EGU General Assembly 2020
Online | 4–8 May 2020

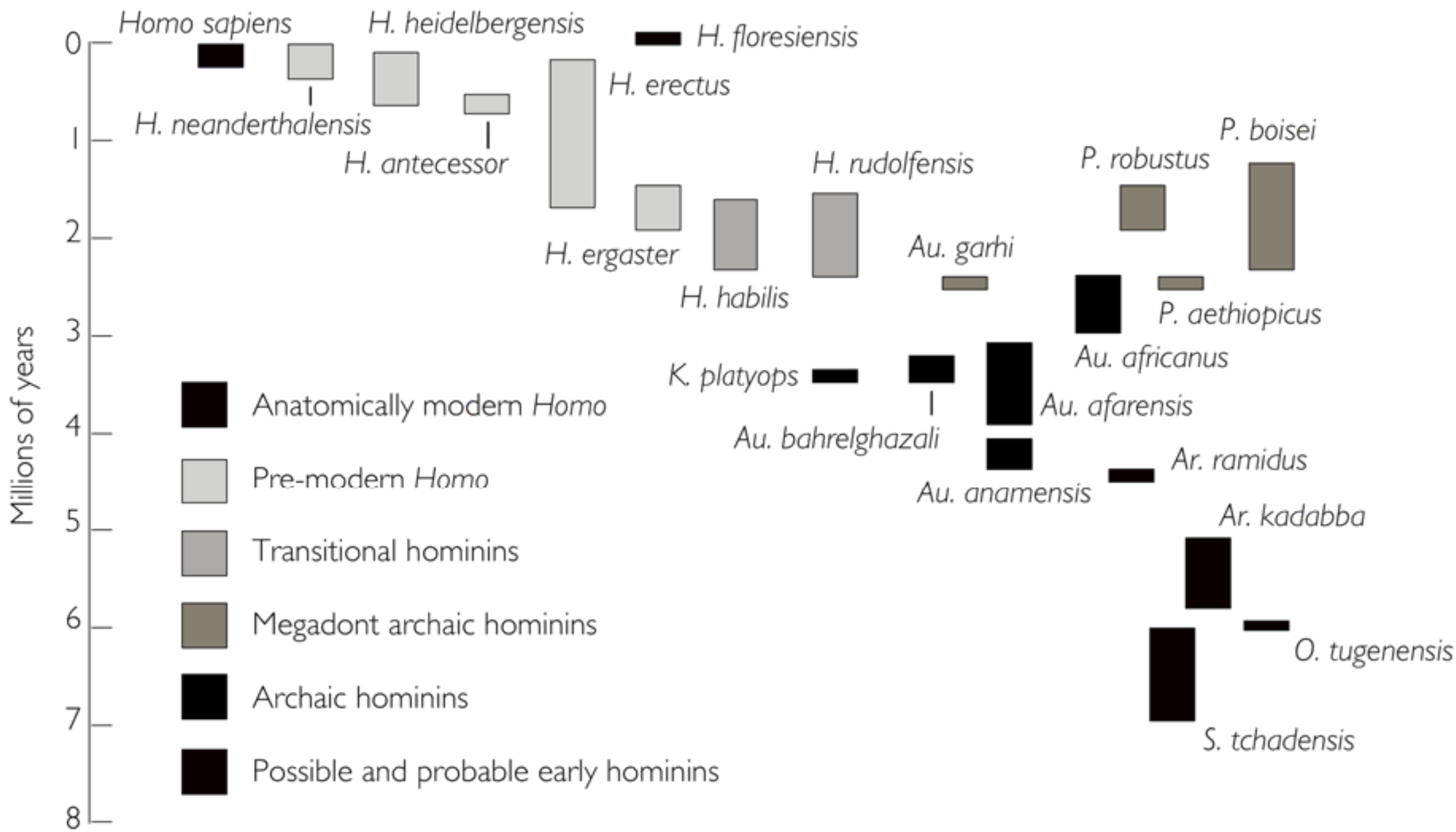
Universität Potsdam

Martin H. Trauth

Dust storms, blackouts and 50°C in the shade

Exploring the Roots of Humankind with MATLAB

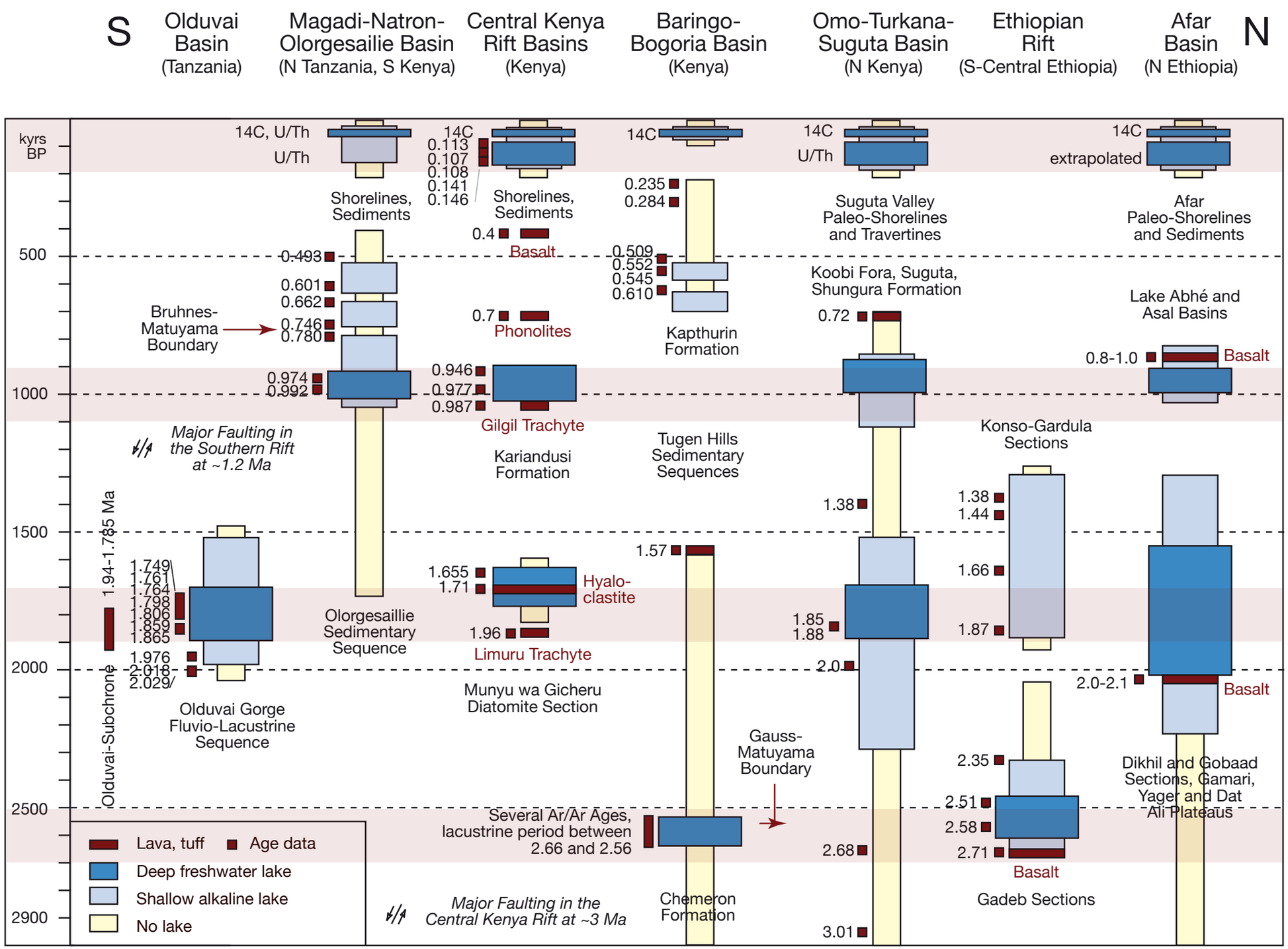
