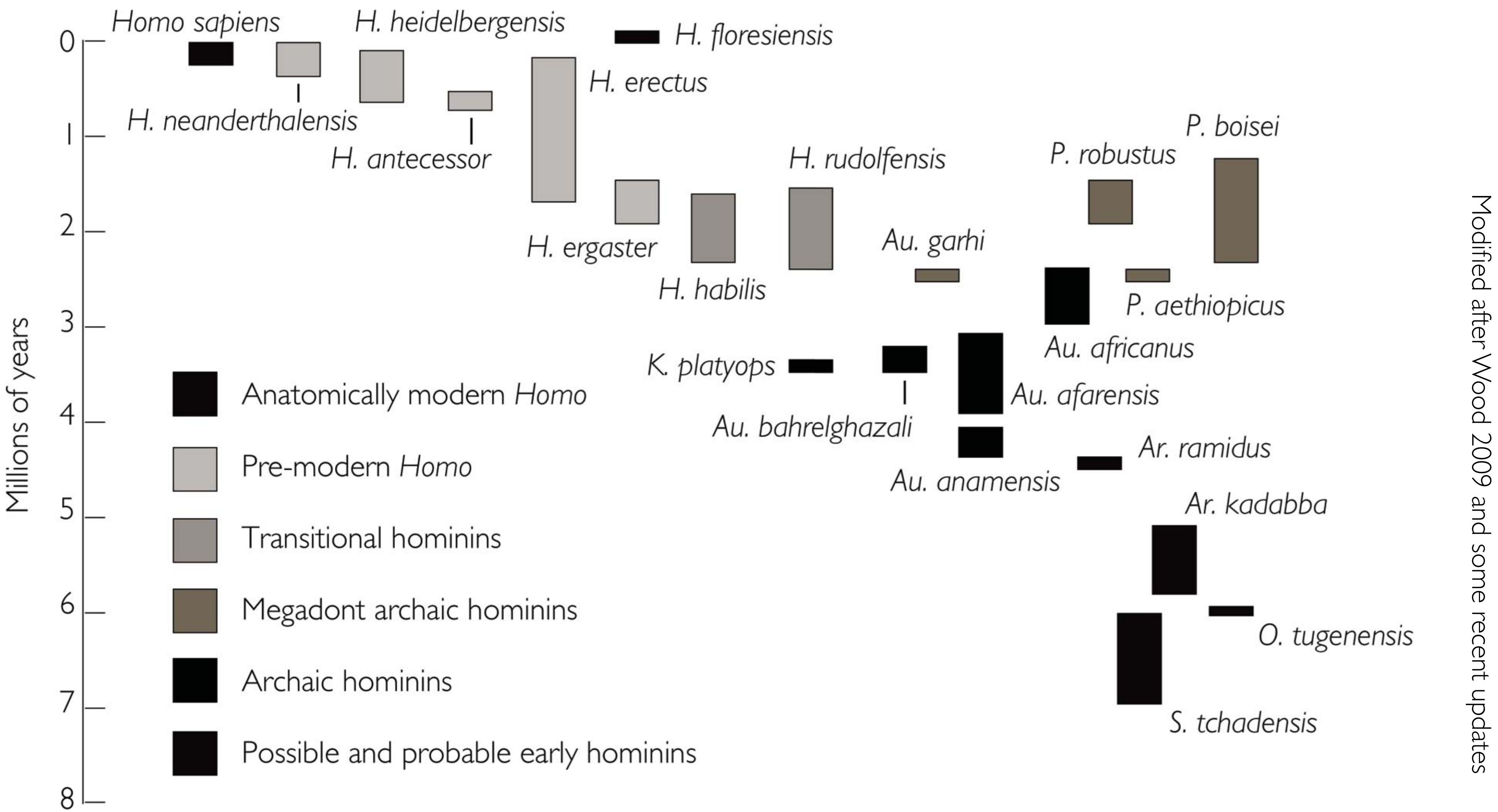
Universität Potsdam

Martin H. Trauth

Staubstürme, Blackouts und 50°C im Schatten

Mit MATLAB unterwegs in der Wiege der Menschheit

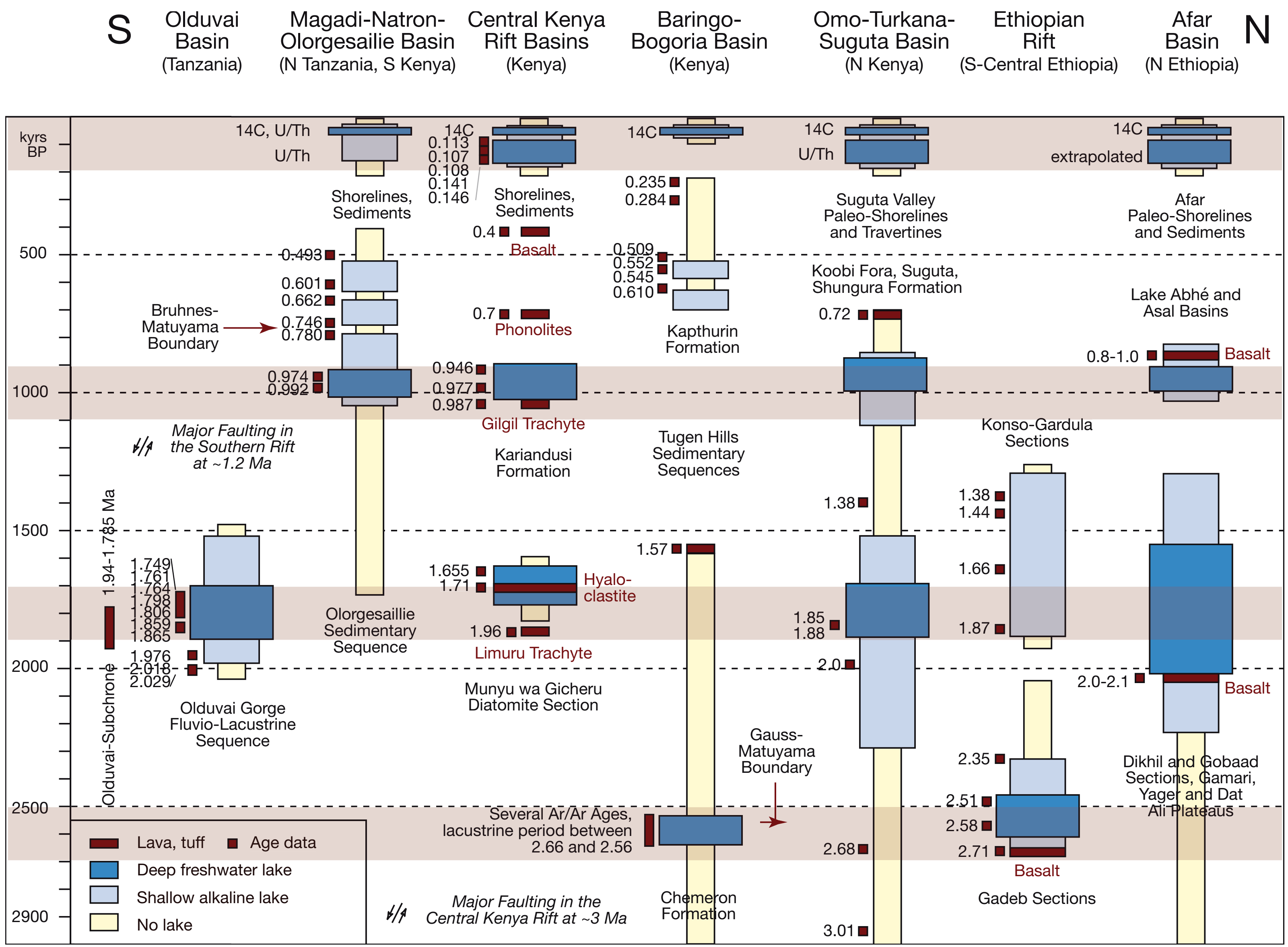
Tectonics, Climate and Evolution



Millions of years
0
1
2
3
4
5
6
7
8
Homo sapiens
H. neanderthalensis
H. heidelbergensis
H. antecessor
H. erectus
H. floresiensis
H. ergaster
H. habilis
H. rudolfensis
Au. garhi
P. robustus
P. boisei
P. aethiopicus
Au. africanus
K. platyops
Au. bahrelghazali
Au. afarensis
Au. anamensis
Ar. ramidus
Ar. kadabba
O. tugenensis
S. tchadensis
Anatomically modern Homo
Pre-modern Homo
Transitional hominins
Megadont archaic hominins
Archaic hominins
Possible and probable early hominins
Modified after Wood 2009 and some recent updates

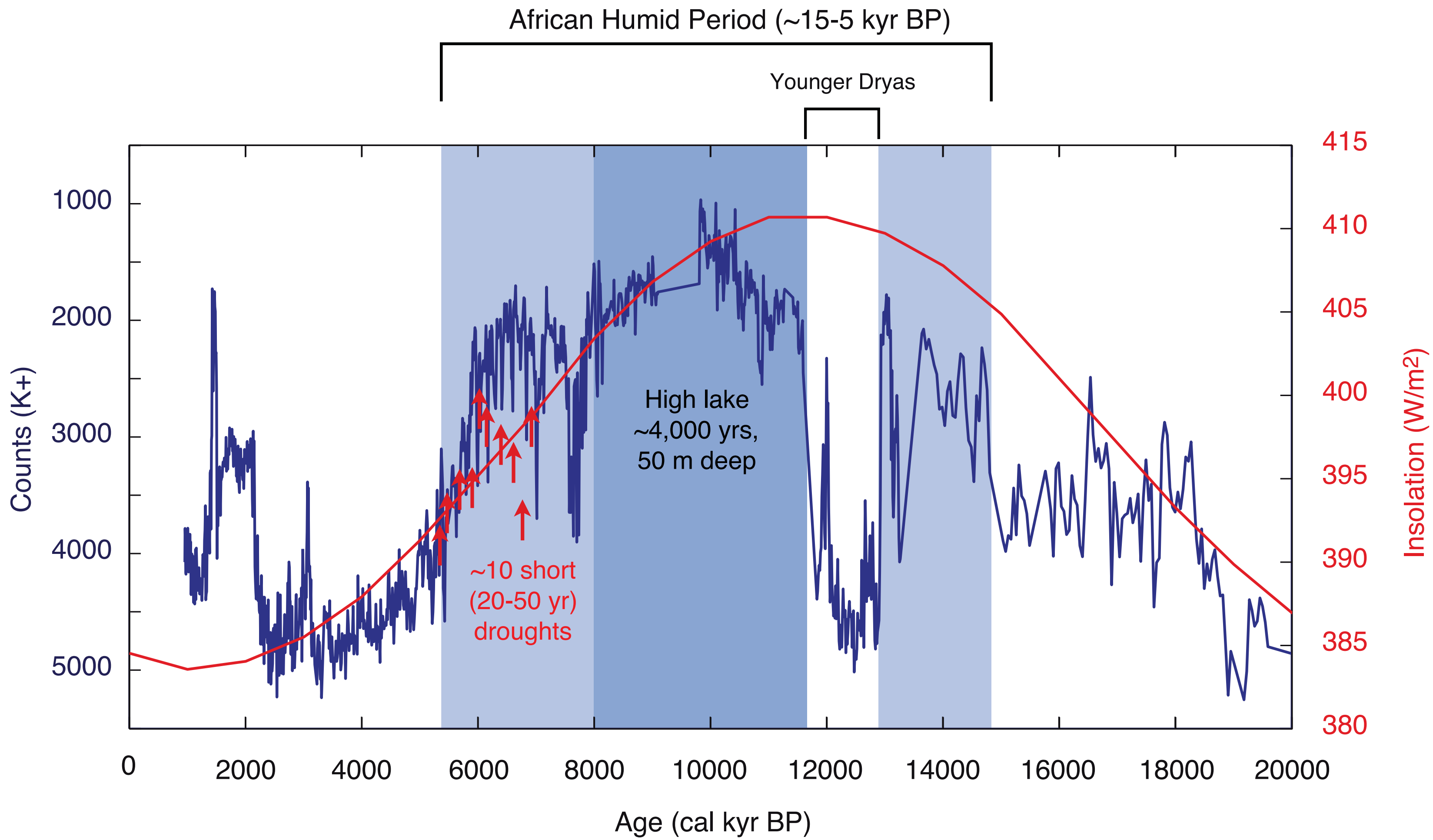

TOYOTA


1 III 2 1m 3 4 5 6 7 8



Trauth et al., Science 2005 and follow-up publications

Early Herders | Fisher-Hunter-Gatherers



Foerster et al., Quat. Int. 2012; Trauth et al., J Human Evolution in press

Die FFT von wechselhaftem Klima

```
      SUBROUTINE four1(data,nn,isign)
      INTEGER isign,nn
      REAL data(2*nn)
         Replaces data(1:2*nn) by its discrete Fourier transform, if isign is input as 1; or replaces
         data(1:2*nn) by nn times its inverse discrete Fourier transform, if isign is input as -1.
         data is a complex array of length nn or, equivalently, a real array of length 2*nn. nn
         MUST be an integer power of 2 (this is not checked for!).
      INTEGER i,istep,j,m,mmax,n
      REAL tempi,tempr
      DOUBLE PRECISION theta,wi,wpi,wpr,wr,wtemp      Double precision for the trigonomet-
      n=2*nn                                              ric recurrences.
