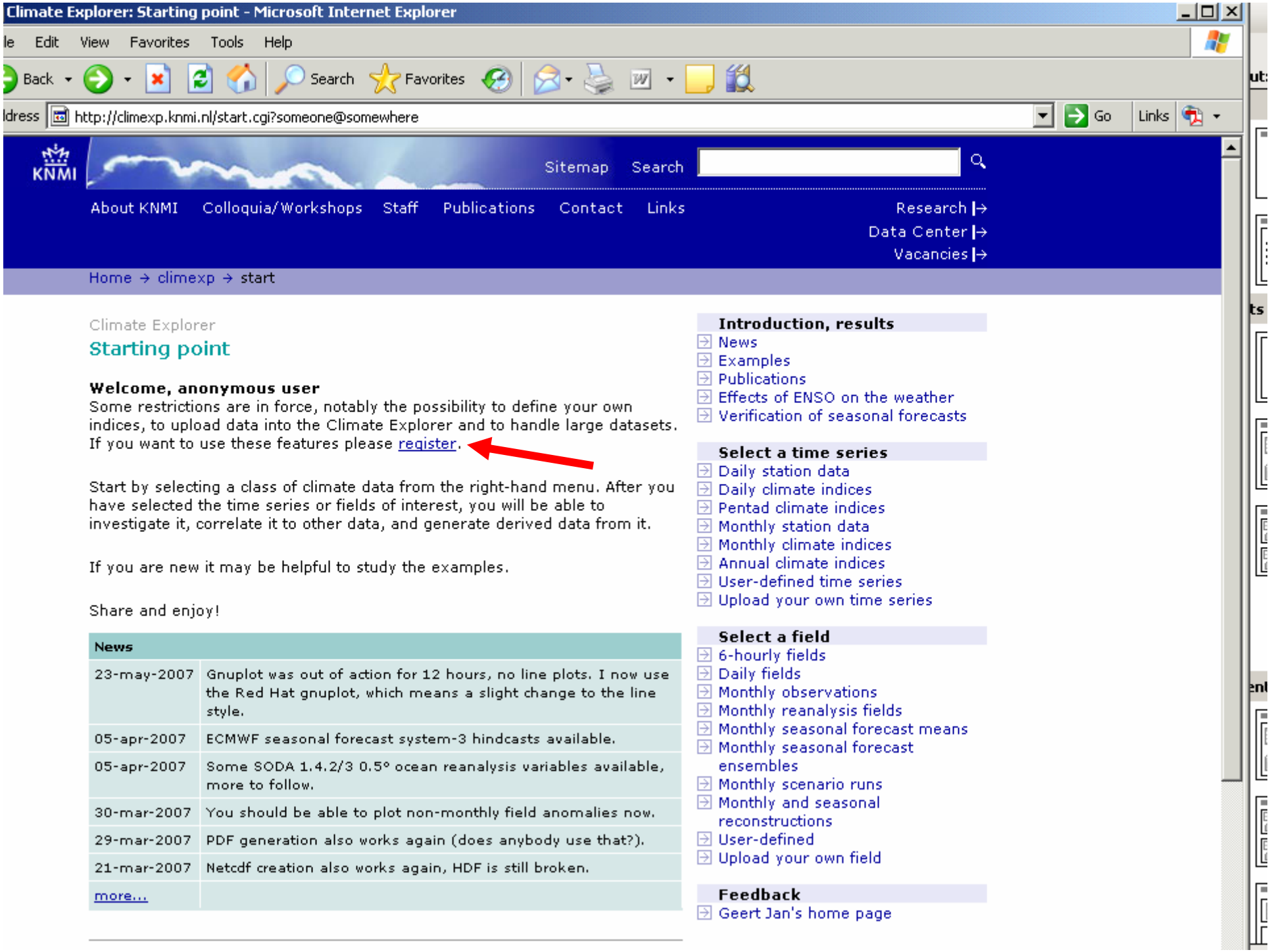
analysing data

http://climexp.knmi.nl

Sjoukje Philip

Geert Jan van Oldenborgh

Koninklijk Nederlands Meteorologisch Instituut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Climate Explorer
Starting point
Welcome, anonymous user
Some restrictions are in force, notably the possibility to define your own indices, to upload data into the Climate Explorer and to handle large datasets. If you want to use these features please register.
Start by selecting a class of climate data from the right-hand menu. After you have selected the time series or fields of interest, you will be able to investigate it, correlate it to other data, and generate derived data from it.
If you are new it may be helpful to study the examples.
Share and enjoy!
News
23-may-2007 Gnuplot was out of action for 12 hours, no line plots. I now use the Red Hat gnuplot, which means a slight change to the line style.
05-apr-2007 ECMWF seasonal forecast system-3 hindcasts available.
05-apr-2007 Some SODA 1.4.2/3 0.5° ocean reanalysis variables available, more to follow.
30-mar-2007 You should be able to plot non-monthly field anomalies now.
29-mar-2007 PDF generation also works again (does anybody use that?).
21-mar-2007 Netcdf creation also works again, HDF is still broken.
more...
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Climate Explorer

Starting point

Welcome, sjoukje from knmi
This page can be added to your bookmarks/favorites to avoid logging in.