Tectonics, Climate and Evolution



Modified after Wood 2009 and some recent updates

TOYOTA

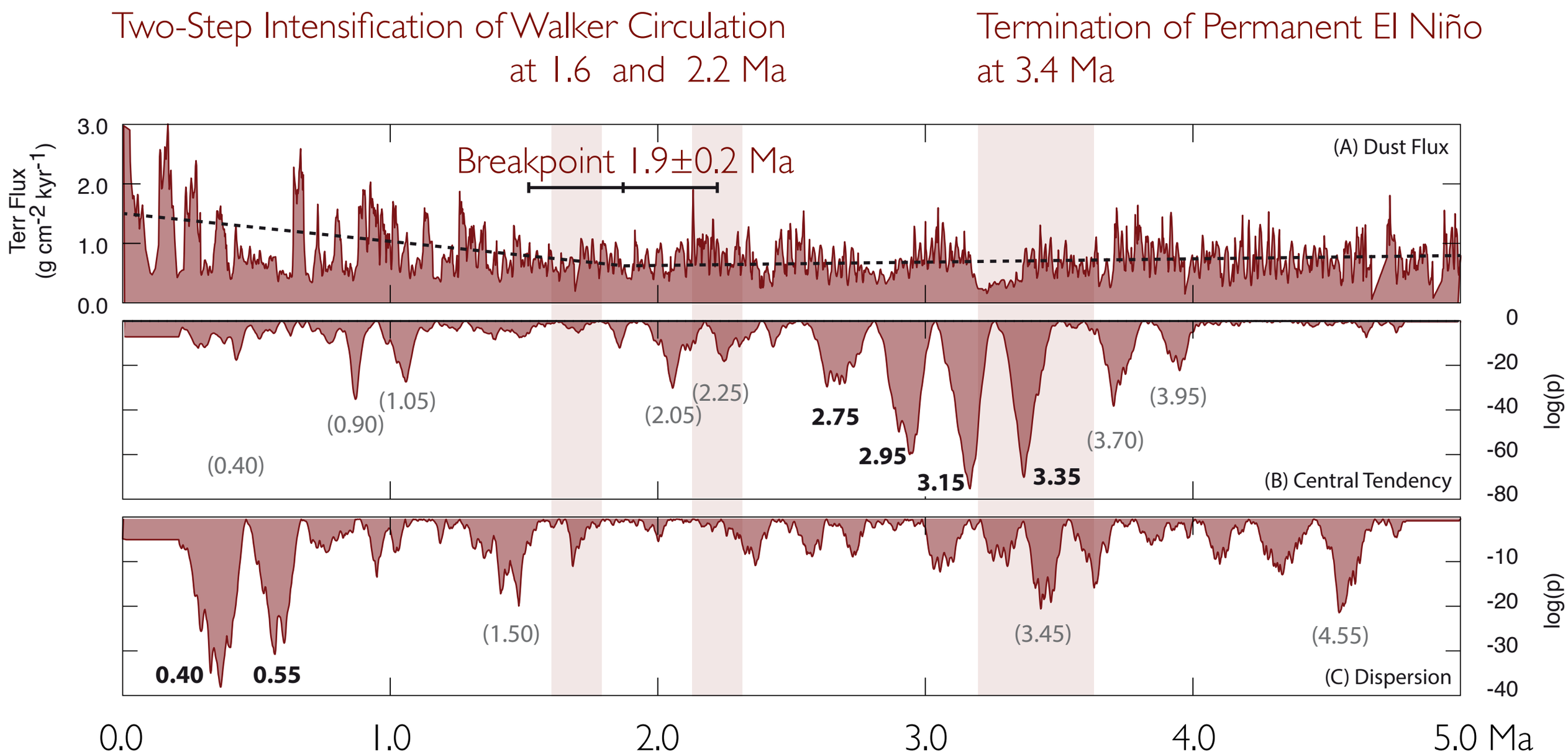
1 III 2 1m 3 4 5 6 7 8



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