      j=1
      do 11 i=1,n,2                    This is the bit-reversal section of the routine.
          if(j.gt.i)then
              tempr=data(j)            Exchange the two complex numbers.
              tempi=data(j+1)
              data(j)=data(i)
              data(j+1)=data(i+1)
              data(i)=tempr
              data(i+1)=tempi
          endif
          m=n/2
1         if ((m.ge.2).and.(j.gt.m)) then
              j=j-m
              m=m/2
          goto 1
          endif
          j=j+m
      enddo 11
      mmax=2                           Here begins the Danielson-Lanczos section of the routine.
2     if (n.gt.mmax) then              Outer loop executed log2 nn times.
          istep=2*mmax
          theta=6.28318530717959d0/(isign*mmax)      Initialize for the trigonometric recur-
          wpr=-2.d0*sin(0.5d0*theta)**2                  rence.
          wpi=sin(theta)
          wr=1.d0
          wi=0.d0
          do 13 m=1,mmax,2             Here are the two nested inner loops.
              do 12 i=m,n,istep
                  j=i+mmax             This is the Danielson-Lanczos formula:
                  tempr=sngl(wr)*data(j)-sngl(wi)*data(j+1)
                  tempi=sngl(wr)*data(j+1)+sngl(wi)*data(j)
                  data(j)=data(i)-tempr
                  data(j+1)=data(i+1)-tempi
                  data(i)=data(i)+tempr
                  data(i+1)=data(i+1)+tempi
              enddo 12
              wtemp=wr                 Trigonometric recurrence.
              wr=wr*wpr-wi*wpi+wr
              wi=wi*wpr+wtemp*wpi+wi
          enddo 13
          mmax=istep
      goto 2                           Not yet done.
      endif                            All done.
      return
      END
```

