

Analysis of some data from microstructure database

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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

$$\epsilon_\chi = \frac{N^2\chi}{2\gamma T_z^2} \quad (1)$$

, in the framework of trying to estimate 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

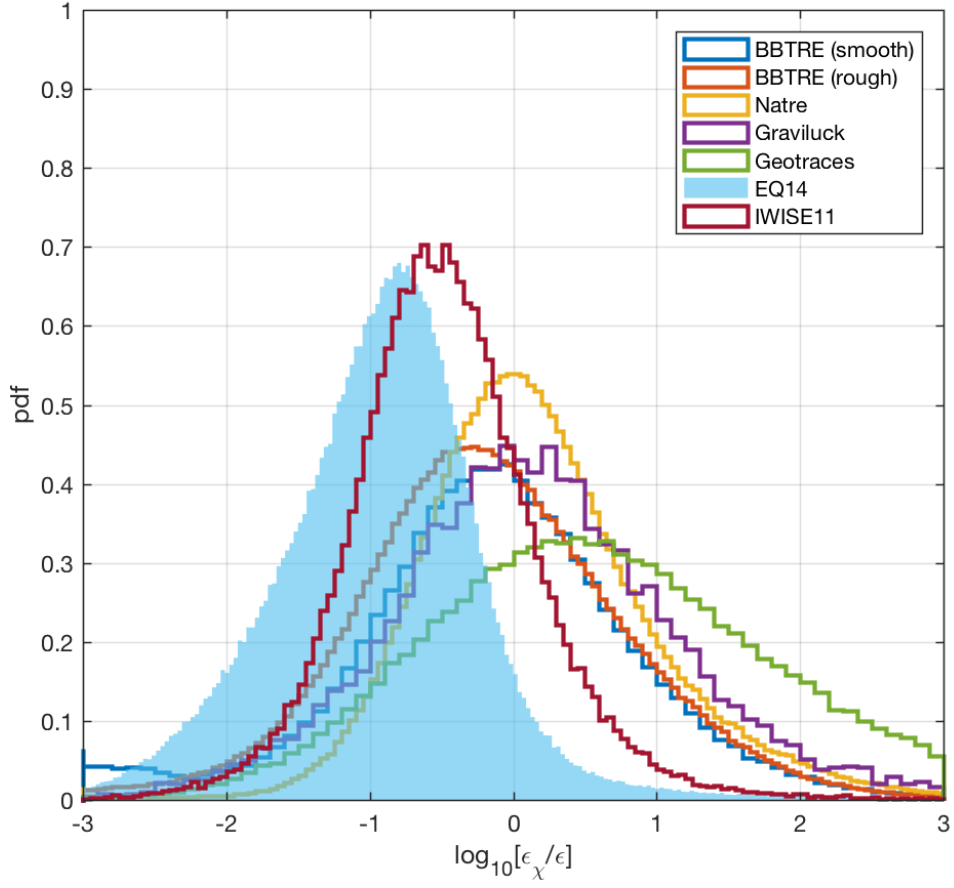


Figure 1: Histograms of (\log_{10}) the ratio ϵ_{χ}/ϵ .

