Analysis of some data from microstructure database

Andy Pickering

May 31, 2017

Contents

1 Overview

Analysis of some global microstructure datasets, to compare the results to my EQ14 analysis. Specifically I am looking at γ and the ratio of ϵ_χ/ϵ, where ϵ_χ is computed as

$$\epsilon_\chi = \frac{N^2\chi}{2\gamma T_z^2} \tag{1}$$

, in the framework of trying to estime ϵ from thermistor profiles.

2 Data

- Data are from the microstructure data base at `https://microstructure.ucsd.edu/`. I am using matlab files made from the raw database files by Amy Waterhouse (shared w/ me via Google drive).
- IWISE 11 vmp data were shared with me by Lou St. Laurent.
- EQ14 data are from Jim Moum and company.

3 Code

Code and results (including figures and these notes) are available in a github repository: `https://github.com/OceanMixingGroup/Analysis/tree/master/Andy_Pickering/micro_database`

- `Plot_micro_data_AP.m`
- `Plot_hist_chieps_chi_all.m`
- `Plot_epschi_eps_2Dhist_all.m`
- `Plot_chi_eps_norm_all.m`

4 Results

4.1 Histograms of ϵ_χ/ϵ

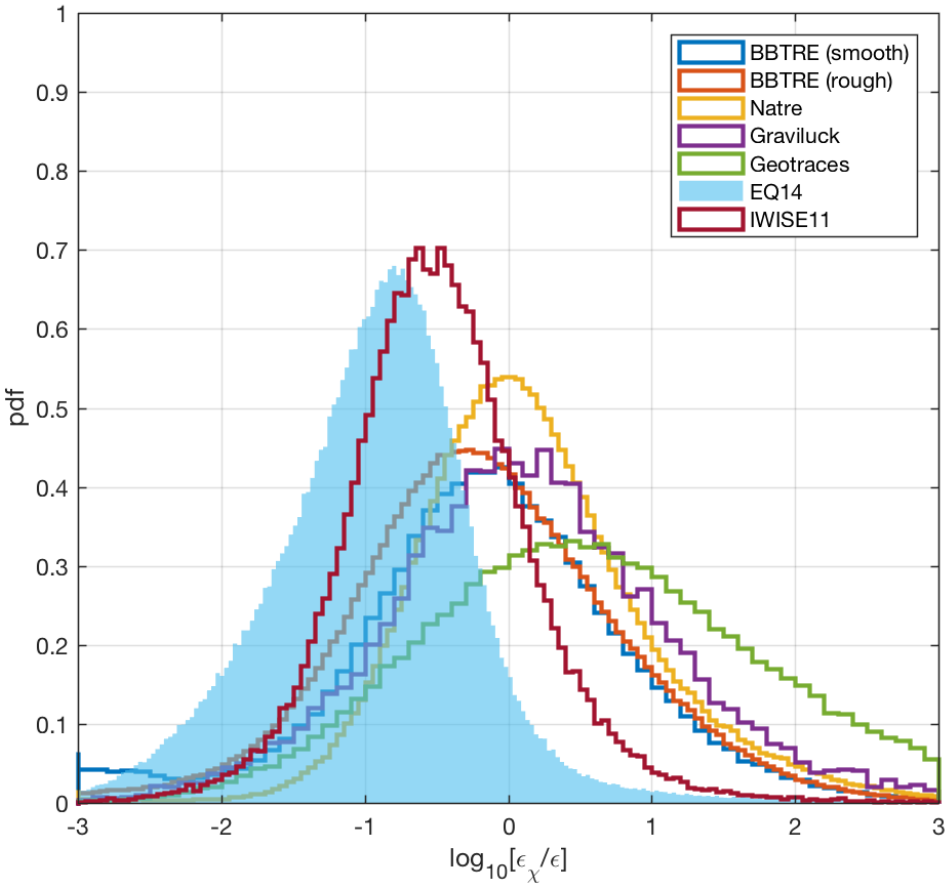

Figure 1: Histograms of (log10) the ratio ϵ_χ/ϵ.