Press et al. (1992) Numerical Recipes in FORTRAN, 2nd Edition

```
Y = fft(X);
```

MATLAB 3.5 (1990)

```
Y = fft(X);
```

MATLAB 3.5 (1990)

Geologisch-Paläontologisches Institut
und Museum
Christian-Albrechts-Universität
Kiel, Deutschland

Berichte — Reports

Nr. 74

Trauth, Martin H.:

Bioturbate Signalverzerrung hochauflösender paläoozeanographischer Zeitreihen

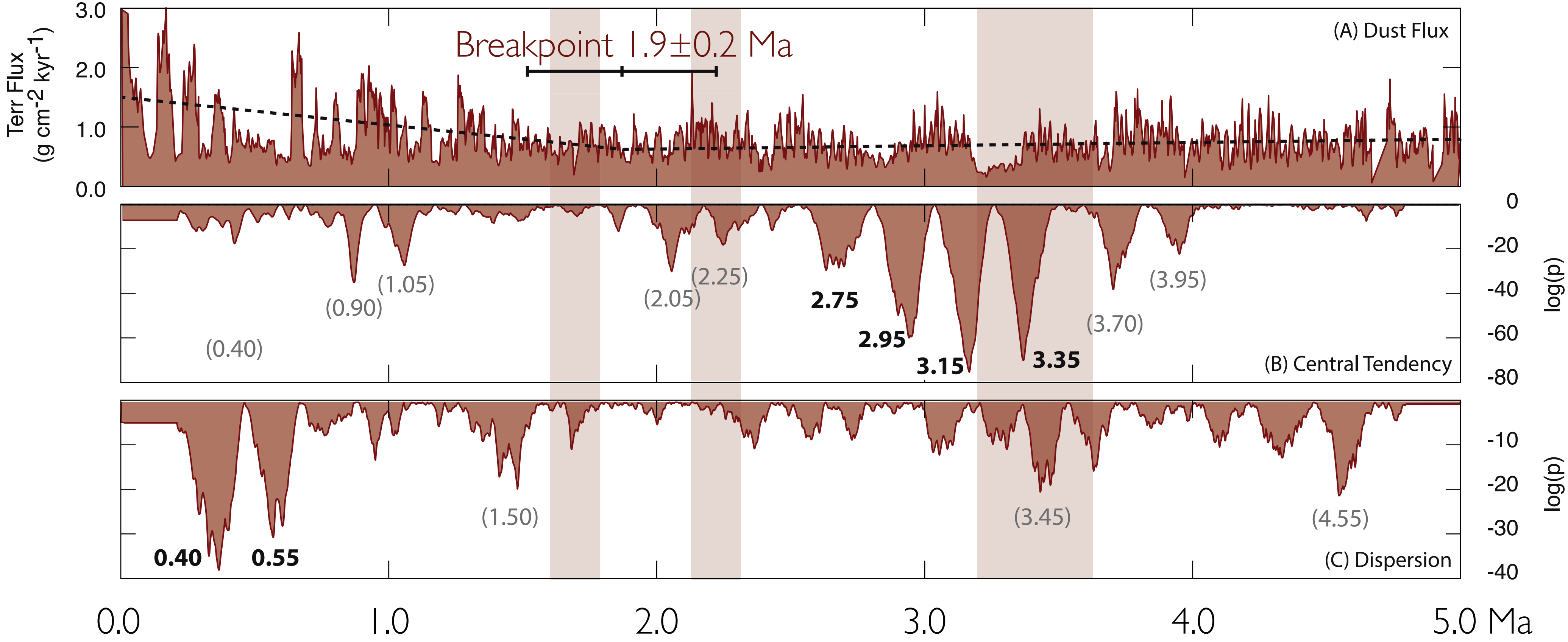
Bioturbational signal distortion
of high-resolution paleoceanographic time-series

Berichte — Reports, Geol.-Paläont. Inst. Univ. Kiel, Nr. 74,
167 S., 60 Abb., 4 Tab., Kiel, (August) 1995

ISSN 0175-9302

Two-Step Intensification of Walker Circulation at 1.6 and 2.2 Ma

Termination of Permanent El Niño at 3.4 Ma



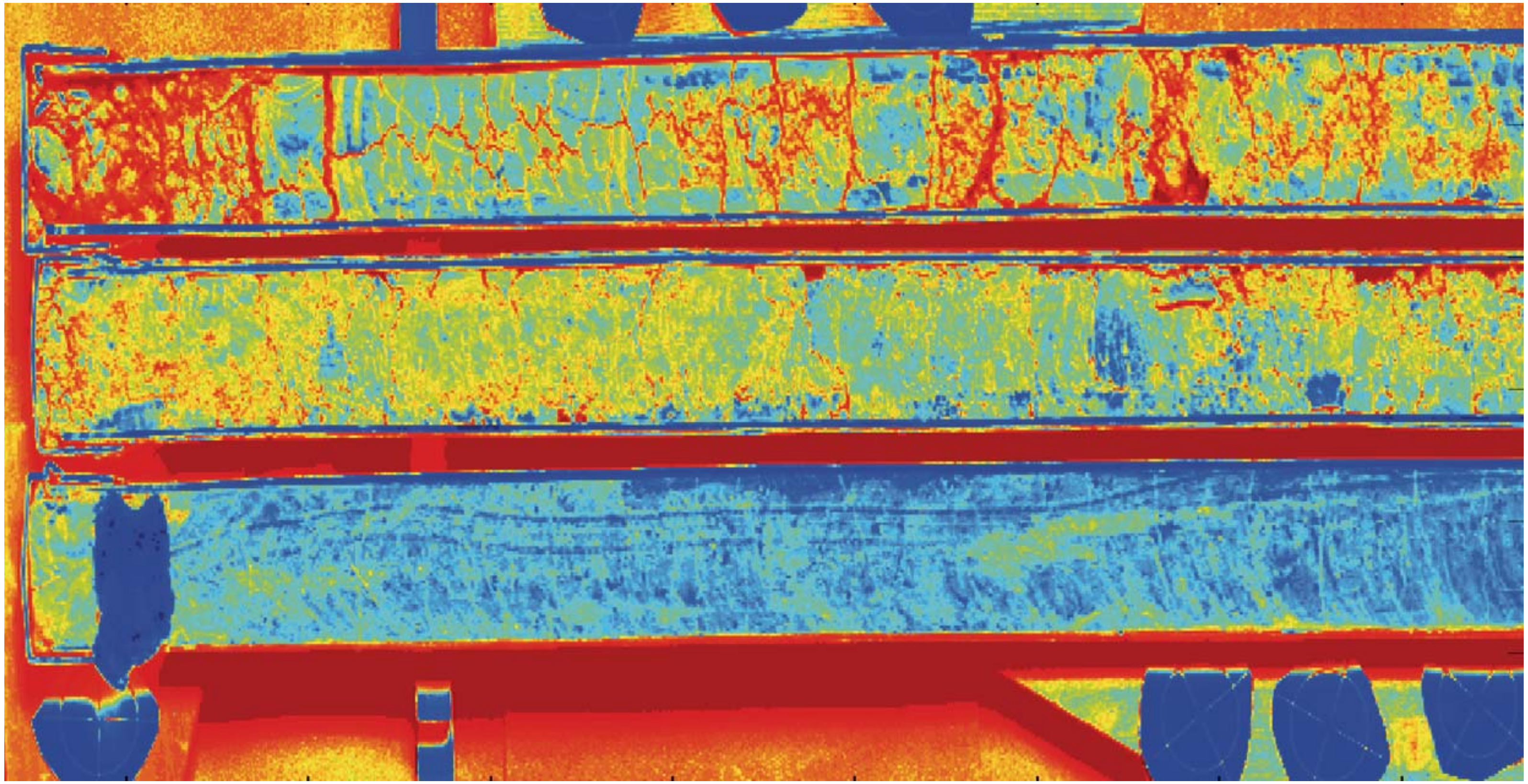
Data from deMenocal 1995; reanalyzed by Trauth et al., QSR 2009; Donges et al., PNAS 2011; Berner et al., in preparation

