Dynamics 2, 14.06.2021

Lecturer: Prof. Dr. G. Lohmann
Exercise 8, Summer Semester 2021

Due date: 21.06.2021
Tutors: Justus Contzen, Lars Ackermann

Motivation: We analyse climate data and explore teleconnections using http://climexp.knmi.nl

1) **Monthly climate indices (4 points)**
a) Select one pre-defined index (NAO or ENSO). Plot the index for each month.
b) Correlation with temperature, precipiation, SLP
c) Explain the teleconnections for different seasons with your knowledge in Dynamics (e.g. geostrophy)

2) Home town climate (4 points)
a) Calculate the climate (temperature or precipiation) in different regions on the world (select your home town, or Bremen has 53° N, 8.8° E)
b) Correlation with large-scale temperature and SLP for different seasons
c) Explain the teleconnections for different seasons. Any relation to modes of climate variability ? (e.g. ENSO, PDO, NAO, Monsoon)

3) Composite Map (2 points)
a) Calculate the composite map of 1b) instead of correlation, any difference?
b) Calculate the composite map of 2b) instead of correlation, any difference?

Select a monthly time series

Climate indices

Select a time series by clicking on the name		
ENSO	Relative NINO12, NINO3, NINO3.4, NINO4 (1880-now, ERSST v5, relative to 20S-20N, i.e., without global warming trend)	
	NINO12, NINO3, NINO3.4, NINO4 (1880-now, ERSST v5)	
	NINO12, NINO3, NINO3.4, NINO4 (1870-now, HadISST1)	
	SOI (1866-now, Jones)	
	SOI (1882-now, NCEP)	
	Precipitation Niño indices: GPCC, CRU TS land , CMORPH satellite	
	1979-now: MEI v2, 1950-2018: MEI (NOAA/ESRL/PSD)	
	Niño cold tongue, warm pool reconstructions (1617-2008, CSIRO)	
	Warm Water Volume (5°S-5°N, 120°E-80°W, 1980-now, PMEL/TAO)	
	WWV (5°S-5°N, 120°E-80°W, 1960-sep2020, POAMA/PEODAS)	
	temperature averaged to 300m (130°E-80°W, 1979-now, GODAS)	
NAO	NAO Gibraltar-Stykkisholmur (1821-now, Jones)	

Select a time series

- Daily station data
- Daily climate indices
- Monthly station data
- Monthly climate indices
- Annual climate indices
- View, upload your time series