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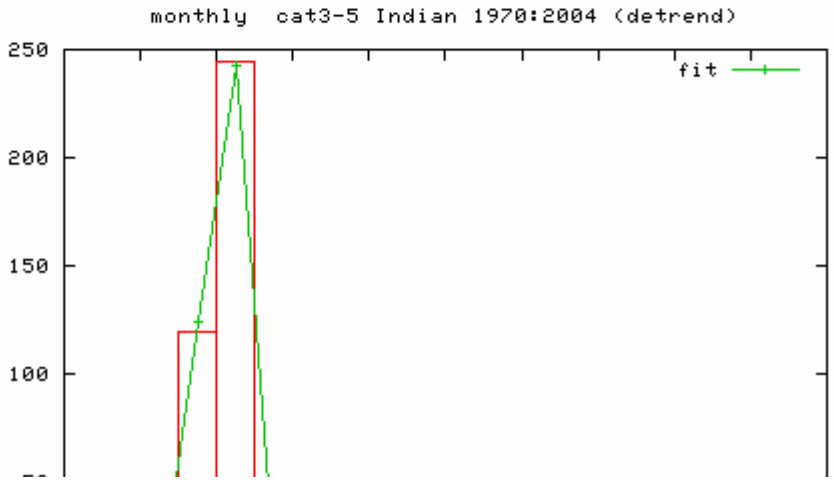

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Select a daily time series

Historical observations

GHCN-D	pure ECA/ECD	blended ECA/ECD	HCDN
○ precipitation	○ precipitation	○ precipitation	○ US runoff
	◉ mean temperature	○ mean temperature	
○ minimum temperature	○ minimum temperature	○ minimum temperature	
○ maximum temperature	○ maximum temperature	○ maximum temperature	
(full lists)	○ pressure	○ pressure	

Select

- stations with a name containing
- 10 stations near 58 °N, 22 °E (world map)
- all stations in the region °N - °N, °E - °E
- the stations with station numbers

```
# lon1 lon2 lat1 lat2 (optional)
station number (one per line)
```

Time, distance

At least 10 years of data

At least ° apart and with m < elevation <

Get stations | Clear Form

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Climate Explorer

Found station data

daily ecatemp stations near 58N 22E

Create a new set of station data

New time scale: monthly

New variable: mean of

Threshold: absolute value

make new eries

mean
sd
sum
sum above
sum below
min
max
number

Looking up 10 stati
Searching for static , 22.00E
Requiring at least 10 years with data
Found 10 stations

SORVE (EE)
coordinates: 57.92N, 22.05E, 0.0m
ECA station code: 885 (get data)
Found 12 years of data in 1996-2007

VILSANDI (EE)
coordinates: 58.38N, 21.82E, 6.0m
ECA station code: 230 (get data)
Found 85 years of data in 1920-2004

RISTNA (EE)
coordinates: 58.90N, 22.10E, 9.0m
ECA station code: 626 (get data)
Found 11 years of data in 1995-2005

VIRTSU (EE)
coordinates: 58.57N, 23.52E, 0.0m
ECA station code: 630 (get data)

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Investigate this set of time series
- Make a map/export kml
- Plot ecatemp
- Correlate with a time series
- Autocorrelations
- Statistical properties
- Correlate with a field
- Plot and fit combined distribution
- Make a list suitable for uploading

Climate Explorer

Found station data

daily ecatemp stations near 58N 22E

Create a new set of station data

New time scale: monthly

New variable: mean of

Threshold: no cut absolute value

make new set of time series

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Requiring at least 10 years with data
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Found 12 years of data in 1996-2007

KIHNU (EE)
coordinates: 58.10N, 23.97E, 0.0m
ECA station code: 637 (get data)
Found 12 years of data in 1996-2007

PYARNU (EE)
coordinates: 58.38N, 24.50E, 1.0m

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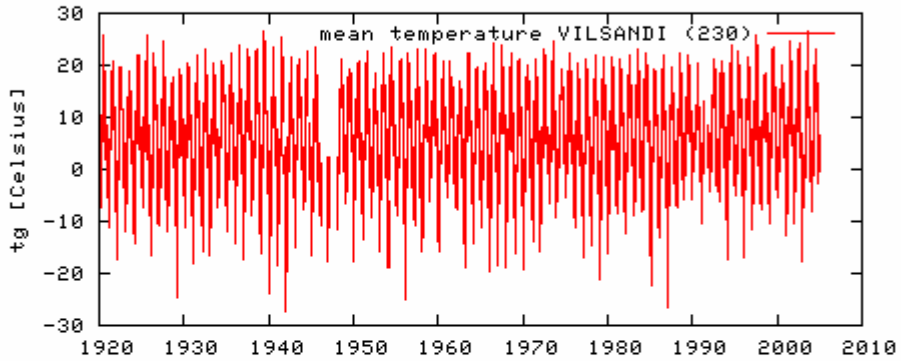
Time series

VILSANDI mean temperature

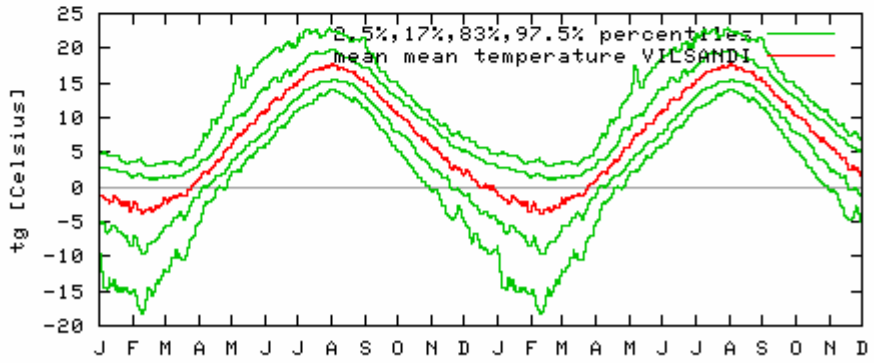
Retrieving data from ECA&D v1.1 database ...