Bildverarbeitung und -analyse

Hyperspektrale Messung von Sedimenten

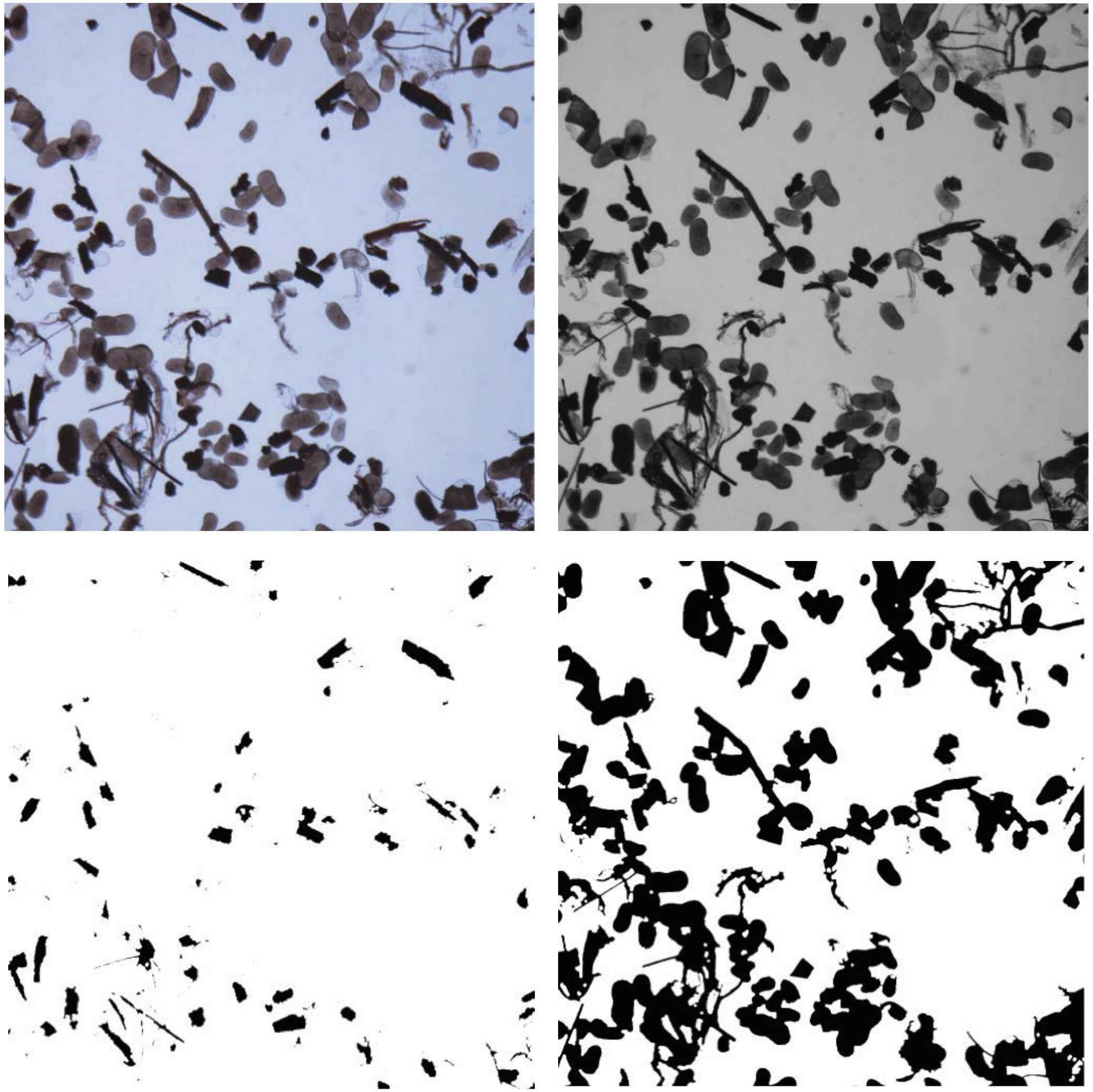
Fe^{3+}-O bounds of Chew Bahir Sediment Core CB-03

HySpex 560 nm of 300-360 cm, 200–260 cm, 20–80 cm core depth (bottom to top)



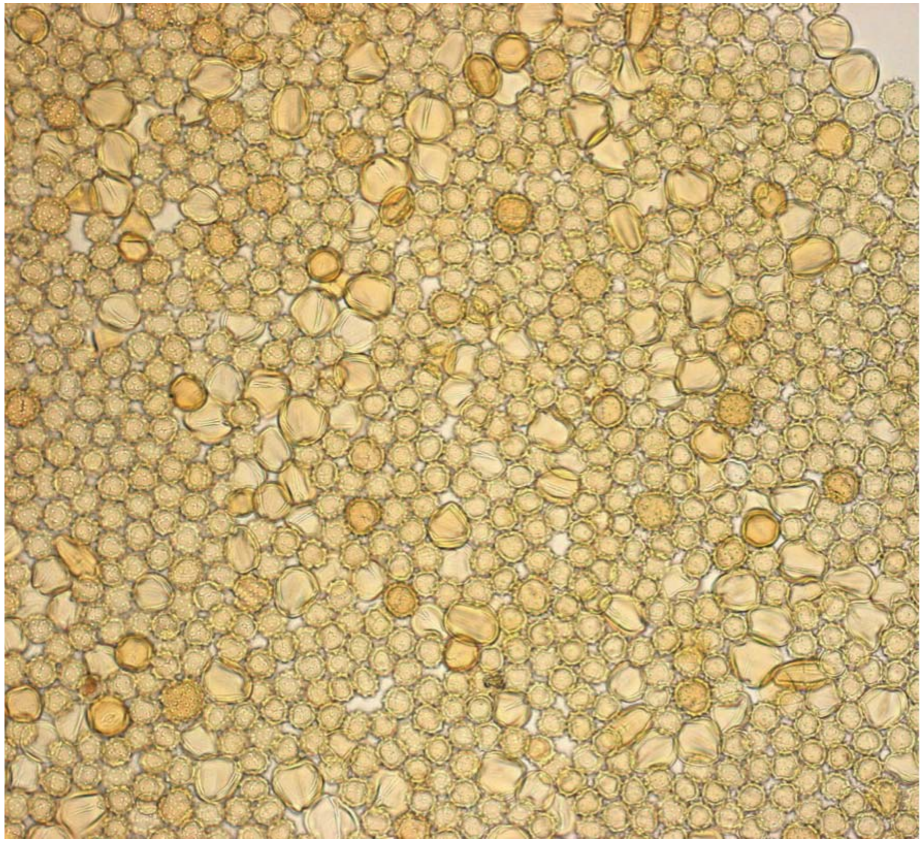
Schüürman, Foerster et al., in preparation