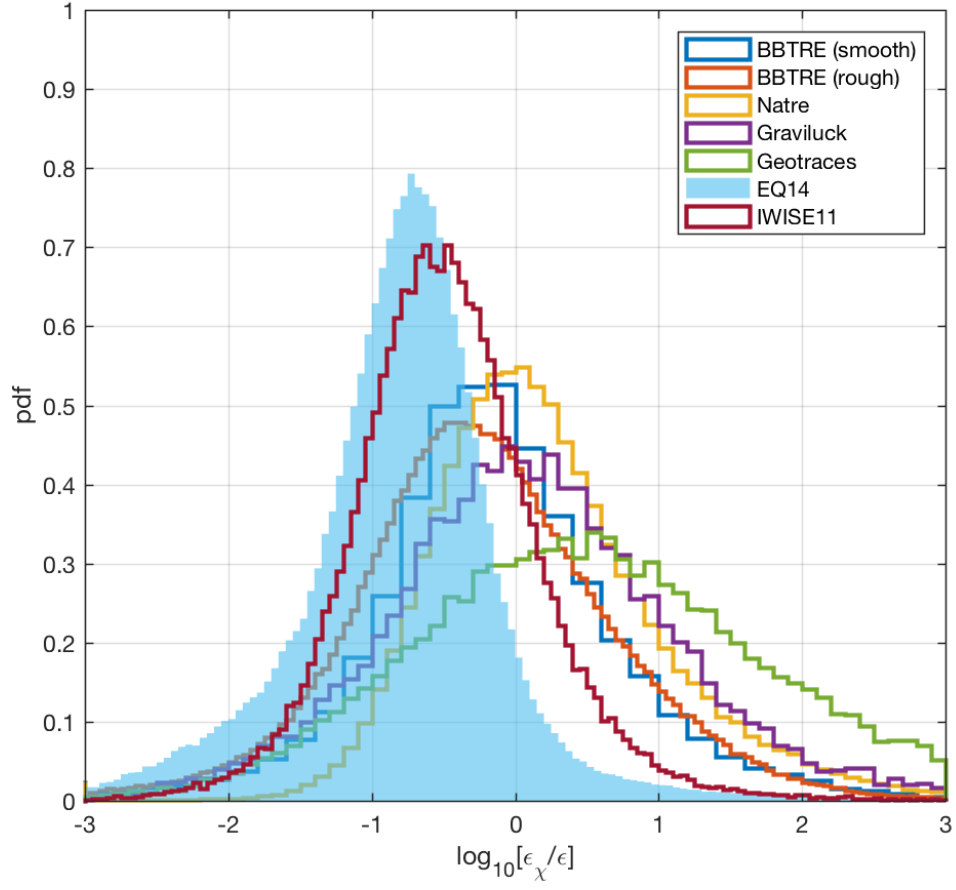


Figure 2: Histograms of (\log_{10}) the ratio ϵ_{χ}/ϵ . Values below estimated noise level of $\log_{10}[\epsilon] = -10$ discarded.