If it takes too long you can abort the job here (using the [back] button of the browser does not killl the data extraction job)

coordinates: 58.38N, 21.82E, 6.0m; ECA station code: 230 VILSANDI EE; tg in [Celsius] , Data and metadata available at http://eca.knmi.nl, (postscript version, raw data, netcdf)



Two annual cycles computed with all data available, not 30 years percentiles computed with a 5-day window (postscript version, raw data)



Anomalies with respect to the above annual cycle (postscript version, raw data, netcdf)

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Investigate this time series
Correlate with other time series
Correlate with a field (correlation, regression, composite)
- only observations
- only reanalyses
- only seasonal forecasts
- only scenario runs
- only user-defined fields

Verify against another time series
Spectrum, autocorrelation function
Wavelet
Running mean/s.d./skew/curtosis
Plot and fit distribution

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Make index: teca_VILSANDI **Add to list**

Filter adjacent days: high-pass | running-mean filter with cut-off value of 12 days **Submit**

Filter consecutive years: high-pass | running-mean filter with cut-off value of 2 years, requiring at least 75 % valid data

Filter consecutive years

Scale series: Scale factor: 1 **Scale**

Time derivative: **Take time derivative**

Combine with another timeseries to form a normalized index

Mask out based on another time series

Create a lower resolution time series

New time scale: monthly

New variable: mean of VILSANDI tg

Threshold: no cut | Celsius

make new time series

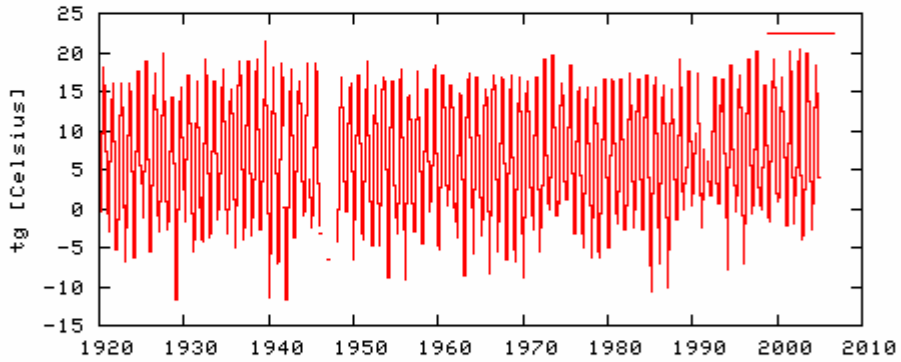
Climate Explorer

Time series

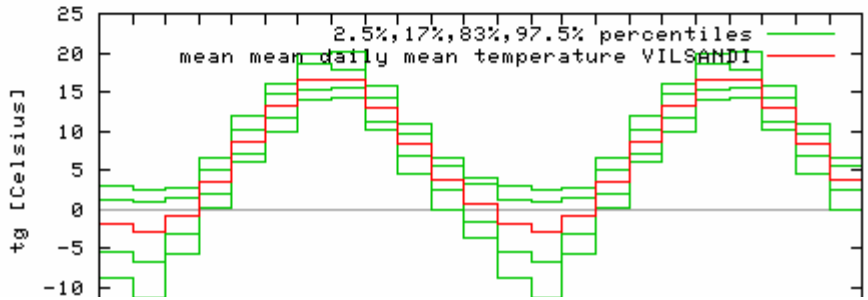
VILSANDI mean daily mean temperature

Retrieving data ...

daily2longer 12 mea, coordinates: 58.38N, 21.82E, 6.0m; ECA station code: 230 VILSANDI EE; tg in [Celsius], Data and metadata available at http://eca.knmi.nl, (postscript version, raw data, netcdf)



Two annual cycles computed with all data available, not 30 years (postscript version, raw data)