Colors of Climate Change

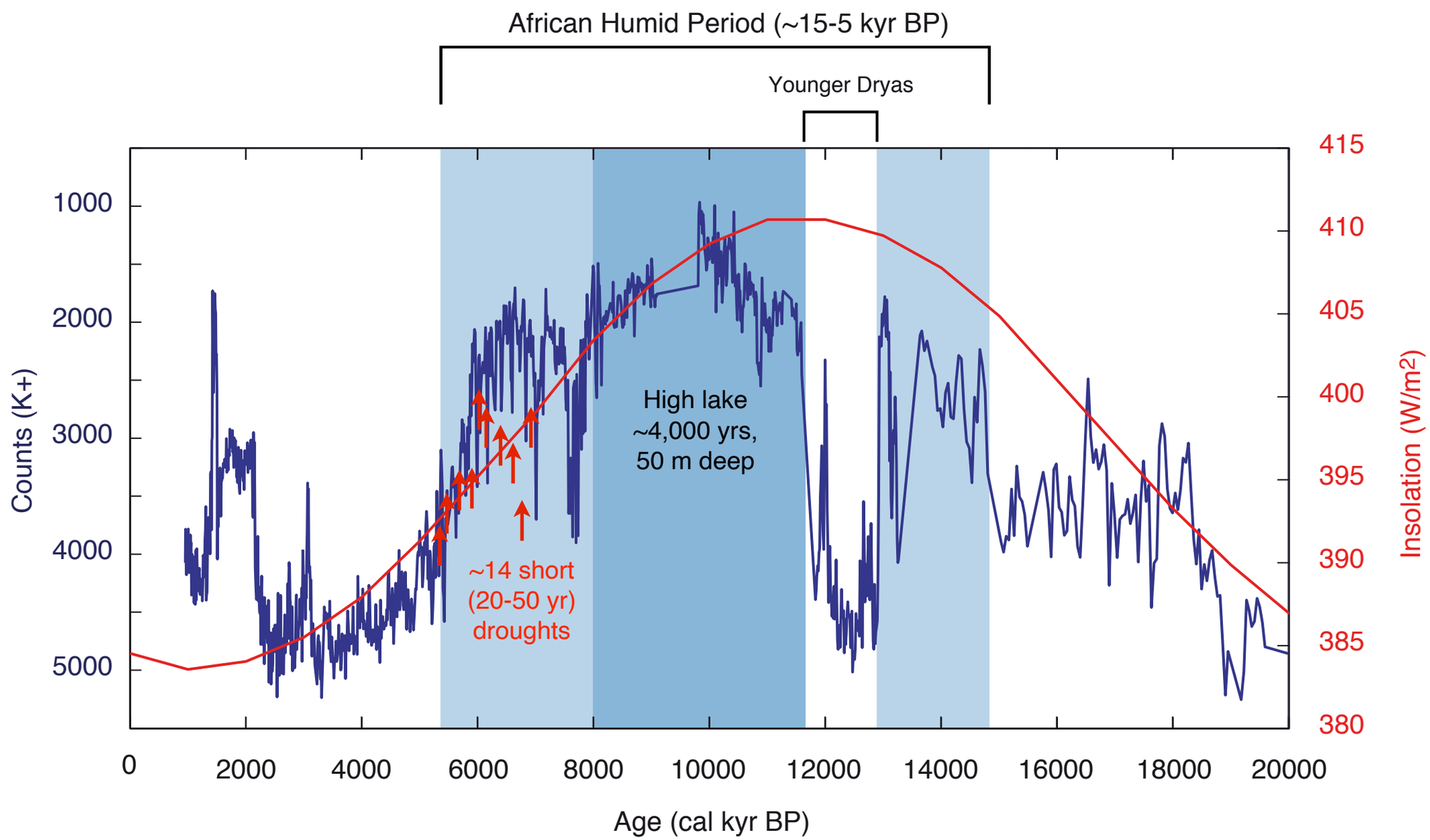
Climate Transitions and Human Evolution



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

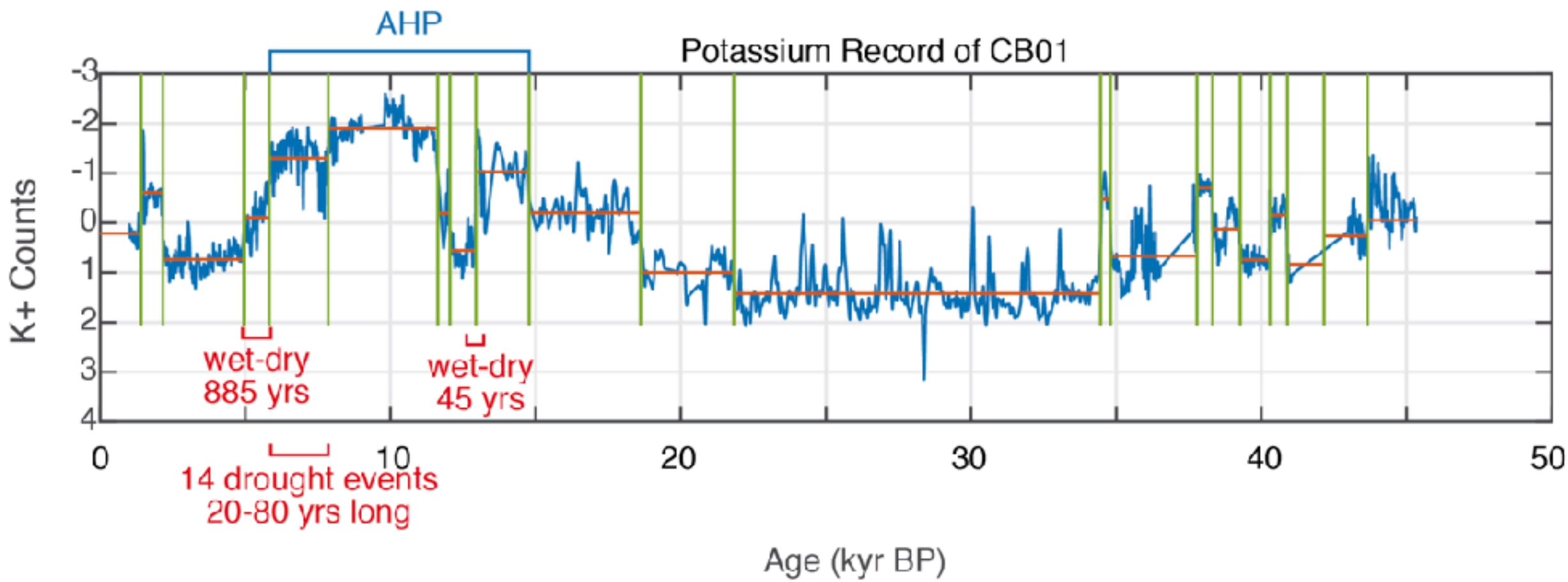
Climate Change and Change in Food Production