4.2 Plots of normalized χ vs ϵ

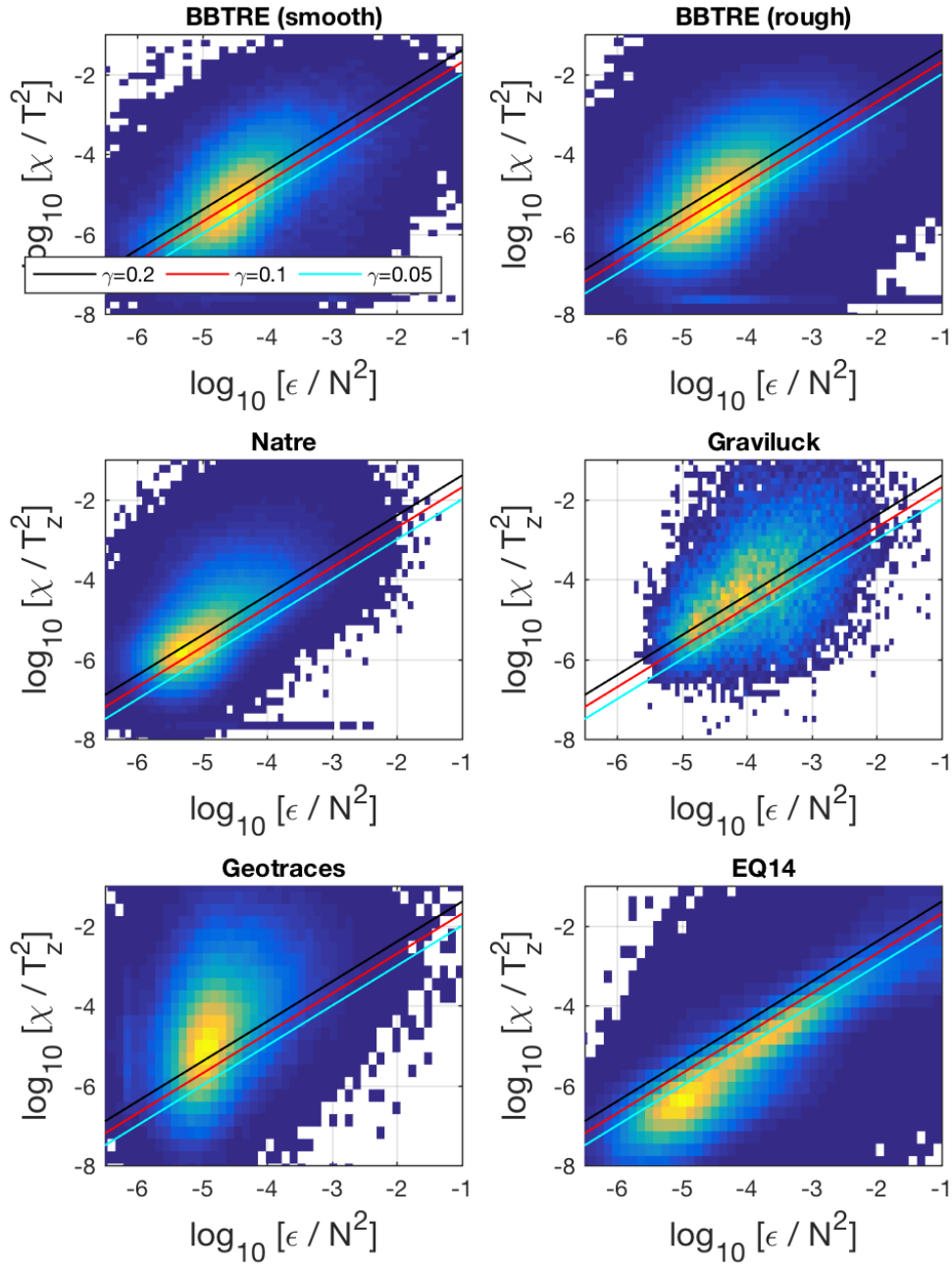


Figure 3: χ vs ϵ , normalized such that the slope is proportional to γ .