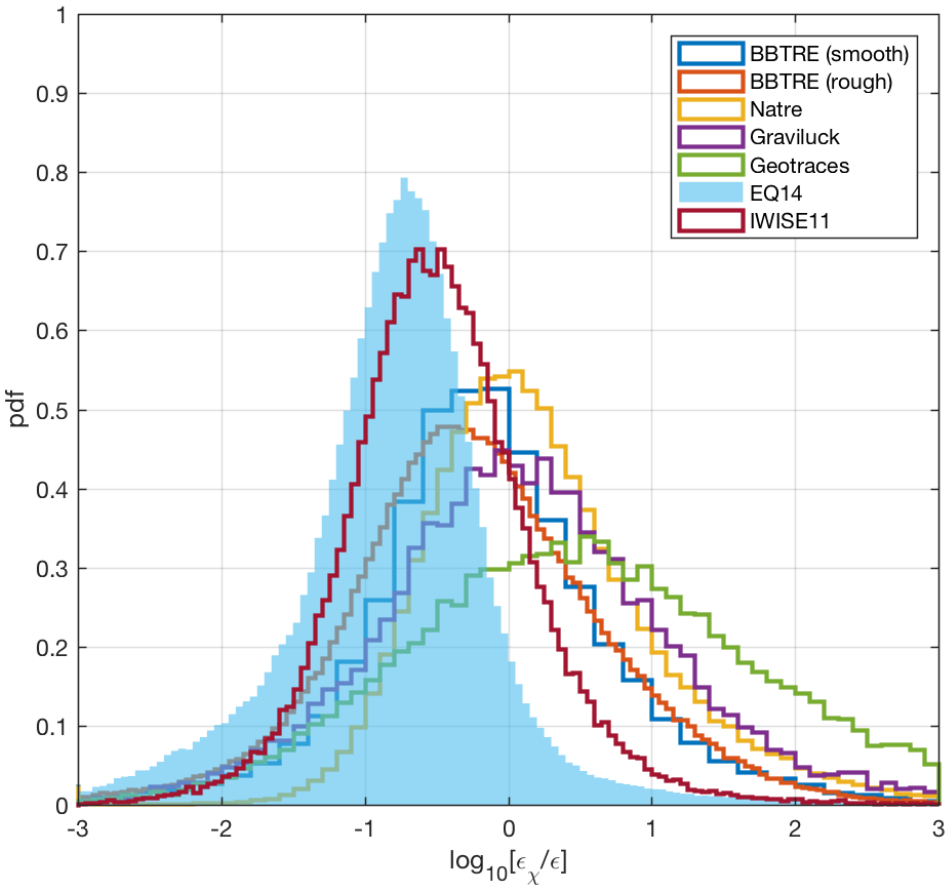

Figure 2: Histograms of (log10) the ratio ϵ_χ/ϵ. Values below estimated noise level of $log_{10}[\epsilon] = -10$ discarded.