Early Herders | Fisher-Hunter-Gatherers



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

Detecting Climate Transitions using `findchangepts`



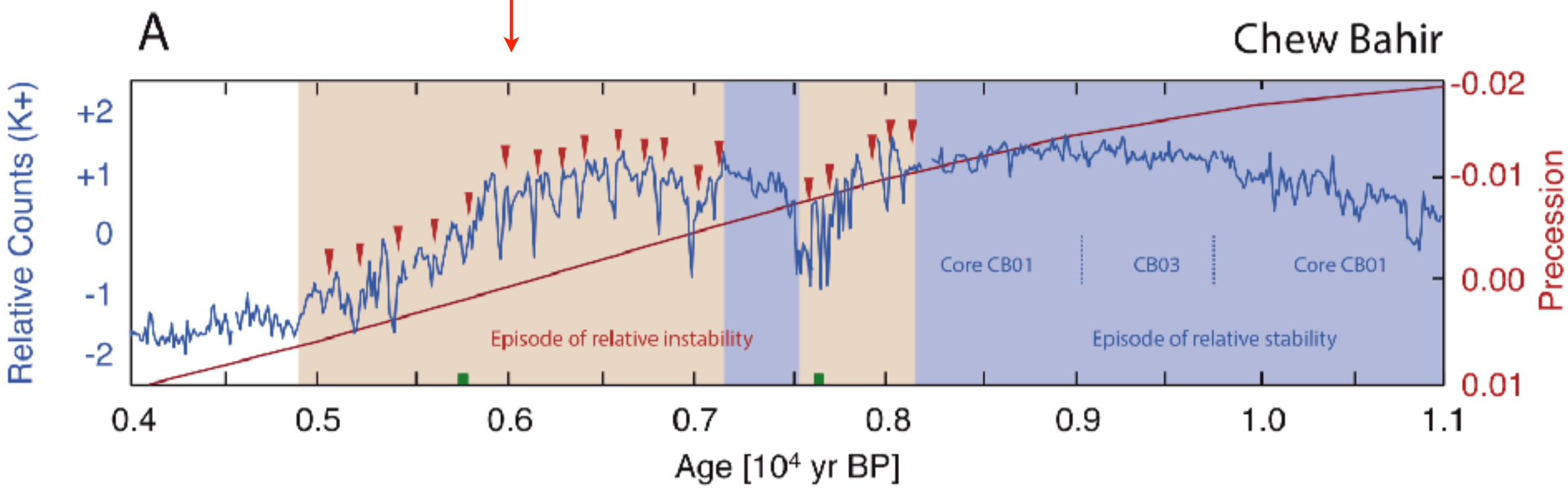
Trauth et al., Quaternary Research 2018

Detecting Tipping Points and Early Warnings

Dry Climate

Tipping Point at the Termination of the African Humid Period

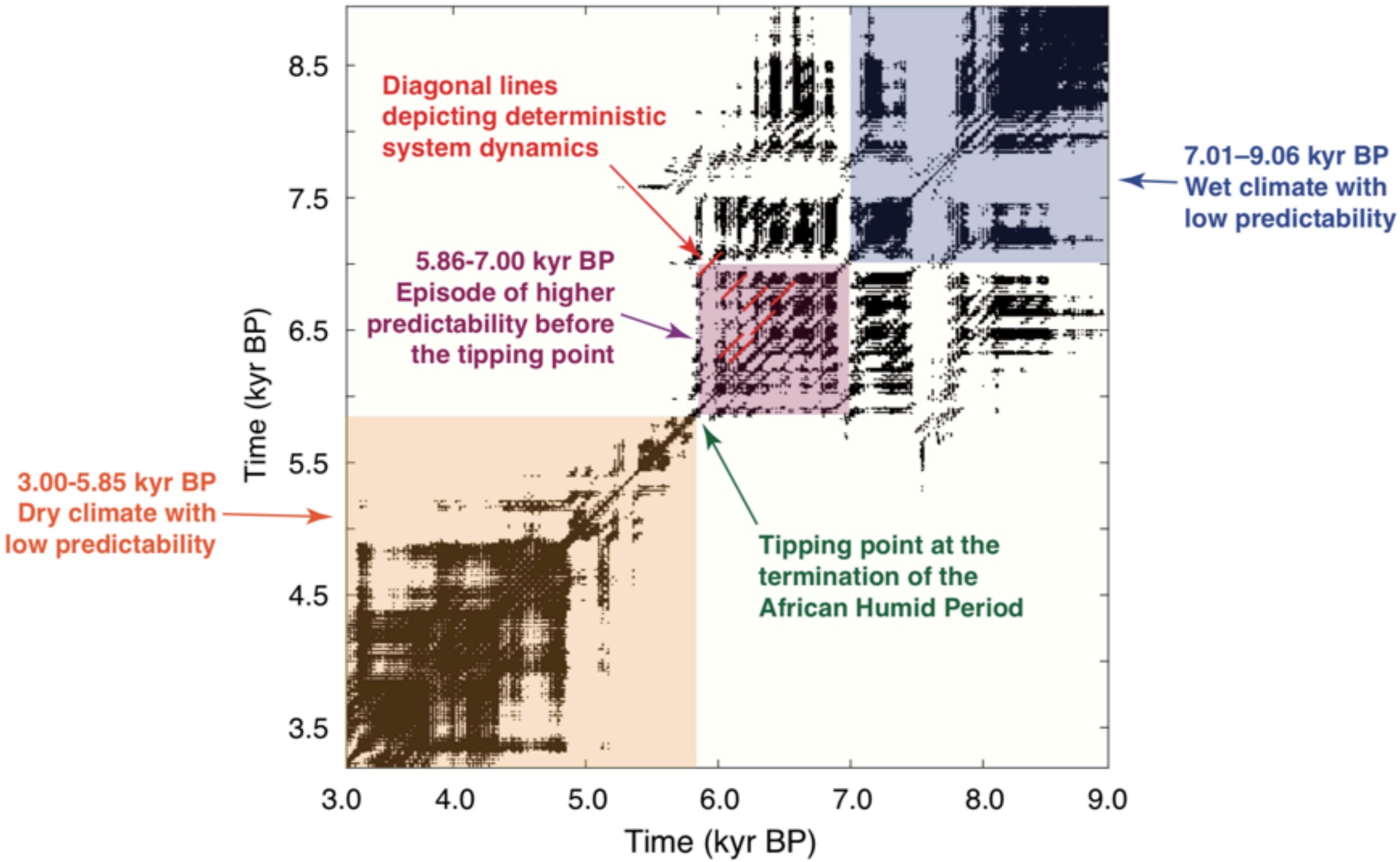
African Humid Period (25–30% wetter than today)