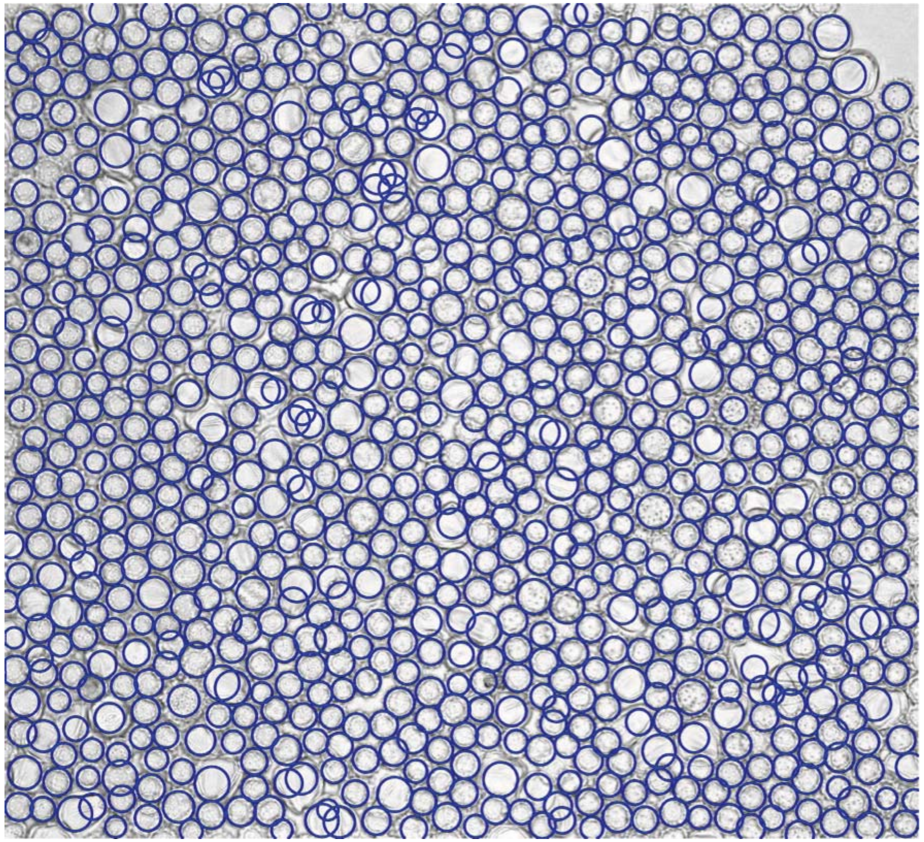
Quantifizierung von Holzkohle in Sedimenten



Trauth, MATLAB Recipes for Earth Sciences, 4th Edition, 2015

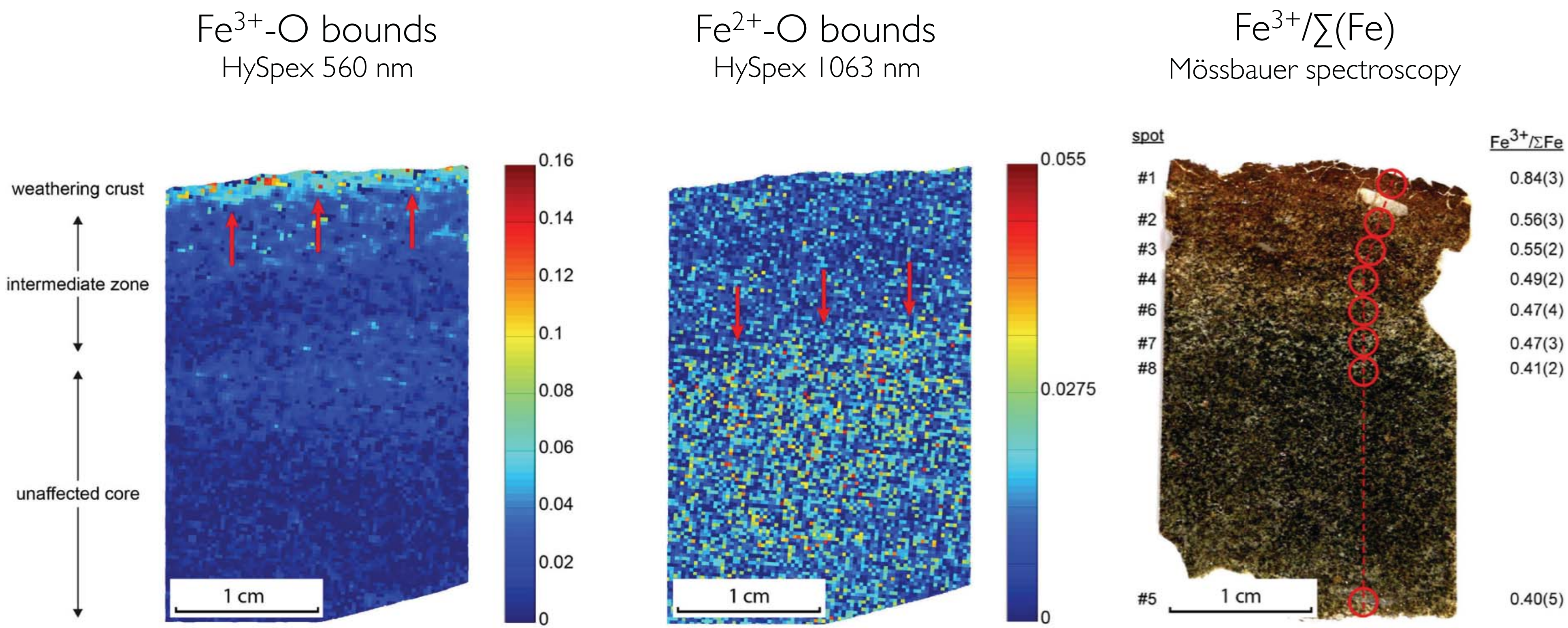
Pollenzählen mittels Hough-Transformation