4.2 Plots of normalized χ vs ϵ

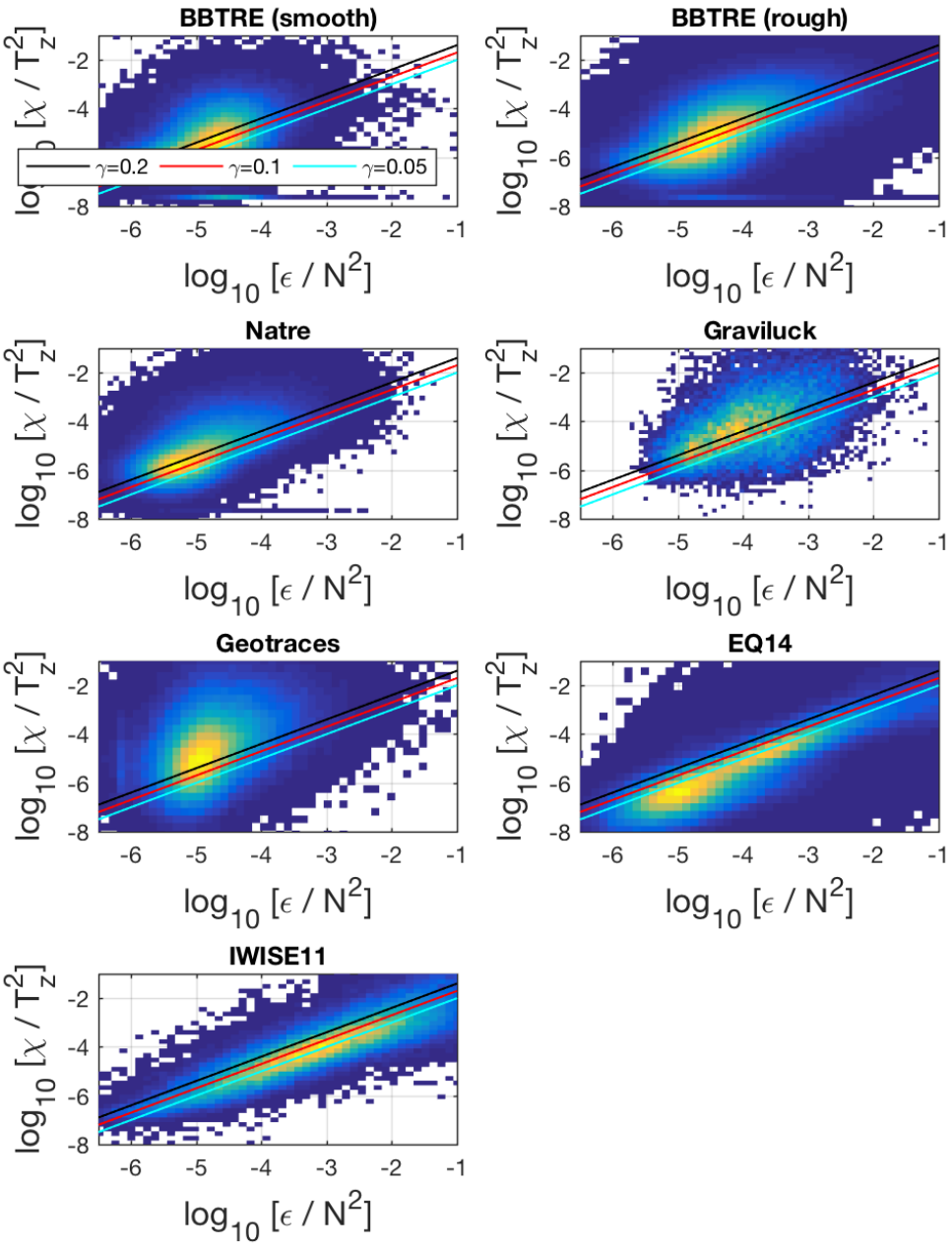

Figure 3: χ vs ϵ, normalized such that the slope is proportional to γ.