Precursors / Early Warnings
~14 short (20-50 yr) droughts

Trauth et al., Quaternary Research 2018

Recurrence Plots/Recurrence Quantification Analysis



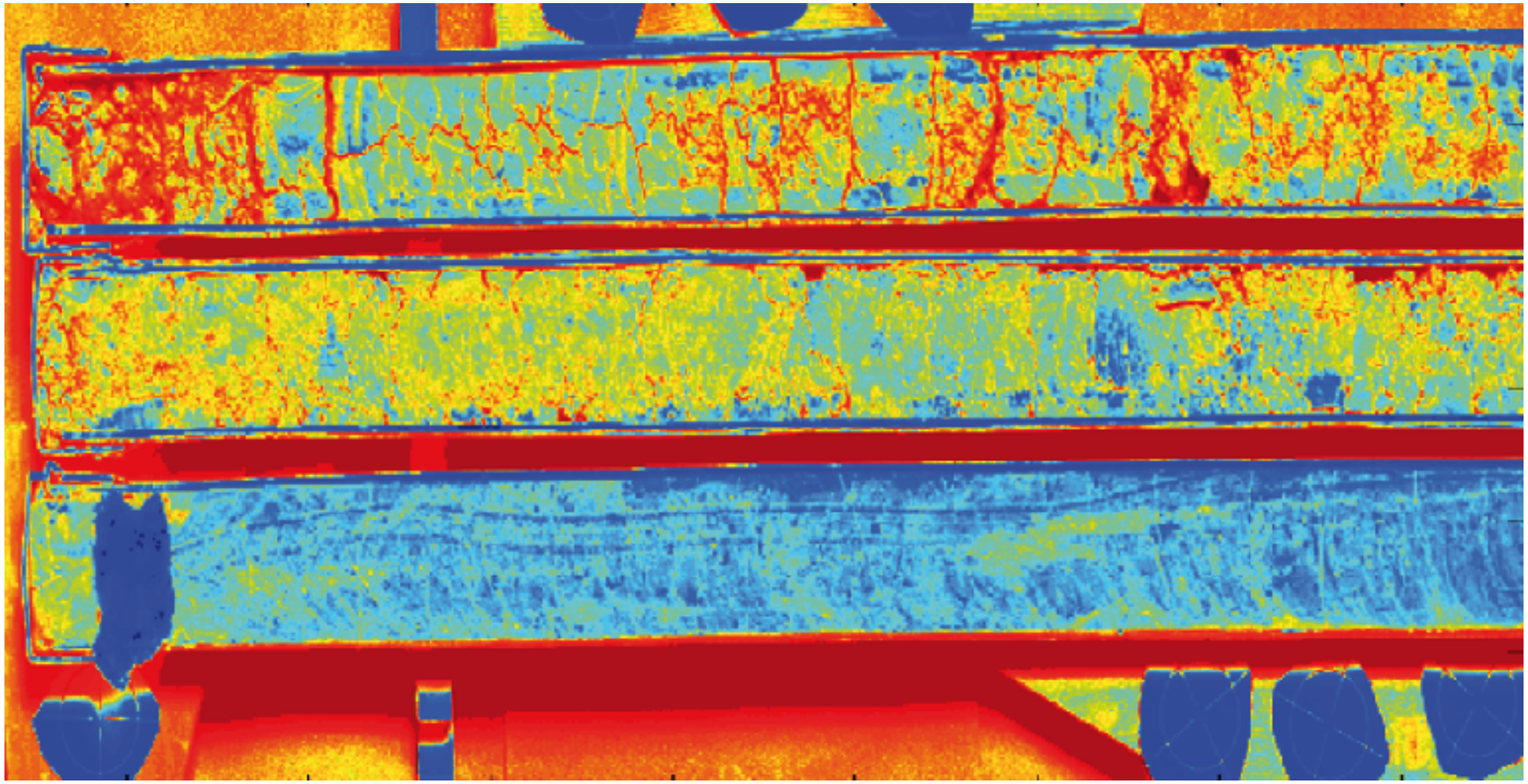
Trauth et al., Climate Dynamics 2019

Image Processing and Analysis

Hyperspectral Imaging of Lake Sediments

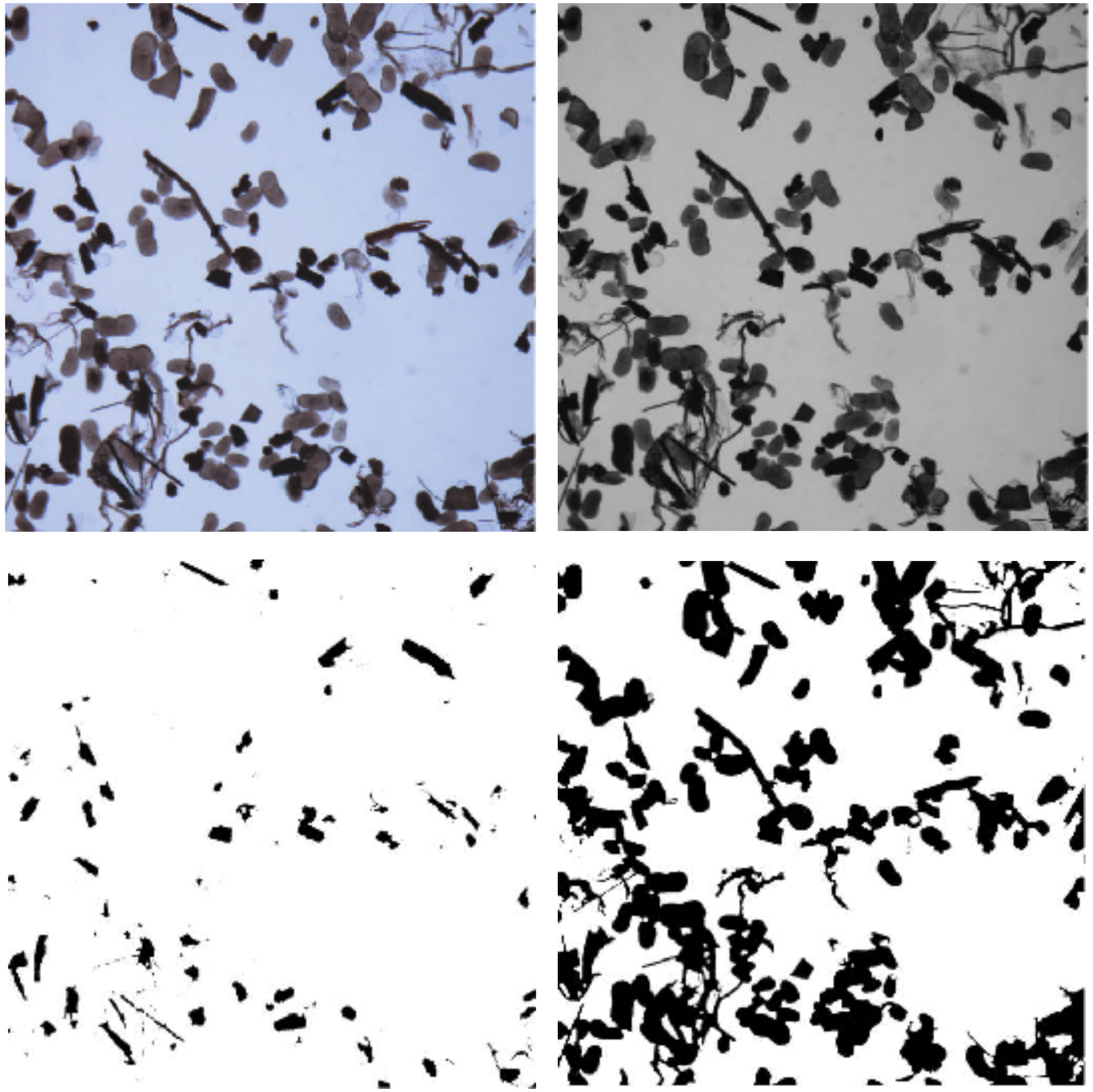
Fe^{3+}-O bounds of Chew Bahir Sediment Core CB-03