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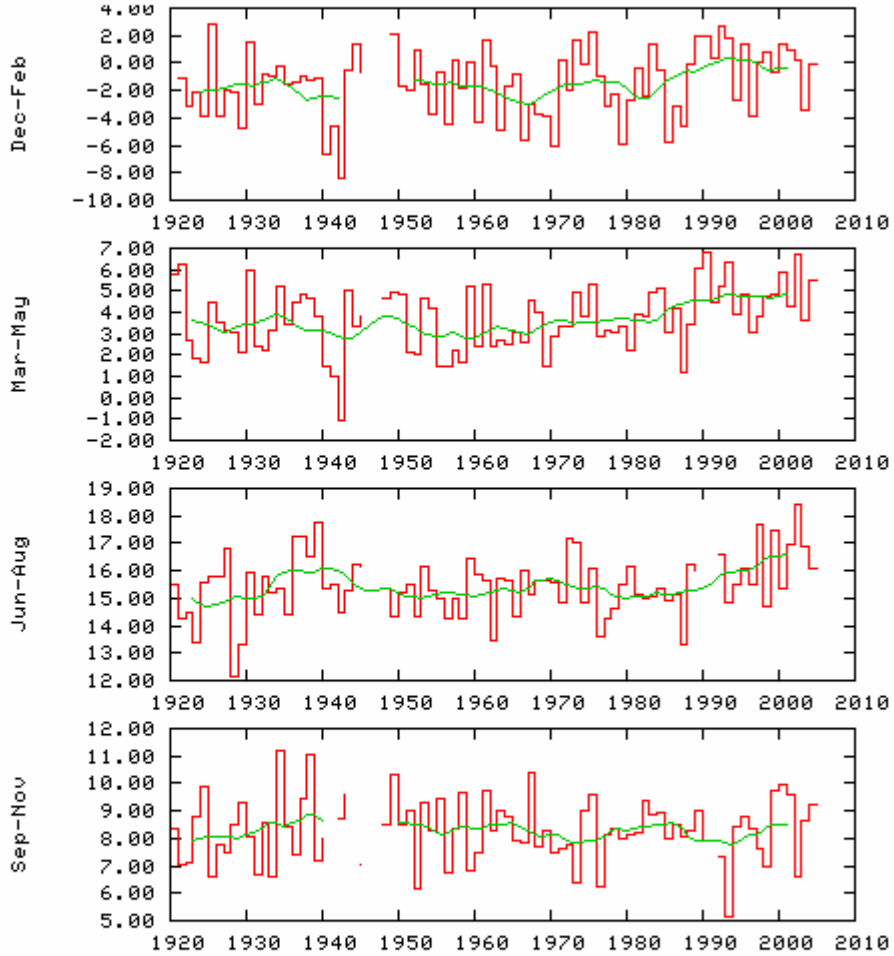
Time series plots per season

VILSANDI mean daily mean temperature

The thick line is a 10-year running average (postscript version, raw data)



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- Spectrum, autocorrelation function
- Wavelet
- Running mean/s.d./skew/curtosis
- Plot and fit distribution

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Running moments

VILSANDI mean_daily_mean_temperature

Compute running mean, standard deviation, skewness, ...

Running: mean

Window: 15 years, with at least ____ years with data

Starting month: Mar , averaging over 3 month(s),

Anomalies: ☐

Begin year: ____ End year: ____

Only for: ____ < series < ____

Apply: ☐ log, ☐ sqrt, ☐ square, ☐ year-on-year difference

Filter: subtract mean of ____ previous years on all data

Detrend: ☐

Decorrelation length: 0 month(s)

Compute

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Running mean

VILSANDI

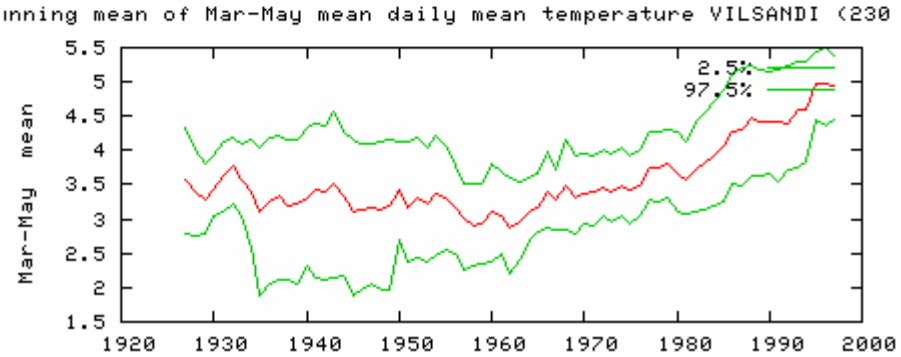
summing over 3 periods
For overall significance disregarding nonzero skewness and curtosis for the moment. Assuming a decorrelation length of 2.0 Significances are computed against a 799 sample Monte Carlo.

Probability that the distribution is a chance fluctuation around a constant		
statistic	**value**	**p-value**
minimum	2.88	0.2893
maximum	4.98	0.0164
difference	2.10	0.0273

Demanding at least 12 years in a sliding window of 15 years

moment	**value**	**95% CI**
mean	3.698	3.329 ... 4.102

Running mean of Mar-May mean_daily_mean_temperature VILSANDI (230_mean12) (postscript, raw data, analyze as time series)



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Select a monthly time series

