Course Fees

Students*	300 €
University Employees	400 €
Others	500 €

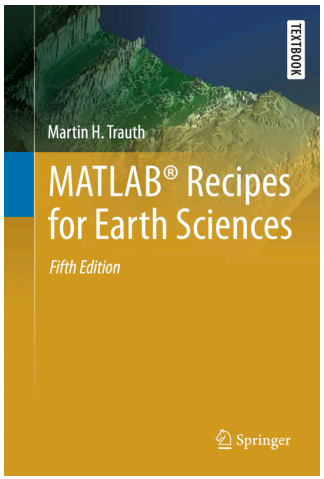
* including doctoral students. Employees and students of the University of Potsdam are exempted from the fee.

The book

The course fees includes a copy of the textbook

Trauth, M.H. (2020) MATLAB Recipes for Earth Sciences – Fifth Edition. Springer International Publishing, ~500 p., ISBN: 978-3-030-38440-1

including all course materials, example data, and MATLAB recipes.



Organizer

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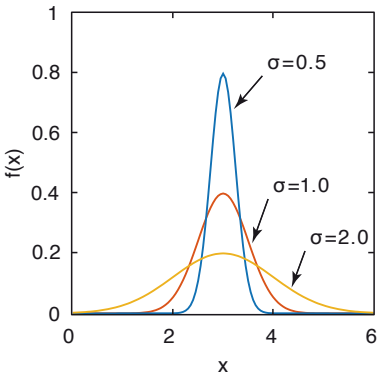


Probability density function f(x) of a logarithmic normal distribution with a mean μ=0 and with various values for the standard deviation σ.

51st Shortcourse on

MATLAB® Recipes for Earth Sciences

14–18 September 2020
Interactive online seminar

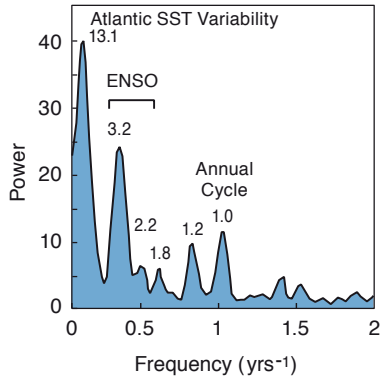
Martin H. Trauth
University of Potsdam, Germany

Content

The course introduces methods of data analysis in earth and environmental sciences using the MATLAB software, one of the leading software packages for the solution of mathematical problems. The content of the course includes basic statistics for univariate, bivariate and multivariate datasets, time-series analysis and signal processing, processing and displaying digital elevation models, gridding and contouring, and image processing and analysis.

References

The course was taught at the U Aberystwyth, U Addis Ababa, U Bremen, U Bratislava, U Ghent, UA Barcelona, BGR Hannover, U Kiel, UC London, LMU München, BGI Bayreuth, U Nairobi, U Köln, U Stockholm, U Amsterdam, NHM Vienna, GNS Science Wellington, Brown U Providence, U Arizona Tucson and U Potsdam.



Power spectrum of a red-color intensity transect across 70 varves dominated by significant peaks at frequencies of ca. 0.076, 0.313, 0.455 and 1.0 yrs-1, suggesting a strong influence of the tropical Atlantic sea-surface temperature (SST) variability, the El Niño/Southern Oscillation (ENSO), and the annual cycle that occurred 30 kyrs ago, similar to today's cyclicities.

Course Program

Monday

Data analysis in earth and environmental sciences, types of data, overview of methods, introduction to the MATLAB programming environment. MATLAB syntax, import and export of data, types of data, scripts and functions, basic visualization techniques.

Tuesday

Univariate statistics, theoretical distributions, hypothesis testing. Bivariate statistics, regression, bootstrap and jackknife, reduced major axis regression, nonlinear weighted regression.

Wednesday

Time-series analysis, Blackman-Tukey spectral analysis, periodogram, evolutionary spectrum, Lomb-Scargle method, Wavelets. Signal processing, convolution and filtering, filter design, adaptive filters.

Thursday

Analysis of spatial data, digital terrain models, spatial interpolation, visualization of spatial data. Multivariate statistics, principal component analysis, cluster analysis.

Friday

Image processing and analysis, processing and georeferencing satellite images, image analysis of microscope images, quantification of objects in images. Creating animated eBooks and webpages with MATLAB results.

Course Concept

The course is being taught as an interactive online seminar with lectures, demonstrations and exercises on selected examples from the earth and environmental sciences.

We use a modern web conferencing system for the lectures, demonstrations and exercises, in connection with a course management system for the course materials.

The participants are expected to use their personal computers running Windows, Linux, or Mac OS X. A temporary license of MATLAB will be provided by the organizers.

Registration

Register online at
http://www.j-work.de/up/kps51/
51st Course – English 14–18 September 2020

Deadline: 15 July 2020

Surface plot of the GTOPO30 elevation data using light. The plot uses Phong as the lighting type creating a combined diffuse and specular reflection on surfaces.