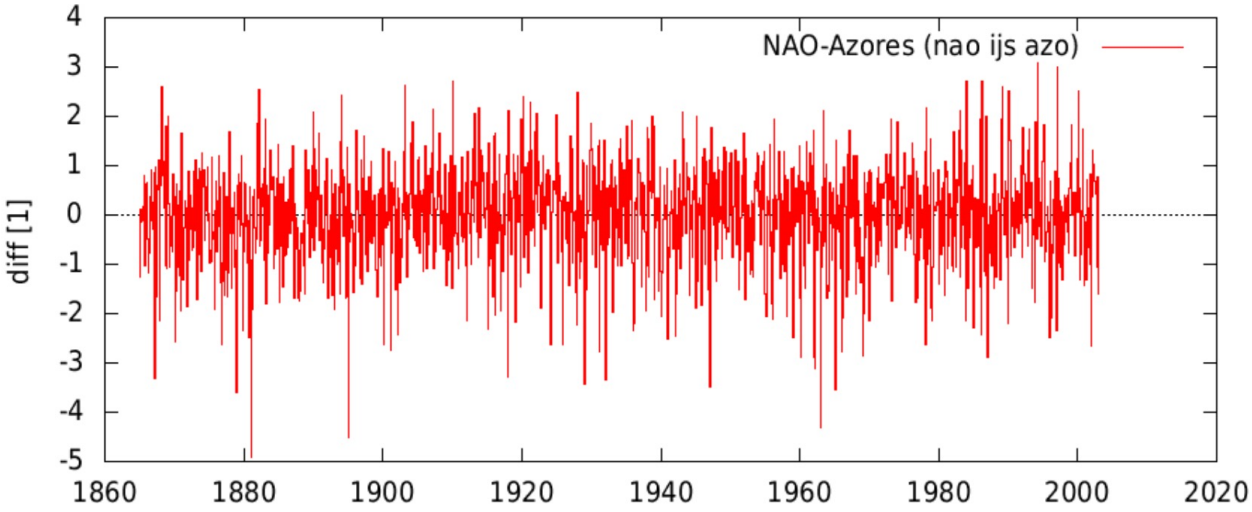
Select a field

- Daily fields
- Monthly observations
- Monthly reanalysis fields
- Monthly and seasonal historical reconstructions
- Monthly seasonal hindcasts
- Monthly CMIP3+ scenario runs
- Monthly CMIP5 scenario runs
- Annual CMIP5 extremes
- Monthly CMIP6 scenario runs
- Monthly CORDEX scenario runs

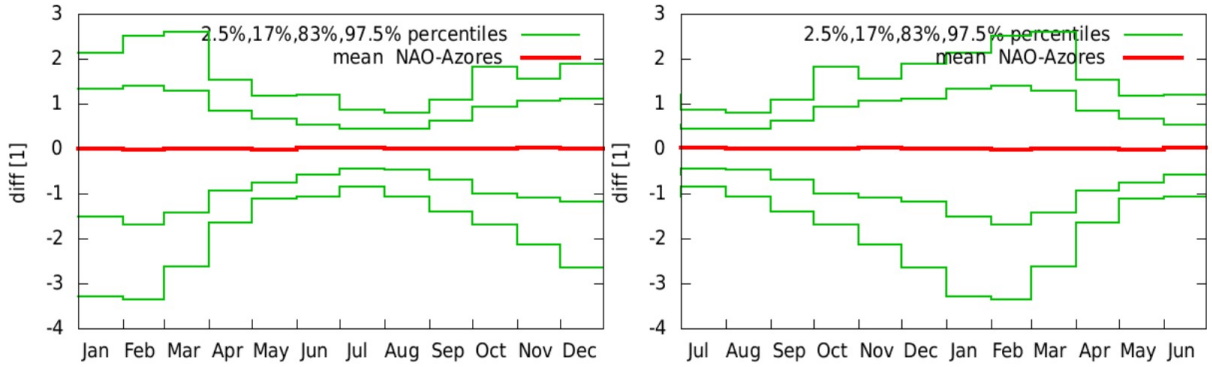
Time series

monthly NAO-Azores

Difference between nao azo new.dat and nao ice new.dat, Timeseries are normalized per year, Timeseries are normalized per year, diff [1] normalised difference of and , (eps, pdf, metadata, raw data, netcdf)



Annual cycles, computed with all data available (Jan-Dec: eps, pdf, raw data,. Jul-Jun: eps, pdf, raw data).



Anomalies with respect to the above annual cycle (eps, pdf, raw data, netcdf, analyse this time series)

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- Attribution runs
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Investigate this time series

- View per month, season, half year or full year (Jan-Dec or Jul-Jun)
- View last 1, 5, 10, N years
- Correlate with other time series
- Correlate with a field (correlation, regression, composite)

Plot options

Variable: (•) correlation ( ) covariance ( ) significance
( ) regression ( ) error) ( ) reverse ( ) relative regression
( ) composite ( ) error)
extreme dependence measures ( ) χ, ( ) χbar, threshold 90 %

Demand at least [ ] % valid points

Map type: North polar stereographic projection

Region: 20 °N to 90 °N, [ ] °E to [ ] °E in a lat-lon plot

Contours: [ ] to [ ] mask out: p> 10 % [ ] logarithmic scale

Colours: blue-grey-red

Shading: ( ) shading and contours (•) shading ( ) contours ( ) grid boxes

Plot options: [ ] no color bar [ ] no title on plot, [ ] no grid [ ] no political boundaries
label distance [ ] × [ ] ° or [ ] no labels

Output to: (•) browser ( ) Google Earth (kml) ( ) GIS (geotiff)

Units: (•) convert to standard units ( ) use original units

Options

Starting month: all of timeseries

Season: averaging over 1 month(s) of the timeseries same month(s) of the field.