Climate indices

- NINO12, NINO3, NINO3.4, NINO4 (1856-now, Kaplan and Reynolds)
- NINO12, NINO3, NINO3.4, NINO4 (1880-now, NCDC (Reynold & Smith) v2 SST reconstruction)
- SOI (1866-now, Jones), same SOI with a 5-month running mean
- SOI (1882-now, NCEP)
- ENSO indices from the ECMWF seasonal forecast system 1987-2001
- ENSO indices from the DEMETER project seasonal hindcasts 1958-2001
- NAO Lisboa-Stykkisholmur (1865-1998, Hurrell, not yet found)
- NAO Gibraltar-Stykkisholmur (1821-now, Jones)
- NAO Azores-Stykkisholmur (1865-1997, home-constructed from data from Jones)
- NAO reconstruction (1658-2001, Luterbacher)
- NAO (pattern-based, 1950-now, CPC NH teleconnection patterns)
- East Atlantic, East Atlantic/Western Russia, Scandinavia and Polar/Eurasia patterns (1950-now, CPC NH teleconnection patterns)
- West Pacific, East Pacific/North Pacific patterns (1950-now, CPC NH teleconnection patterns)
- old CPC teleconnection patterns (1950-2005)
- North Pacific index (1899-now, Trenberth & Hurrell)
- Pacific North American index and Tropical/Northern Hemisphere index, (1950-now, CPC NH teleconnection patterns)
- Pacific Decadal Oscillation (1900-now, Nathan J. Mantua, U. Washington)
- Arctic Oscillation derived from SLP (1899-now) and derived from SAT (1851-1997, both from Thompson, Colorado State)
- MJO indices 1 (80°E), 2 (100°E), 3 (120°E), 4 (140°E), 5 (160°E), 6 (120° W), 7 (40°W), 8 (10°W), 9 (20°E), 10 (70°E) (1978-now, CPC)
- QBO (1953-1999, Naujokat and Marquardt)
- QBO (1958-now, Cathy Smith, CDC, based on the NCEP/NCAR reanalysis)
- Global average temperature, (simple average), northern hemisphere, southern hemisphere, tropics, northern extratropics, southern extratropics, tropics and midlatitudes (1850-now Hadley Centre)
- Global average temperature, northern hemisphere, southern hemisphere with variance adjustments (1856-now, Hadley Centre/CRU)
- Global average temperature, northern hemisphere, southern hemisphere (1856-now, Hadley Centre/CRU)
- GI, NH, SH old HadCRUT2v versions.
- Indices from the ESSENCE climate change experiments 1950-2100
- Mauna Loa CO_2 concentrations (1958-now, somehere in NOAA)
- Radiative forcing of vulcano eruptions (1855-1996, van Ulden)
- Measured solar constant (1978-now, WRC/PMOD)
- Reconstructed solar constant (1680-1992 yearly, Hoyt and Schatten)

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Correlate with another time series

VILSANDI mean_daily_mean_temperature

System-defined timeseries

☐ NINO1+2 ☐ NINO3 ☐ NINO3.4 ☐ NINO4 ☐ SOI ☐ NAO ☐ time

User-defined timeseries

☑ HadCRUT3 global temperature (ihadcrut3_gl)

Options

- Starting month timeseries Mar, averaging over 3 month(s) of the timeseries same month(s) of the index, lag: 0 months (lag positive: mean_daily_mean_temperature VILSANDI lagging index)
- Begin year: End year:
- Only for < index/field < and for < selected timeseries < .
- Apply ☐ logarithm, ☐ sqrt to mean_daily_mean_temperature VILSANDI, do a ☐ rank correlation or give ☐ contingency tables.
- Assume a decorrelation scale of 0 months for significances (get autocorrelation function)
- ☐ Detrend, ☐ difference or subtract mean of previous years and average with previous years
- Do a running correlation analysis with a window of 15 years, with at least years with data, for significance replace mean_daily_mean_temperature VILSANDI with white gaussian noise
- Fit to a ◉ straight line, ○ parabola, ○ cubic, ○ straight line + a month time derivative, ○ phase diagram, ...
- Plot xrange : , yrange :

Correlate

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Investigate this time series
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Correlate with other time series
Correlate with a field (correlation, regression, composite)
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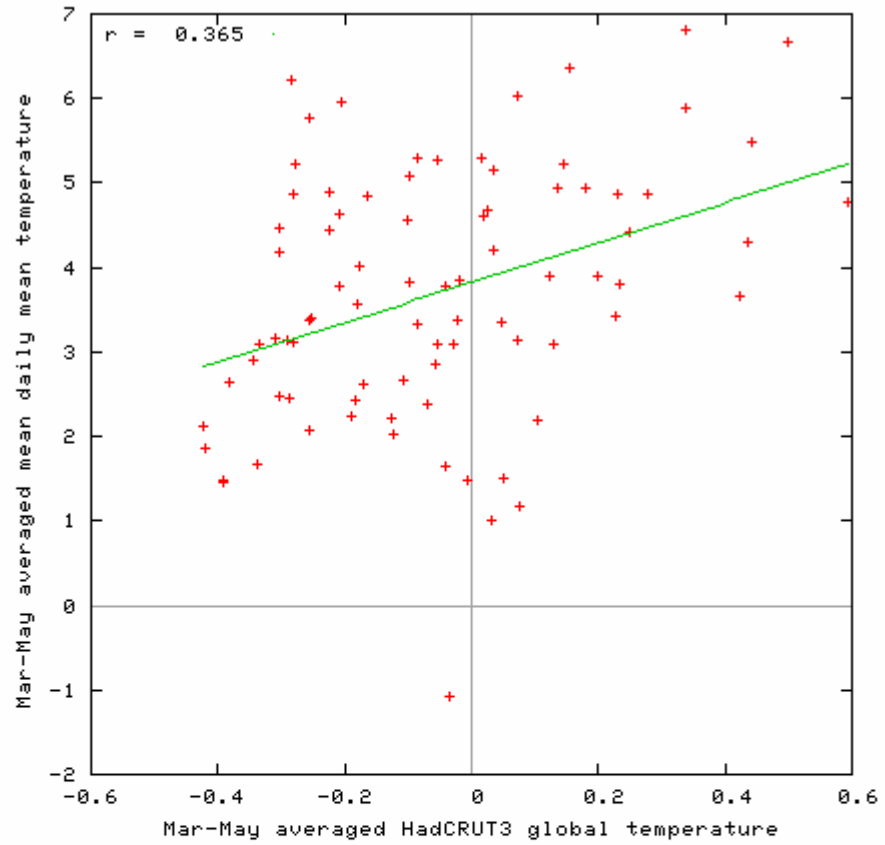
Verify against another time series
Spectrum, autocorrelation function
Wavelet
Running mean/s.d./skew/curtosis
Plot and fit distribution