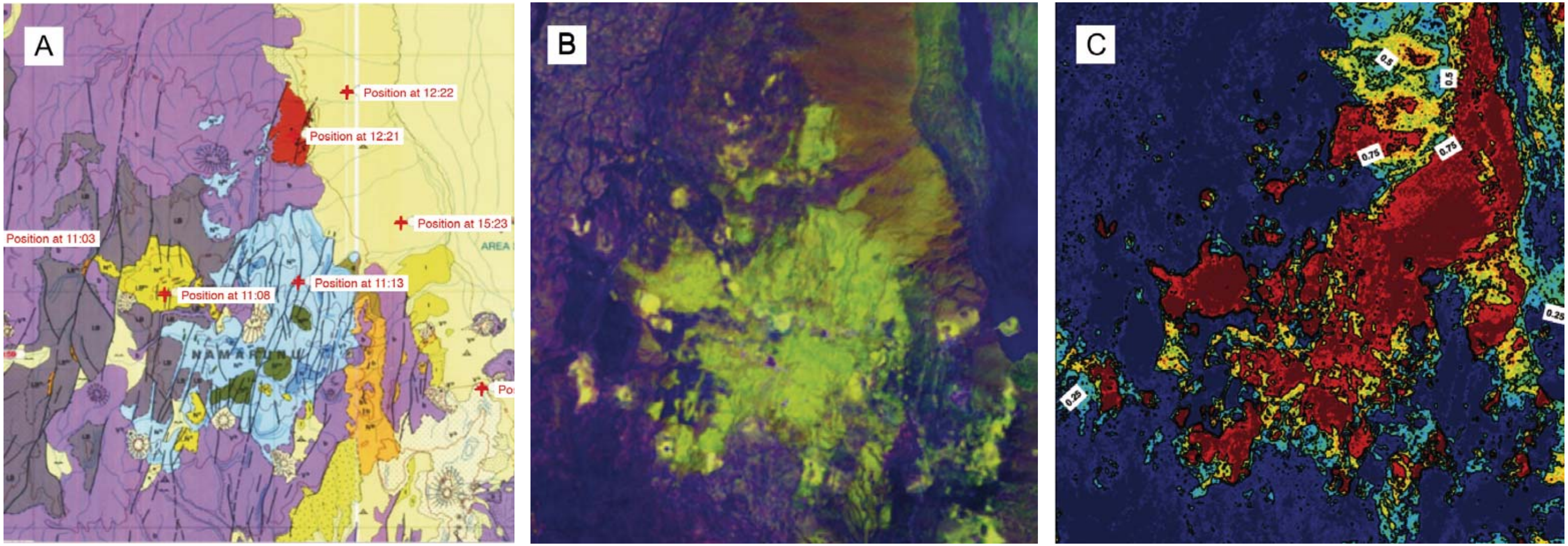
Trauth, MATLAB Recipes for Earth Sciences, 4th Edition, 2015

Hyperspektrale Messung von Vulkaniten



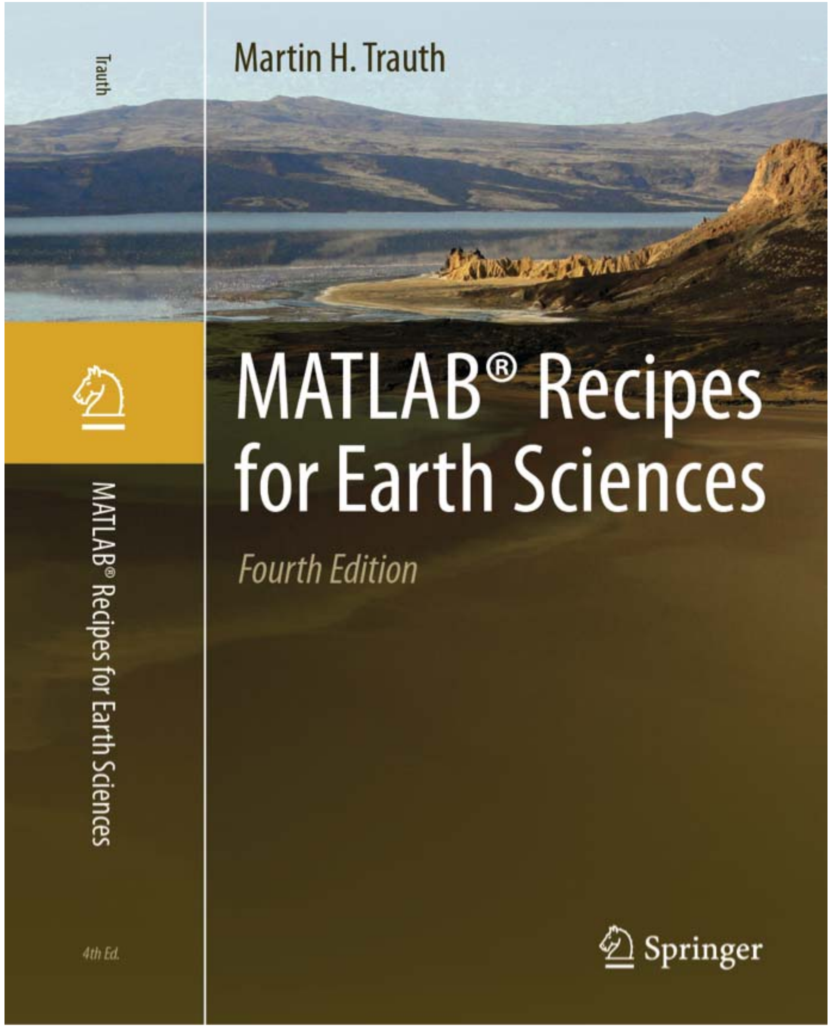
Borchardt Dissertation 2014; Borchardt et al., in preparation