Anomalies: [ ] subtract seasonal cycle

Lag: 0 months
(lag positive: NAO-Azores lagging field)

Years: [ ] – [ ]

Only for: [ ] < field selected above < [ ]
[ ] < NAO-Azores < [ ]

Apply: [ ] logarithm, [ ] sqrt to NAO-Azores

Output: [ ] rank correlation

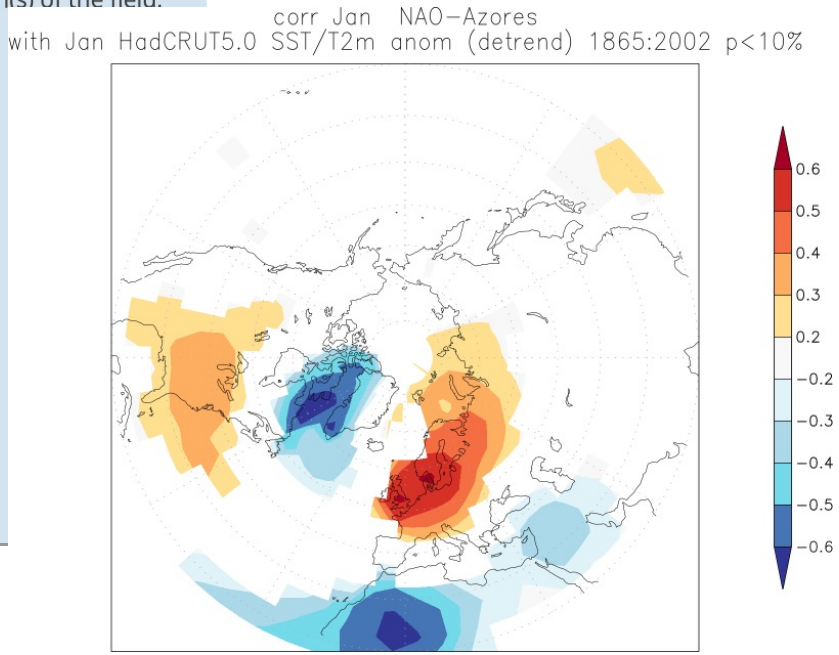
Detrend: [x] detrend everything

Filters: [ ] take year-on-year differences
subtract mean of [ ] previous years

Running correlation: show/hide running correlation options

Fit: (•) straight line, ( ) parabola,

Correlate



Select a monthly field

Observations

.... and select a position

Select a field by following its link (old list)		
Temperature	1850-2018 anomalies: HadCRUT5 median, 1850-now HadCRUT4 median	
	1880-now anomalies: GISS 250km, 1200km	
	1880-now anomalies: NOAA v5	
	1850-now anomalies: HadCRUT4 ,HadCRUT4/HadSST4 filled-in by Cowtan and Way	
	1900-2018 anomalies: CMST	
Land	1850-now anomalies: CRUTEM4, CRUTEM5	
	1880-now anomalies: GISS 250km, 1200km	
	1880-now anomalies: NCDC v3.2.1	
	1948-now: CPC GHCN/CAMS t2m analysis (land) 0.5°, 1.0°, 2.5°	
	1901-2019: CRU TS 4.04 (land) 0.5°, 1.0°, 2.5°, #/value, 4.03 0.5°, 1.0°, 2.5°, #/value	
	1750-now: Berkeley 1°	
	1900-2018 5° homogenised anomalies: CL-SAT 1.3	
	0.25° 1950-now: E-OBS v23.1e Tg (Europe)	
	1895-now: PRISM 4km, PRISM 0.25°, (Contiguous US only)	

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