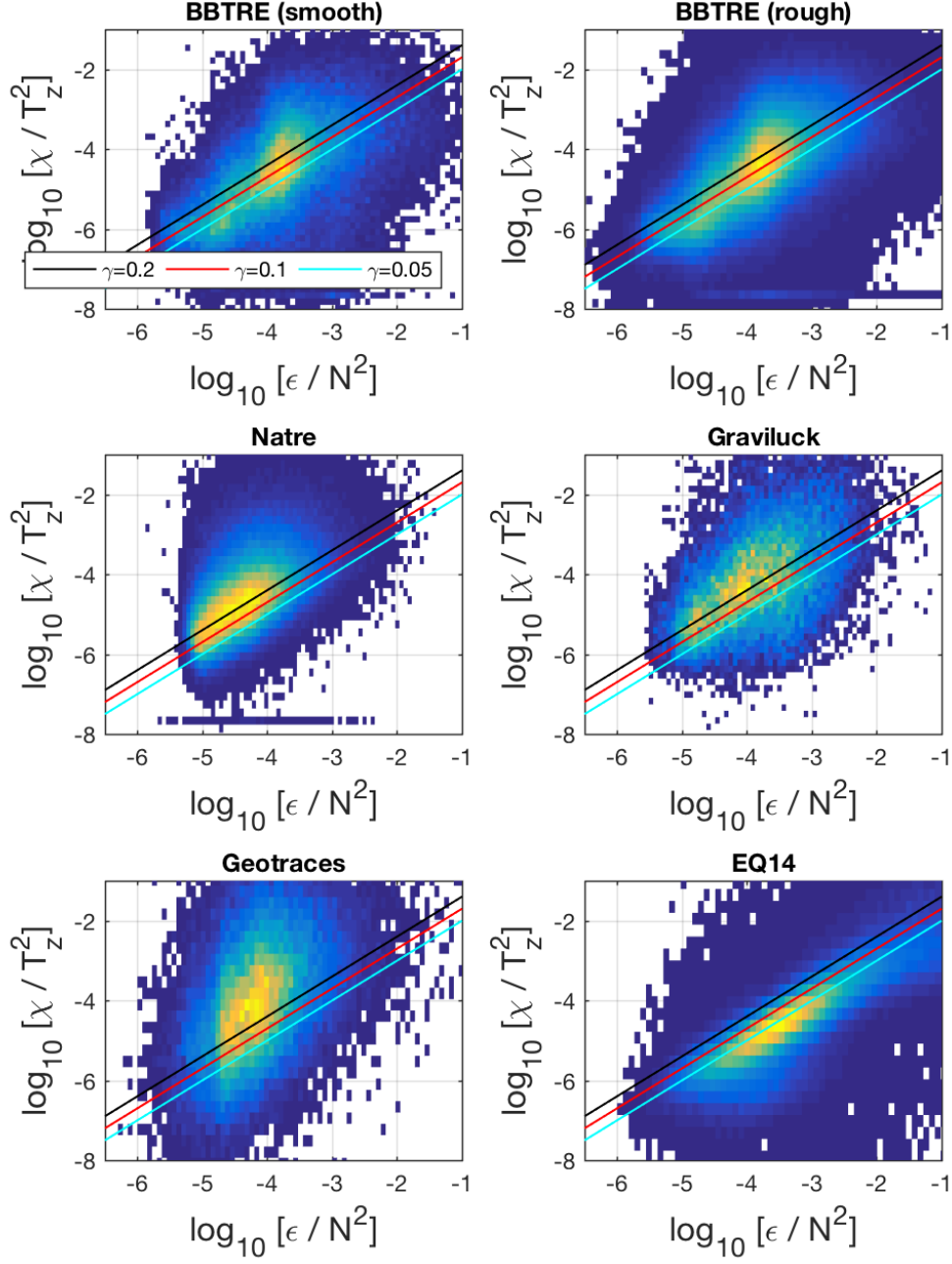


Figure 4: χ vs ϵ , normalized such that the slope is proportional to γ . Values below estimated noise level of $\log_{10}[\epsilon] = -10$ discarded.

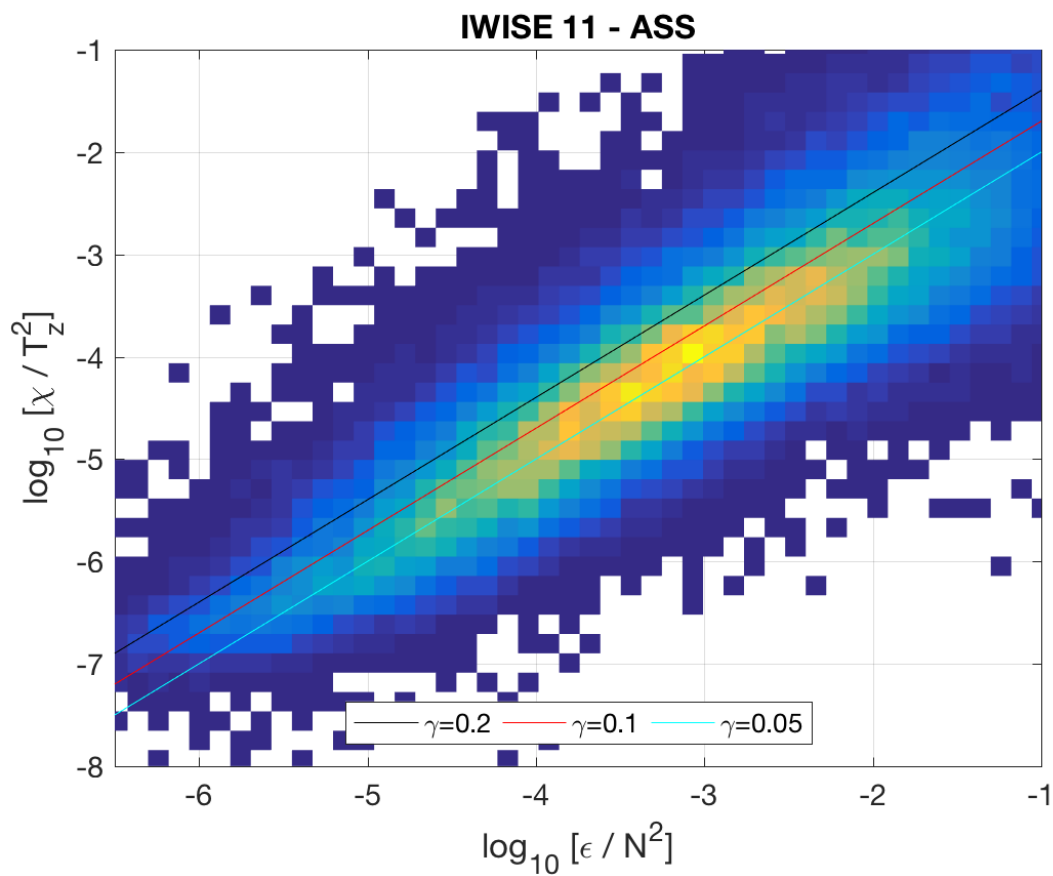


Figure 5: χ vs ϵ , normalized such that the slope is proportional to γ .