Entmischung von Schwemmfächersedimenten

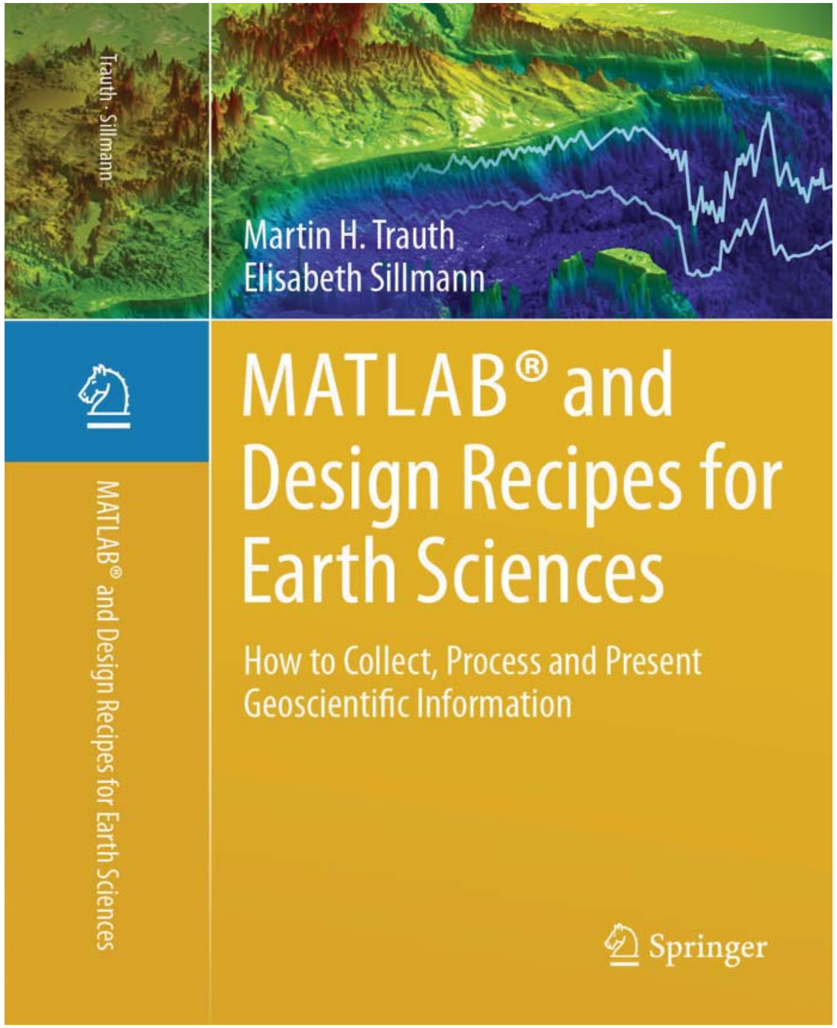


Ebert, Riedl, Trauth, unpublished results

Lehrbücher zur Datenanalyse

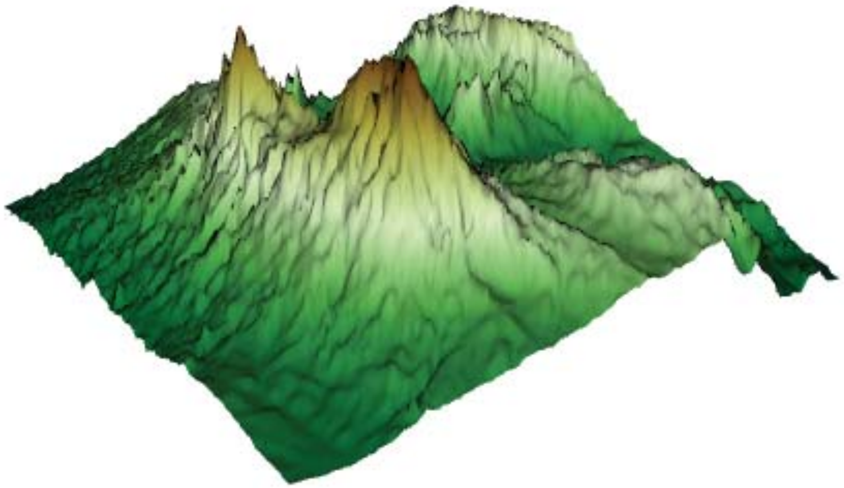


2015

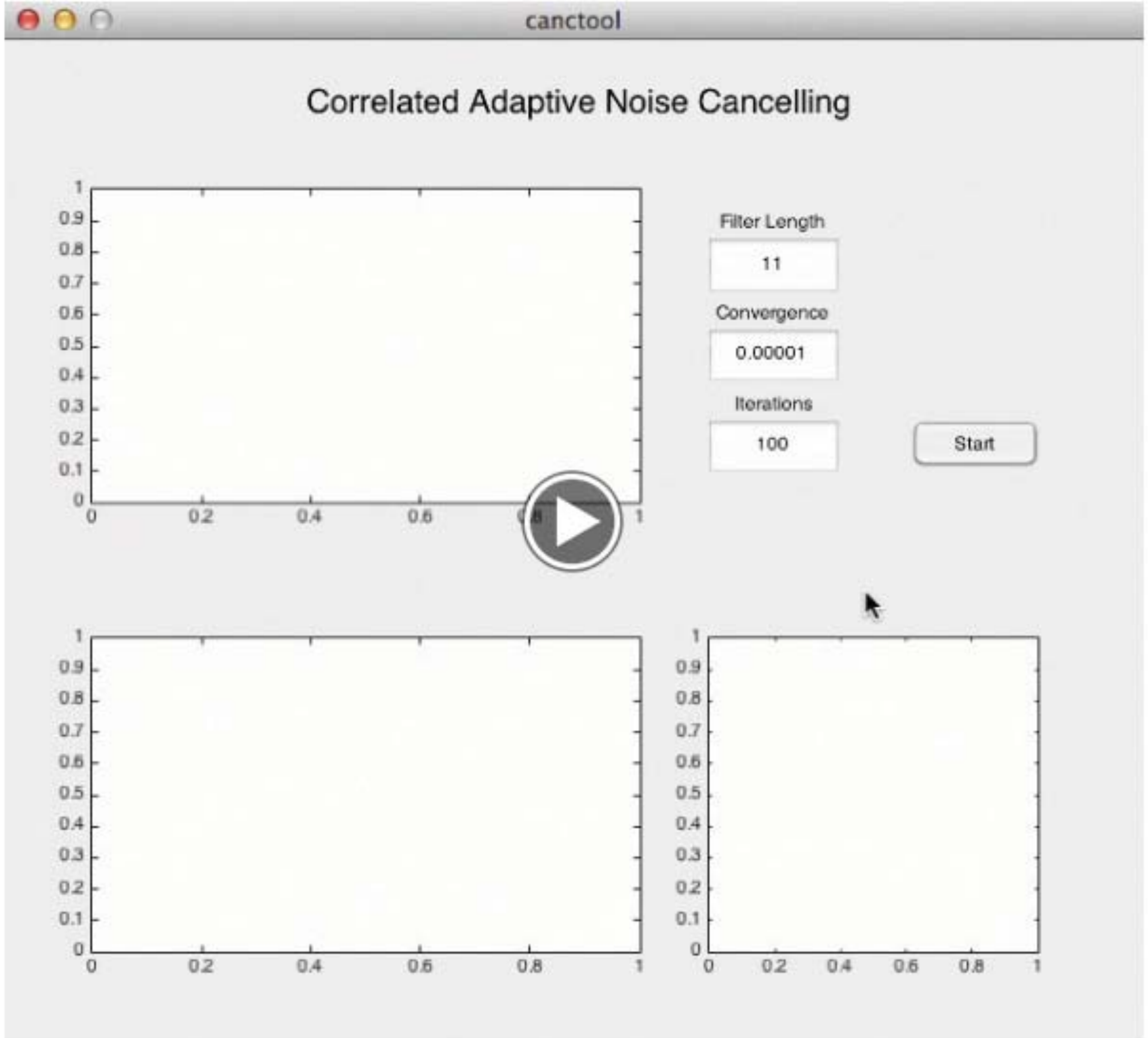


2012
(2. Auflage in Vorbereitung)

Audio 5.1 Three audio examples of sine waves and noise created within this section. **Left:** A single sine wave created with the MATLAB commands `t=1:1000; x=2*sin(2*pi*t/5); sound(x)`. The function `sound` plays the signal at a default sampling frequency of 8,192 Hz. Since the sampling frequency (i.e., the inverse of the sampling interval of `1` in `t=1:1:1000`) of the signal is one, the frequency of the sine wave is 1/5 (as defined by the denominator in the argument of the sine in `x=2*sin(2*pi*t/5)`), the sound that we hear is an 163.8 Hz (i.e., 8,192 Hz/5) sine tone. The sound is saved as a WAV file using `audiowrite('filename.wav',x,8192)` with the default sampling frequency of 8,192 Hz. **Middle:** Three sine waves created with `t=1:1000; x=2*sin(2*pi*t/50)+sin(2*pi*t/15)+0.5*sin(2*pi*t/5); sound(x)` and again exported using `audiowrite`. **Right:** The same three sine waves overlain by additive Gaussian noise, created with `rng(0), xn=x+randn(1,length(x)); sound(xn)` and again exported using `audiowrite`. While the three sine waves are difficult for the human ear to separate, especially when overlain by Gaussian noise (third example), Fourier-based spectral analysis techniques are able to easily separate the sine waves (see Section 5.4).



Interactive 7.4 Display of the filtered SRTM elevation data set. The map uses the function `trimesh` to generate a shaded-relief map with simulated lighting using interpolated shading and the `decmap` colormap (data from Farr et al. 2000, 2008).