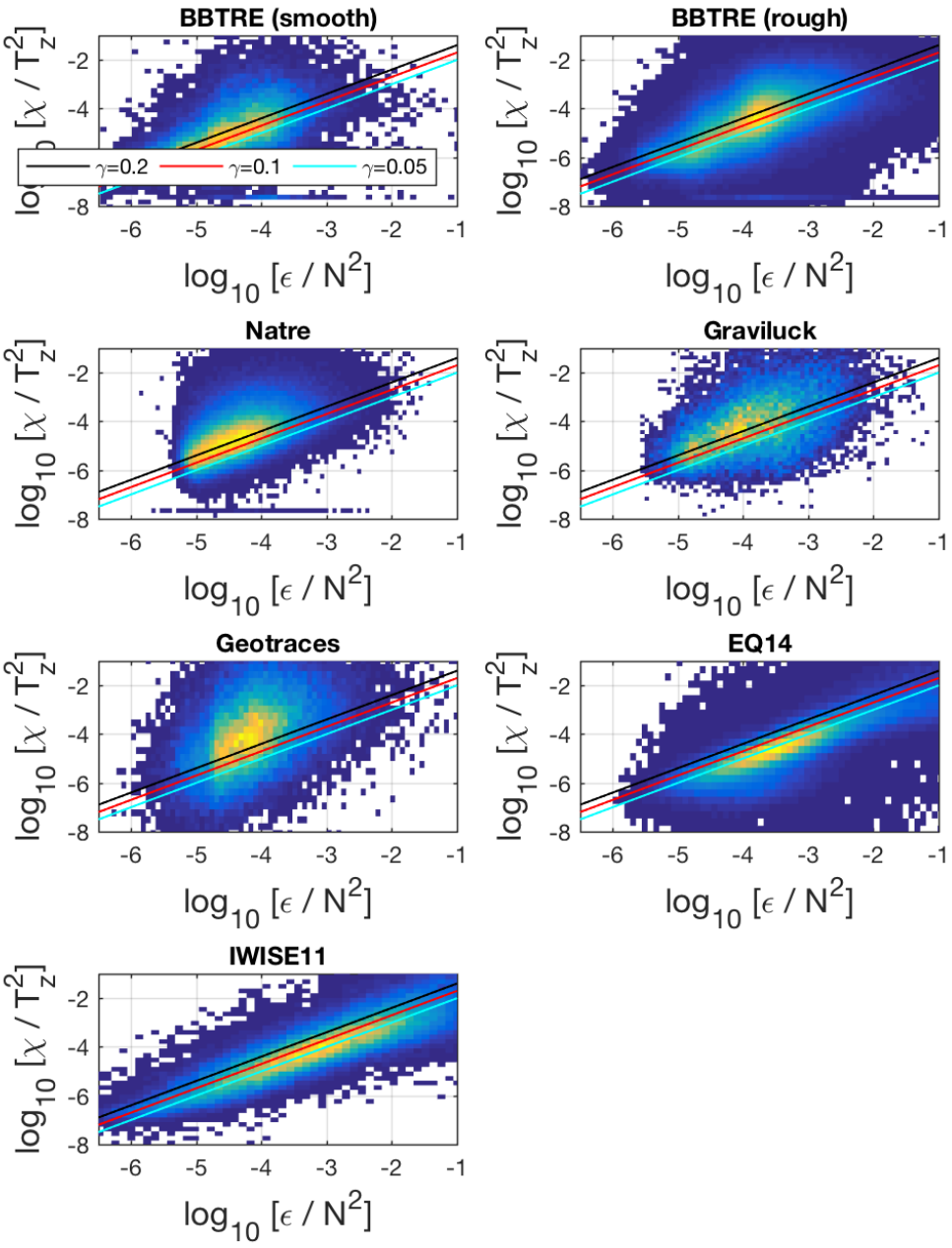

Figure 4: χ vs ϵ, normalized such that the slope is proportional to γ. Values below estimated noise level of $log_{10}[\epsilon] = -10$ discarded.

4.3 2D Histograms of ϵ_χ vs ϵ

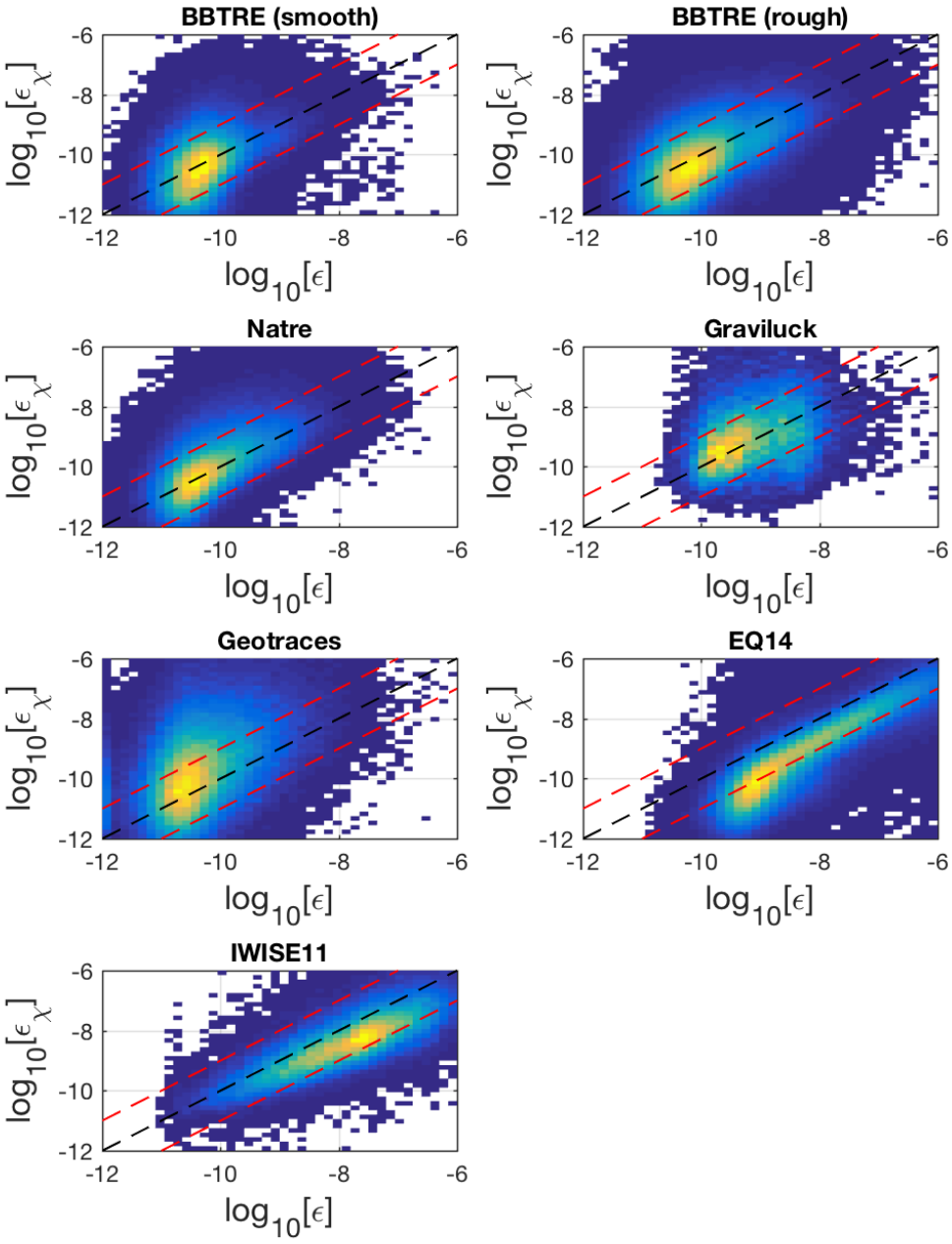

Figure 5: 2D histograms of ϵ_χ vs ϵ.