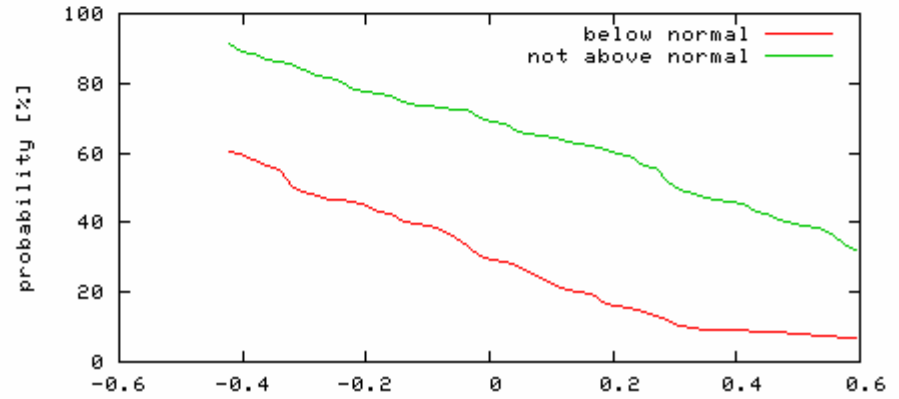
Feedback
Geert Jan's home page

NDI mean daily mean temperature vs HadCRUT3 global temperature 1



VILSANDI mean_daily_mean_temperature vs HadCRUT3_global_temperature
1920:2004 (postscript, plot data, raw data)

aged VILSANDI mean daily mean temperature vs HadCRUT3 global tem



Climate Explorer

Time series correlations

mean_daily_mean_temperature VILSANDI with HadCRUT3_global_temperature

	months	lag	corr	p	no	95% CI
ihadcrut3_gl.dat	Mar-May	0	0.365	0.0007	83	0.16... 0.52

Fit of Mar-May averaged mean_daily_mean_temperature VILSANDI (230_mean12) vs Mar-May averaged HadCRUT3_global_temperature

fit a+b*x 'data/teca230_mean1225246.dump' using 1:2 via a,b

```
resultant parameter values
a               = 3.82287
b               = 2.35515
After 3 iterations the fit converged.
final sum of squares of residuals : 160.372
rel. change during last iteration : -1.0104le-09
degrees of freedom (ndf) : 81
rms of residuals      (stdfit) = sqrt(WSSR/ndf)      : 1.40709
variance of residuals (reduced chisquare) = WSSR/ndf : 1.9799
Final set of parameters            Asymptotic Standard Error
a               = 3.82287          +/- 0.1585       (4.145%)
b               = 2.35515          +/- 0.6669       (28.32%)
correlation matrix of the fit parameters:
                a      b
a               1.000
b               0.223  1.000
```

Tercile probabilities

These are the probabilities that you will get a value below normal (lowest 33%), normal or above normal (top 33%) of the distribution of VILSANDI mean_daily_mean_temperature vs HadCRUT3_global_temperature 1920:2004, given a certain value of the index HadCRUT3_global_temperature. It makes the following three assumptions

1. There is a significant correlation
2. The width and shape of the distribution around the best fit is independent of the index. For a rainfall distribution this is often not true, try selecting a sqrt or logarithm on the previous page
3. The distribution did not change over time

Therefore, use with care.

```
 original percentiles
```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IPSL CM4	20c3m	1	○	○	○	○	○		○	○	○	
	sresa1b	1	○	○	○							
	sresa2	1	○	○	○						○	
MIROC3.2 (hires)	20c3m	1	○	○	○	○	○		○	○	qa toga	
	sresa1b	1	○	○	○	○	○		○		qa toga	
	sresb1	1	○	○								
	1pctto2x	1	○	○	○	○	○		○			
MIROC3.2 (medres)	20c3m	3	○	○	○	○	○		○	○	○	
	sresa1b	3	○	○	○	○	○		○	○ z24	○ qa toga	
	sresa2	3	○	○	○	○	○		○		○	
	sresb1	3	○	○								
	1pctto4x	3	○	○								
ECHO G	20c3m	5	○	○	○							
	sresa1b	3	○	○								
	sresa2	3	○	○								
	sresb1	3	○	○								
model	**exp**	**#**	**tas**	**pr**	**psl**	**tx**	**ty**	**sst**	**tos**	**z20**	**zos**	**z500**
ECHAM5/ MPI-OM	20c3m	3	○	○	○	○	○	○		○		○
	sresa1b	3	◉	○	○	○	○	○	○	○ z24	○	○
	sresa2	3	○	○	○			○				○
	sresb1	3	○	○								
	picntrl	1						○				
	1pctto2x	3	○	○	○			○				
	1pctto4x	1	○	○	○			○				