Movie 6.7 GUI version of the correlated adaptive noise cancelling algorithm. The adaptive filter is used to reduce noise in duplicate measurements `yn1` and `yn2` using a filter length of 11, a convergence rate of 0.00001, and 30 iterations. The algorithm sends the filtered primary `yy` and reference `zz` signals, the extracted noise `ee`, and the mean-squared error `mer`, for each iteration to the workspace.

Sommerschulen in Afrika

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Summer School on

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2015, 2016

We are pleased to announce two fully sponsored consecutive summer school sessions for 20 doctoral students from the bio-geo-sciences.

The summer school aims to help participants identify interesting and up-to-date research topics, to design projects around these topics using the latest methods of data analysis, and to present project results in an effective and professional manner.

The first module (M1) of the summer school will focus on searching for relevant publications and related data on scientific topics using open access and commercial online citation databases. The aim of this module is to identify scientific hypotheses and controversies that might form a basis for new research projects and scientific experiments.

The second set of modules (M2–M3) is concerned with analysing the scientist's own data (published or unpublished) using sophisticated statistical and numerical methods such as, for example, time series analysis to detect climatic variations, or GIS-based remote sensing techniques for spatial mapping of environmental changes in order to define areas of increased georisk.

In the third set of modules (M5–M7), the results generated in the previous modules will
be prepared for publication. Participants will be instructed in academic writing, poster design for conferences, and giving presentations to both specialist and non-specialist audiences. Throughout the summer school participants will receive guidance from teams of senior researchers and young scientists (some of whom will have participated in an earlier summer school), as well as from two professional trainers in academic/scientific English.

Modules M4 and M8 comprise a series of field-based and laboratory-based practical courses with durations ranging from two hours to a full day. These will be held between the other modules and in the vicinity of the course locations.

Participants in the summer school are expected to form part of a new generation of researchers that is well-equipped with the necessary knowledge and tools to assess and mitigate current and future environmental changes.

2015 | Session 1 | Ethiopia

M1
Searching and Reviewing Literature and Data
Sep 20–27, 2015 | Professor Maslin

M2
Statistical Analysis of Bio-Geo-Science Data
M2 | Sep 27–Oct 4, 2015 | apl. Professor Trauth

M3
Analysing BioGeoGraphic Information Systems
M3 | Oct 4–11, 2015 | Dr. Zeilinger

M4
Bio-Geo Field and Laboratory Courses | 1
M4 | Sept 20–Oct 11, 2015 | all instructors

2016 | Session 2 | Kenya

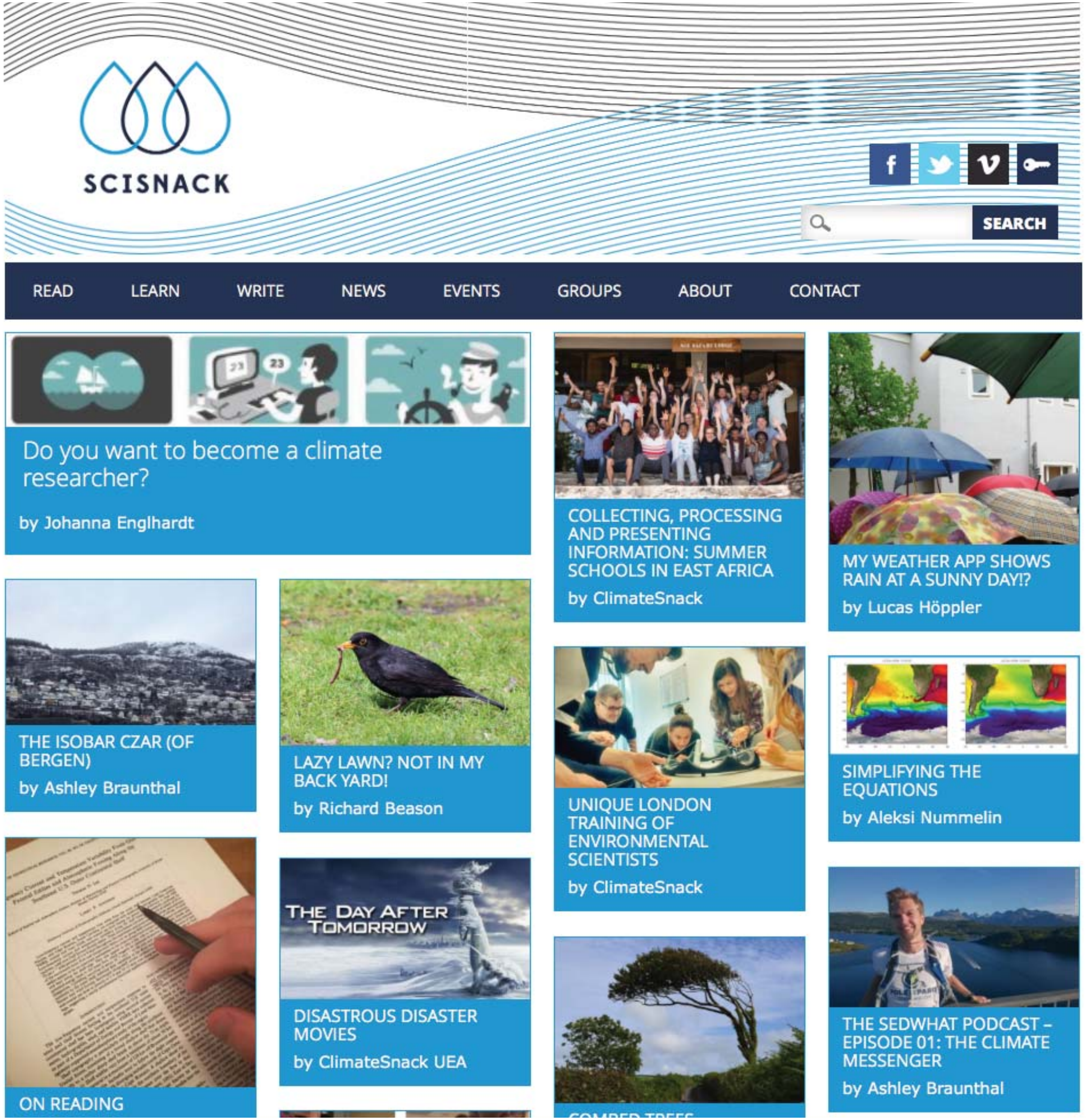
M5
Designing Posters
Feb 21–28, 2016 | Jun.-Professor Junginger

M6
Scientific Writing
Feb 28–Mar 6, 2016 | Professor Maslin

M7
Oral Presentations
Mar 6–13, 2016 | apl. Professor Trauth

M8
Bio-Geo Field and Laboratory Courses | 2
Feb 21–Mar 13, 2016 | all instructors

Spreading of infectious diseases
A networking model approach to understand the importance of air travel for the global spreading of infectious diseases
Author: Frank Brenner
Potsdam Institute for Climate Impact Research, Germany
fbrenner@pik-potsdam.de
Introduction
Infectious Diseases: Data Analysis
COMPLEX DYNAMICS OF MEASLES WITH VACCINATION
Tchuisseuh Roni, F.M.Moukam, C.Tchawoua
Measles Modelisation
Is the Future of Climate Research Hyperspectral?
Household Drought Vulnerability
BAR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Conservation Agriculture for Improved Resilience
and Food Security in Ndalani Community, Kenya
Dorcas Kalele
Summer School 2015 in Ethiopia

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