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



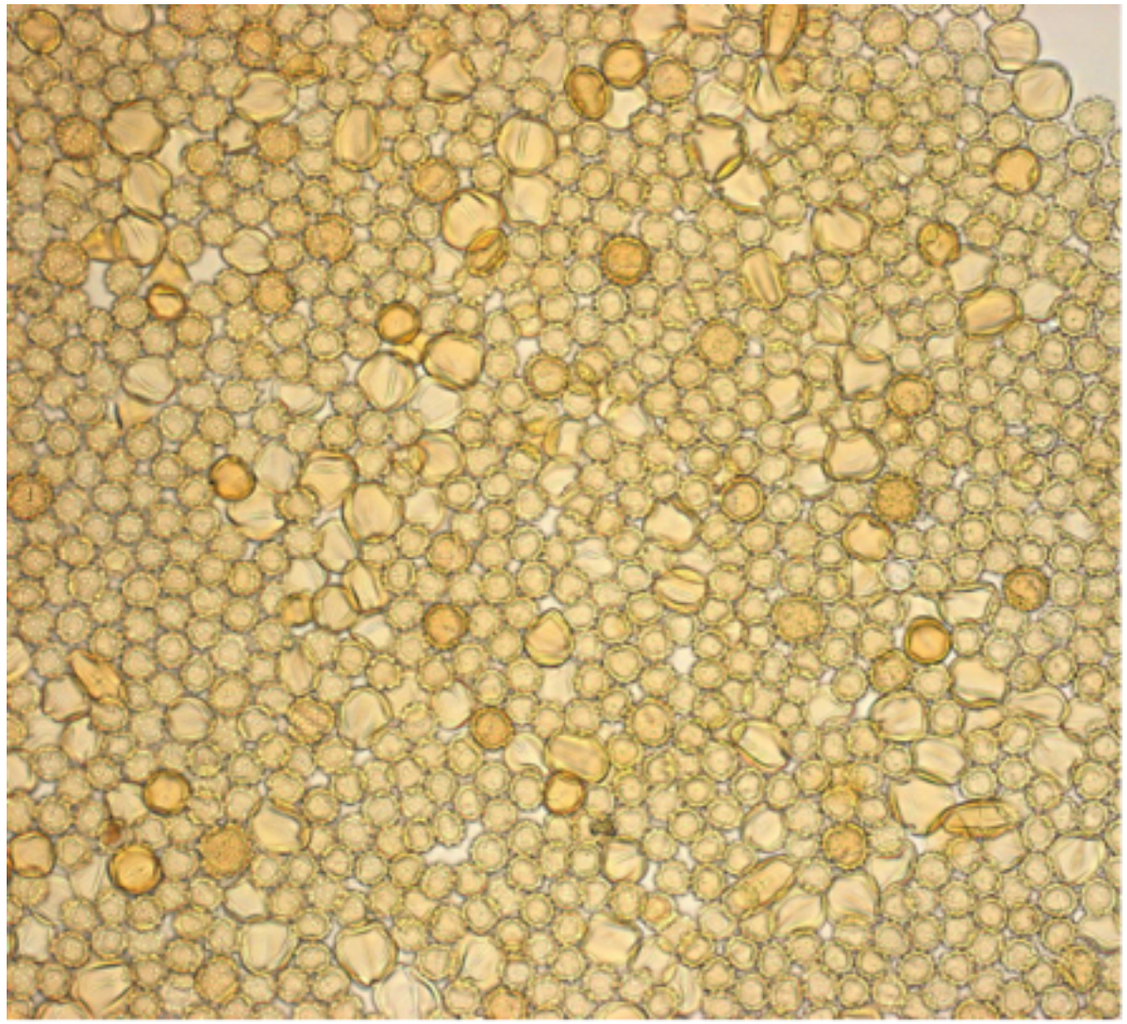
Schüürman, Foerster et al., in preparation

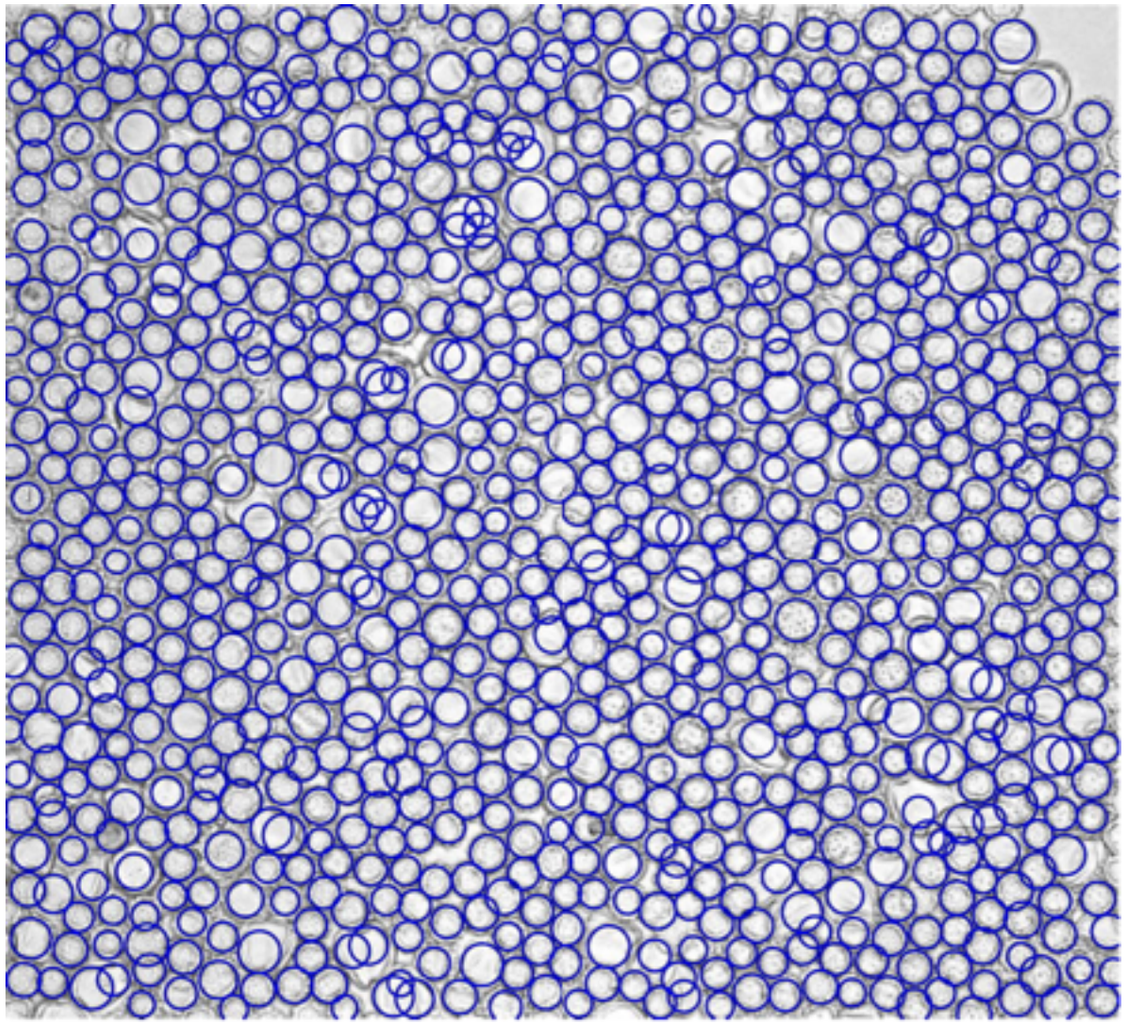
Quantification of Charcoal in Lake Sediments



