45th Online Course
1–10 Feb 2023

This **Online Course in Climate Time Series Analysis** is specifically tailored to the needs of PhD students and post-docs, who wish to learn about an important combination of disciplines (climate change and time series analysis), but have had so far not much exposure to in-depth statistical teaching. It will also attract professional researchers, who wish to update their knowledge or to learn new statistical techniques. We assume that participants come from somewhere in the range of climatology, ecology, econometrics, environmental sciences, geosciences, hydrology, meteorology, or physics.

This online format has emerged in response partly to the Covid-19 situation (which started in 2020), but also to the general upward trend in need of electronic high-level quality education.

What distinguishes this from other online courses? First, the course provides **videos** that have been designed, recorded and edited with care. You can go repeatedly through the videos and make breaks as you need. You receive and can study again the delivered course **slides.** Second, **daily chat meetings** via a video platform over the full course duration allow you to prepare questions beforehand and get extensive response. Third, own-developed **software,** specifically designed to get the most out of "dirty" climate time series data, will enhance your arsenal of analytical tools. Fourth, the **individual feedback period** of two months post-course (via email and, possibly, online meeting) preserves the interactive mode of joint data analysis, it allows to go in depth through real applications – perhaps on your own data!

More details on the registration site.

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https://www.climate-risk-analysis.com/courses/time-series/45th-Online-Course-in-Climate-Time-Series-Analysis.html

Module (Lecture/Tutorial)	Themes
01–02 Introduction (L, T)	Climate variables, time series, statistics, notation, dating, climate equation, interpolation, temporal spacing, autocorrelation, distributional shape, paleoclimatology, proxy data, documentary data
03–04 Persistence Models (L, T)	AR(1) process, autocorrelation estmation, bias, even and uneven spacing, AR(2) process, other processes
05 Bootstrap Confidence Intervals (L)	Error bars, standard error, variance, standard deviation, mean, root mean squared error, confidence interval, Monte Carlo experiment, bootstrap principle, Moving Block Bootstrap resampling, hypothesis testing, Eemian
06–07 Regression I (L, T)	Linear regression, least squares, nonlinear regression (ramp, break), nonparametric regression, smoothing, climate model output, instrumental period, Pliocene, Northern Hemisphere Glaciation, Arctic river runoff
08–09 Spectral Analysis (L, T)	Spectrum, spectrum estimation, periodogram, WOSA, multitaper estimation, Lomb–Scargle method , speleothems, Holocene, monsoon, solar cycles
10–11 Extreme Value Time Series (L, T)	Risk, POT, block extremes, GEV & GP distributions, Poisson process, maximum likelihood, kernels, Cox–Lewis test, heavy tails, river floods, paleo hurricanes
12–13 Correlation (L, T)	Pearson's and Spearman's measures, river runoff, unequal timescales
14 Regression II (L)	Proxy variable, errors-in-variables regression, calibration, ***new LINCAL software,*** prediction, lagged regression, instrumental period, Pleistocene, climate skeptics
15 Future Directions (L)	Timescale modelling, novel estimation problems, higher dimensions, climate models, optimal estimation

1 Teacher
1 Book
10 Programs
15 Modules
15 Hours Video
398 Slides