Climate Explorer

Field

mpi echam5 sresa1b tas

Found ensemble members 0 to 2
MPI model output prepared for IPCC Fourth Assessment climate of the 20th Century experiment (20C3M)
X axis: whole world in 192 1.88° steps, first point at 0.00° E
Y axis: irregular grid of 96 points at -88.57 -86.72 -84.86 -83.00 -81.14 -79.27 -77.41 -75.54 -73.68 -71.81 -69.95 -68.08 -66.22 -64.35 -62.49 -60.62 -58.76 -56.89 -55.03 -53.16 -51.29 -49.43 -47.56 -45.70 -43.83 -41.97 -40.10 -38.24 -36.37 -34.51 -32.64 -30.78 -28.91 -27.05 -25.18 -23.32 -21.45 -19.58 -17.72 -15.85 -13.99 -12.12 -10.26 -8.39 -6.53 -4.66 -2.80 -0.93 0.93 2.80 4.66 6.53 8.39 10.26 12.12 13.99 15.85 17.72 19.58 21.45 23.32 25.18 27.05 28.91 30.78 32.64 34.51 36.37 38.24 40.10 41.97 43.83 45.70 47.56 49.43 51.29 53.16 55.03 56.89 58.76 60.62 62.49 64.35 66.22 68.08 69.95 71.81 73.68 75.54 77.41 79.27 81.14 83.00 84.86 86.72 88.57
Z at 0.00
Monthly data available from Jan1860 to Dec2200 (4092 months)
Variable tas (Surface Air Temperature) in K
The associated land/sea mask is available for some operations

Extract timeseries

latitude: [ ] °N - [ ] °N (leave second field blank for one point)
longitude: [ ] °E - [ ] °E
boundaries: halfway grid points
make: (•) average ( ) set of grid points
considering: (•) everything ( ) only land points ( ) only sea points
units: (•) convert to Celsius ( ) leave in K

Make time series

Create a field with derived data

New time scale: yearly

New variable: mean of tas

Threshold: no cut [ ] K

Make new field

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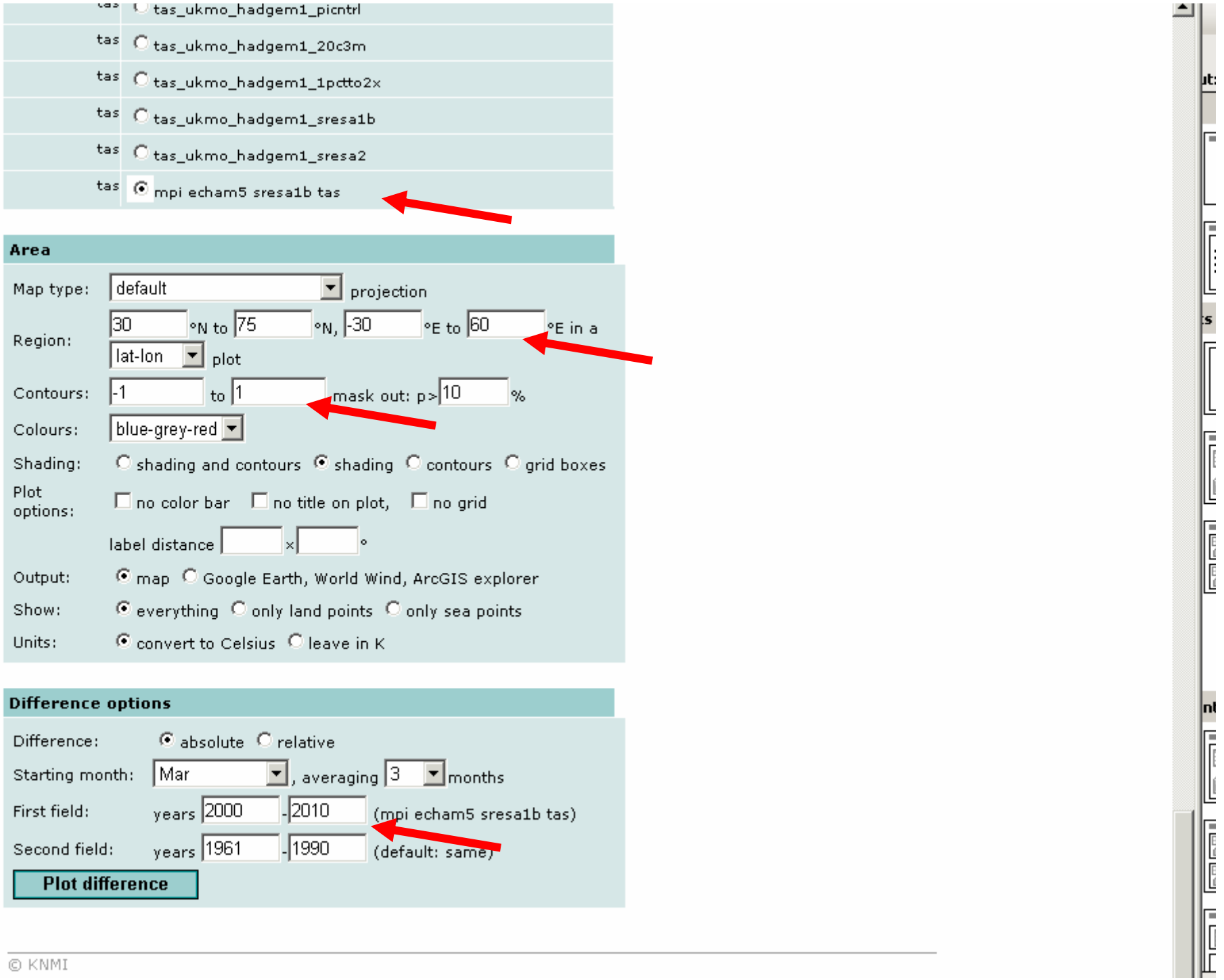
- Verify field against observations
- Make EOFs