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

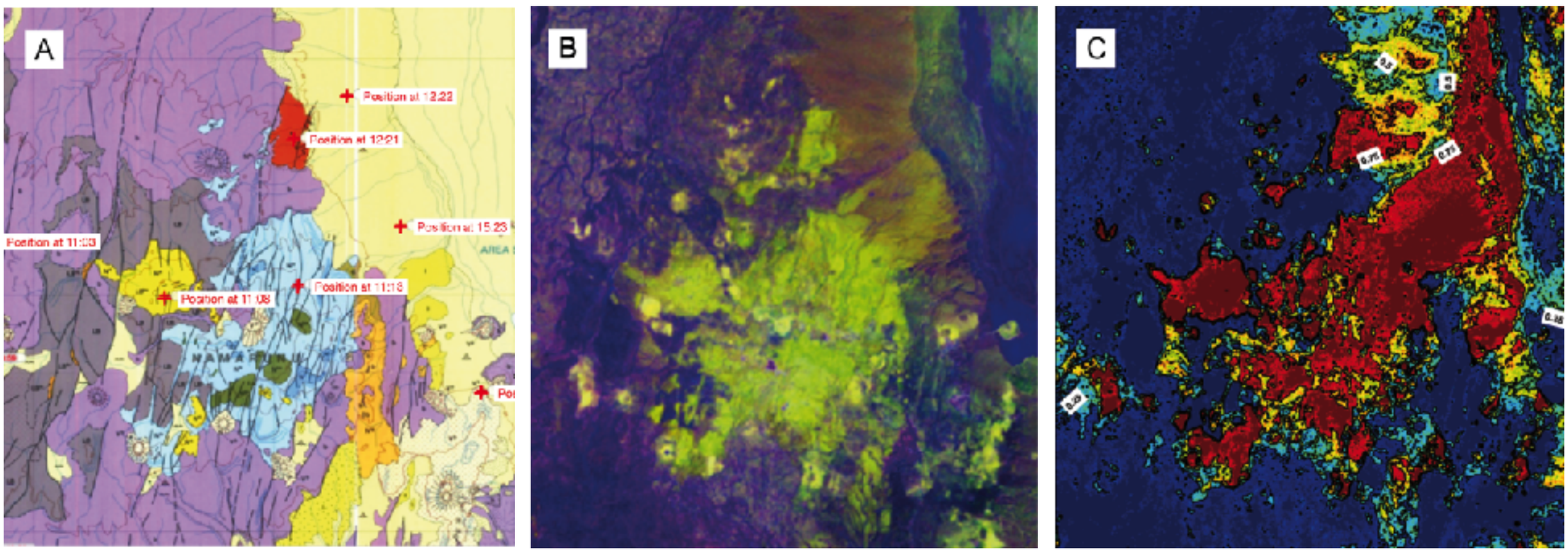
Counting Pollen using the Hough Transform





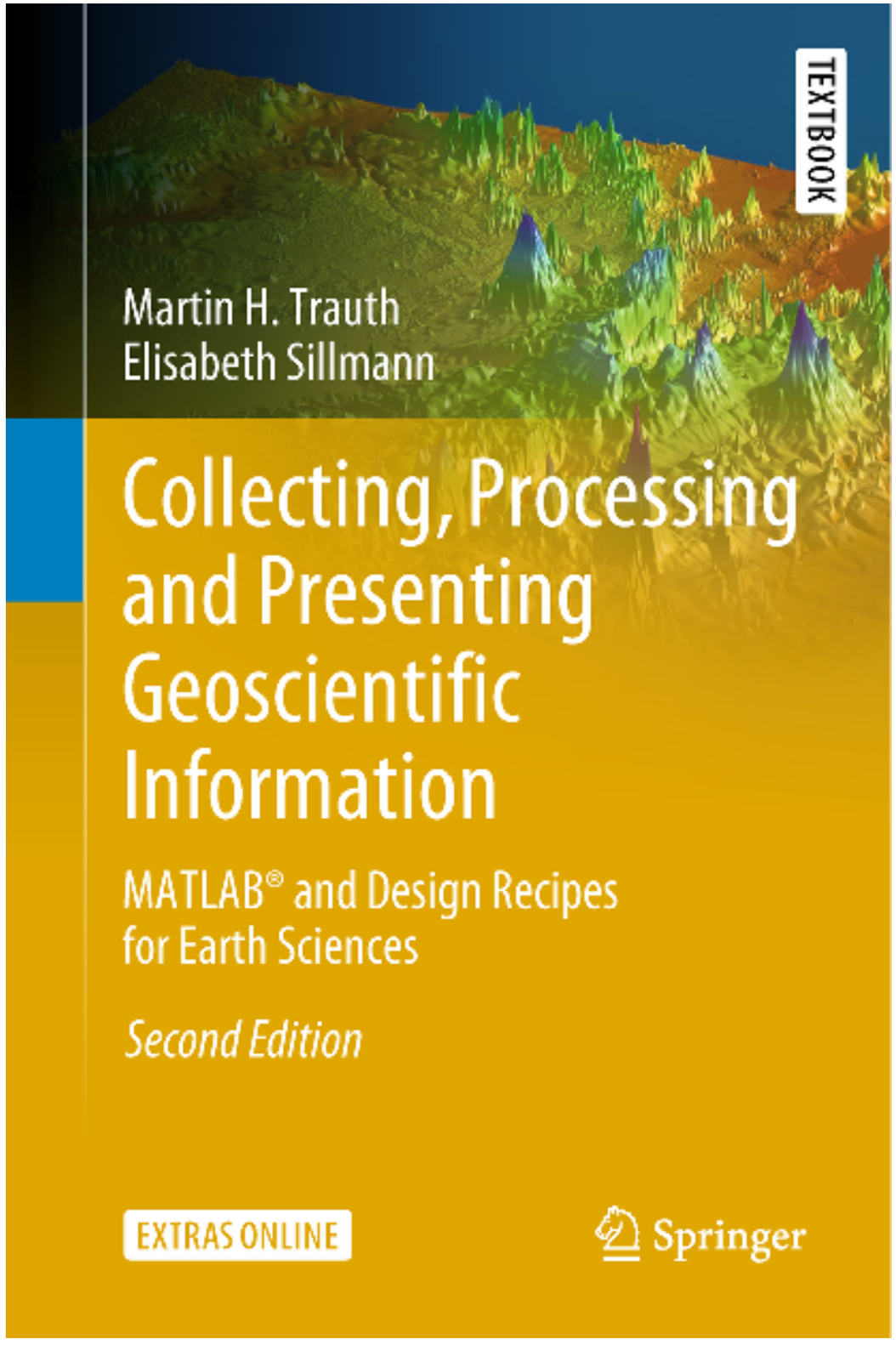
Trauth, MATLAB Recipes for Earth Sciences, 4th Edition, 2015