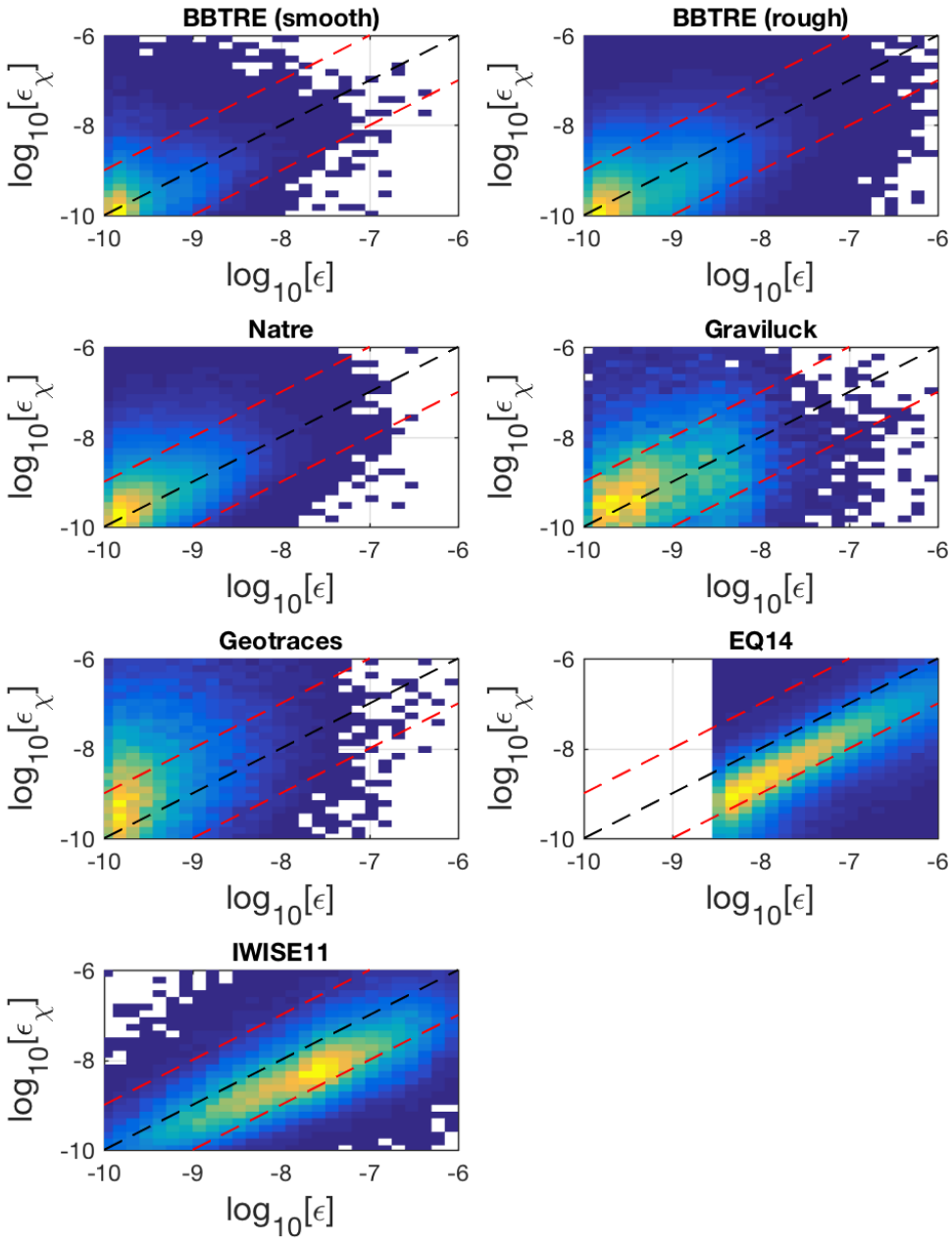

Figure 6: 2D histograms of ϵ_χ vs ϵ. Values below estimated noise level of $log_{10}[\epsilon] = -10$ discarded.