Feedback


tas tas_ukmo_hadgem1_picntrl
tas tas_ukmo_hadgem1_20c3m
tas tas_ukmo_hadgem1_1pctto2x
tas tas_ukmo_hadgem1_sresa1b
tas tas_ukmo_hadgem1_sresa2
tas mpi echam5 sresa1b tas
Area
Map type: default projection
Region: 30 °N to 75 °N, -30 °E to 60 °E in a lat-lon plot
Contours: -1 to 1 mask out: p> 10 %
Colours: blue-grey-red
Shading: shading and contours shading contours grid boxes
Plot options: no color bar no title on plot, no grid
label distance x °
Output: map Google Earth, World Wind, ArcGIS explorer
Show: everything only land points only sea points
Units: convert to Celsius leave in K
Difference options
Difference: absolute relative
Starting month: Mar , averaging 3 months
First field: years 2000 - 2010 (mpi echam5 sresa1b tas)
Second field: years 1961 - 1990 (default: same)
Plot difference
© KNMI

Climate Explorer

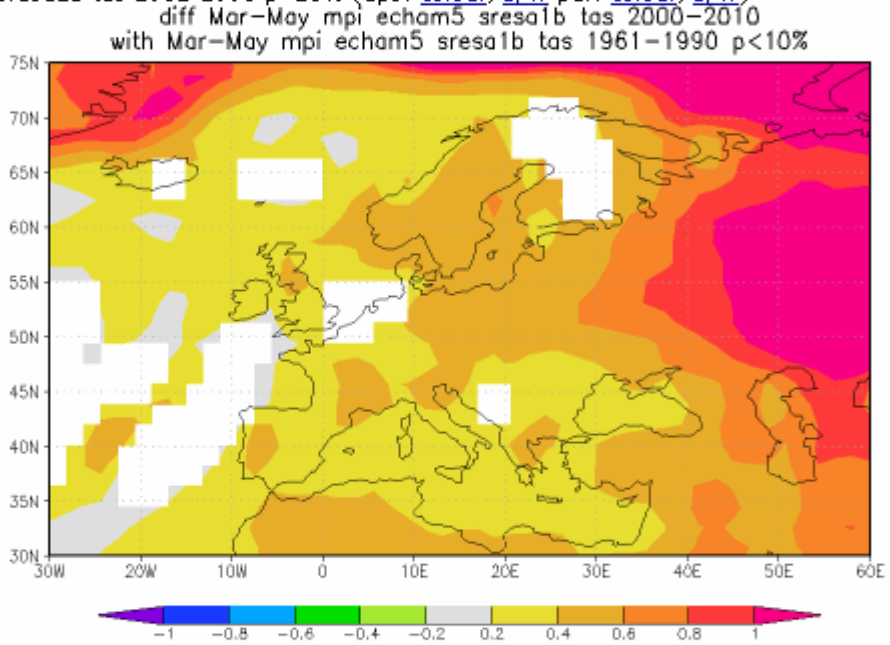
Plot difference of fields

mpi echam5 sresa1b tas minus mpi echam5 sresa1b tas

Converting mpi echam5 sresa1b tas from K to Celsius
Converting mpi echam5 sresa1b tas from K to Celsius

Plotting with GrADS... Converting to postscript with gxeps...

diff Mar-May mpi echam5 sresa1b tas 2000-2010 with Mar-May mpi echam5 sresa1b tas 1961-1990 p<10% (eps: colour, B/W pdf: colour, B/W)



Get the raw data as GrADS ctl and (gzipped) dat files, or generate a (gzipped) netCDF/HDF/HDF5 file, as (gzipped) ascii (big).

Replot
- (•) Surface Air Temperature difference [Celsius]
- ( ) error on Surface Air Temperature difference [Celsius]
- ( ) p-value under a two-sided normal test [1]

Map type: default projection

Region: 30 °N to 75 °N, -30 °E to 60 °E in a lat-lon plot

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More features

- Upload your own field/timeseries
- Make EOFs
- Calculate extremes
- Download data, figures in pdf/eps
- Plotting options

- All kinds of operations and statistics
- Clear title
- Email support

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