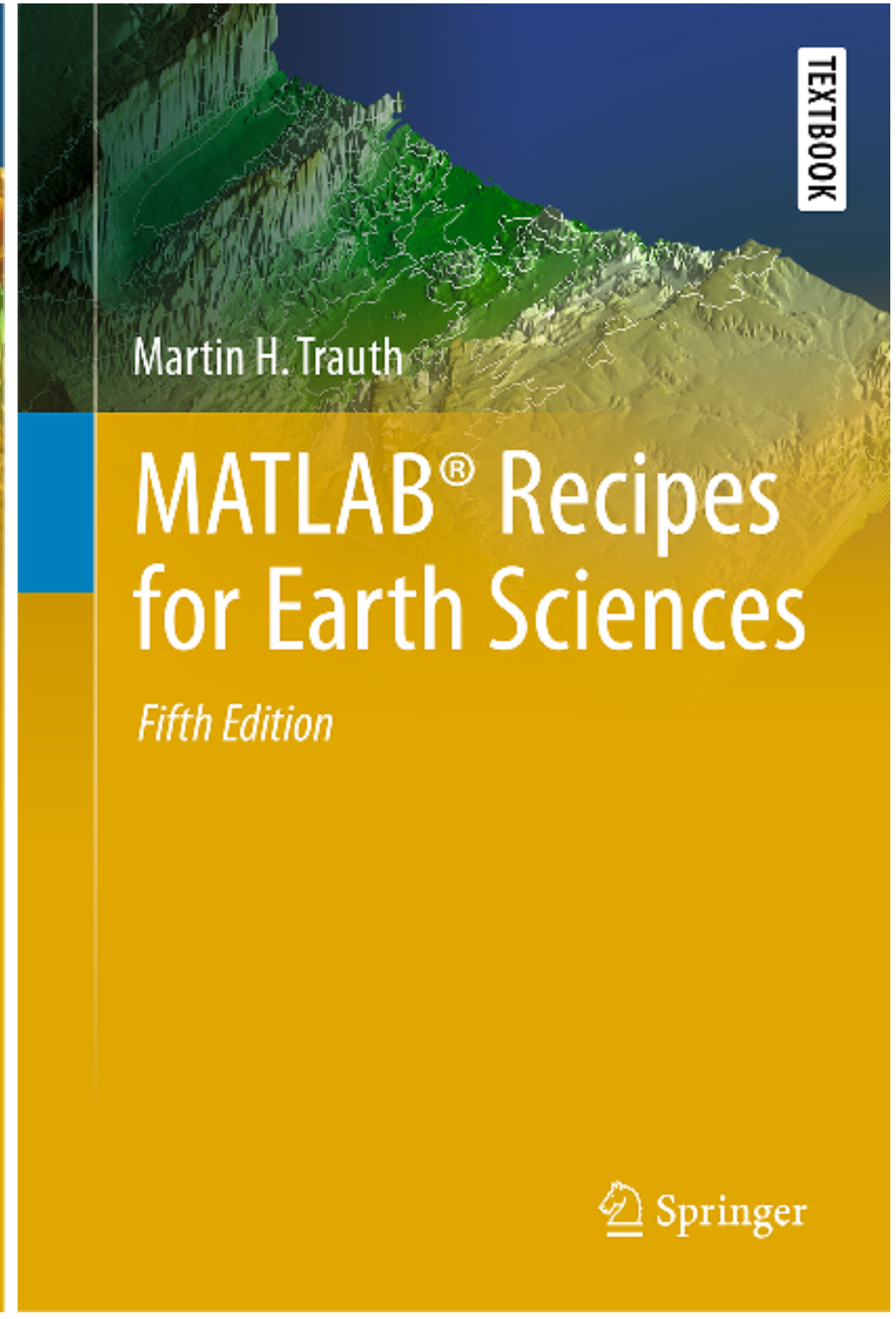
Unmixing Sediment Composition from Sat Images

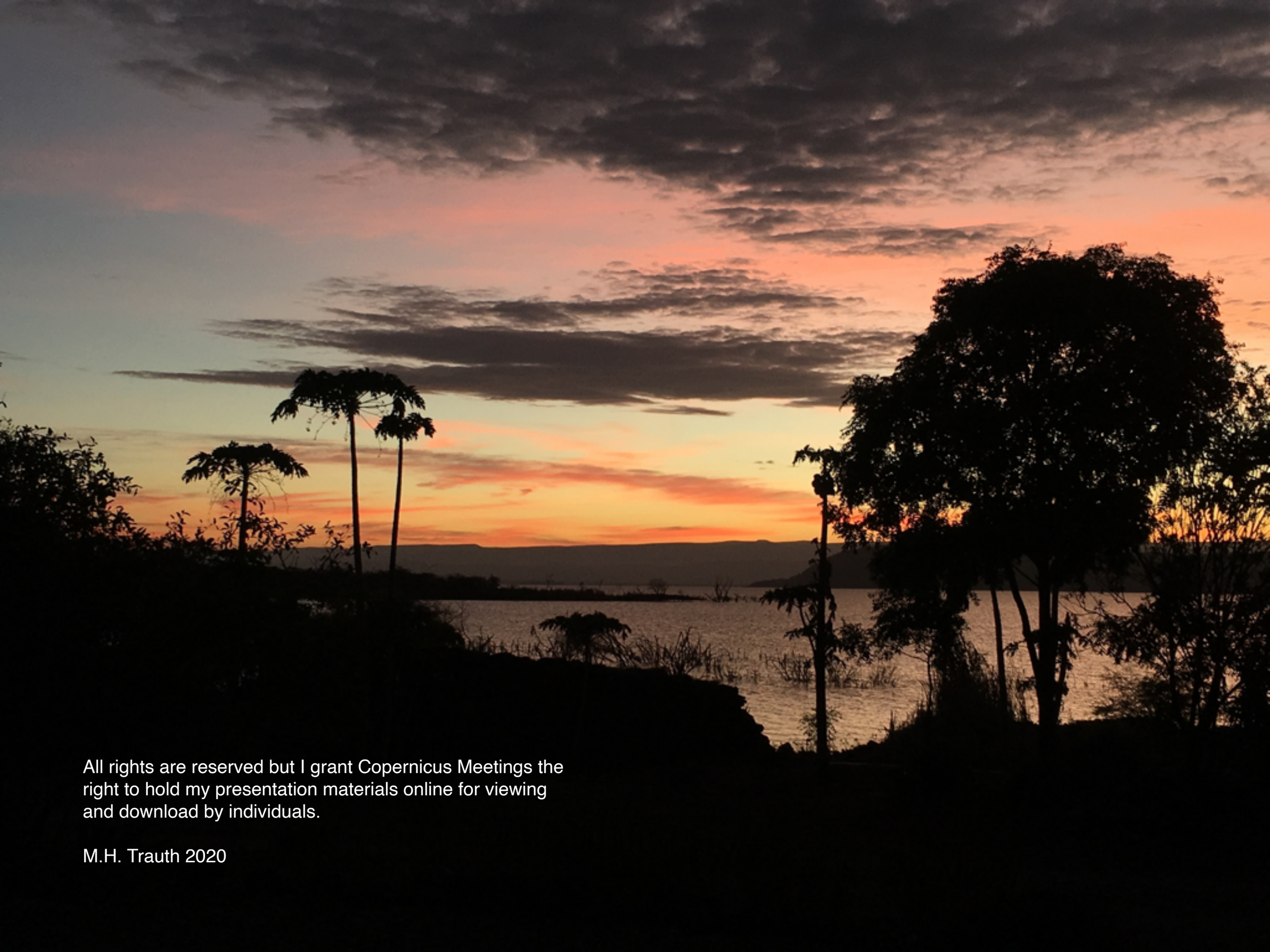


Ebert, Riedl, Trauth, unpublished results

Data Analysis Books with MATLAB


TEXTBOOK
Martin H. Trauth
Elisabeth Sillmann
Collecting, Processing and Presenting Geoscientific Information
MATLAB® and Design Recipes for Earth Sciences
Second Edition
EXTRAS ONLINE
Springer


TEXTBOOK
Martin H. Trauth
MATLAB® Recipes for Earth Sciences
Fifth Edition
Springer



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M.H. Trauth 2020