4.3 2D Histograms of ϵ_χ vs ϵ

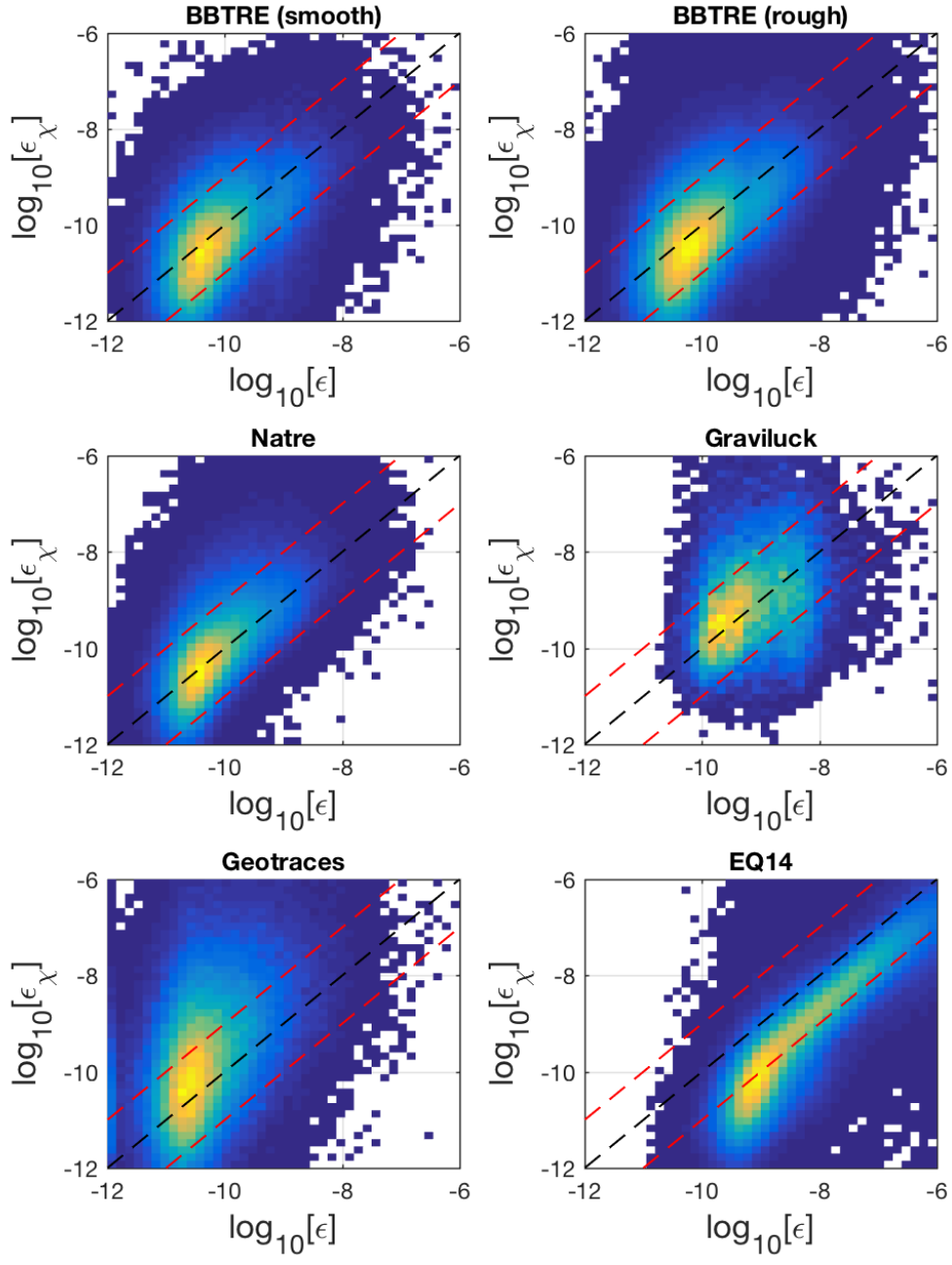


Figure 6: 2D histograms of ϵ_χ vs ϵ .

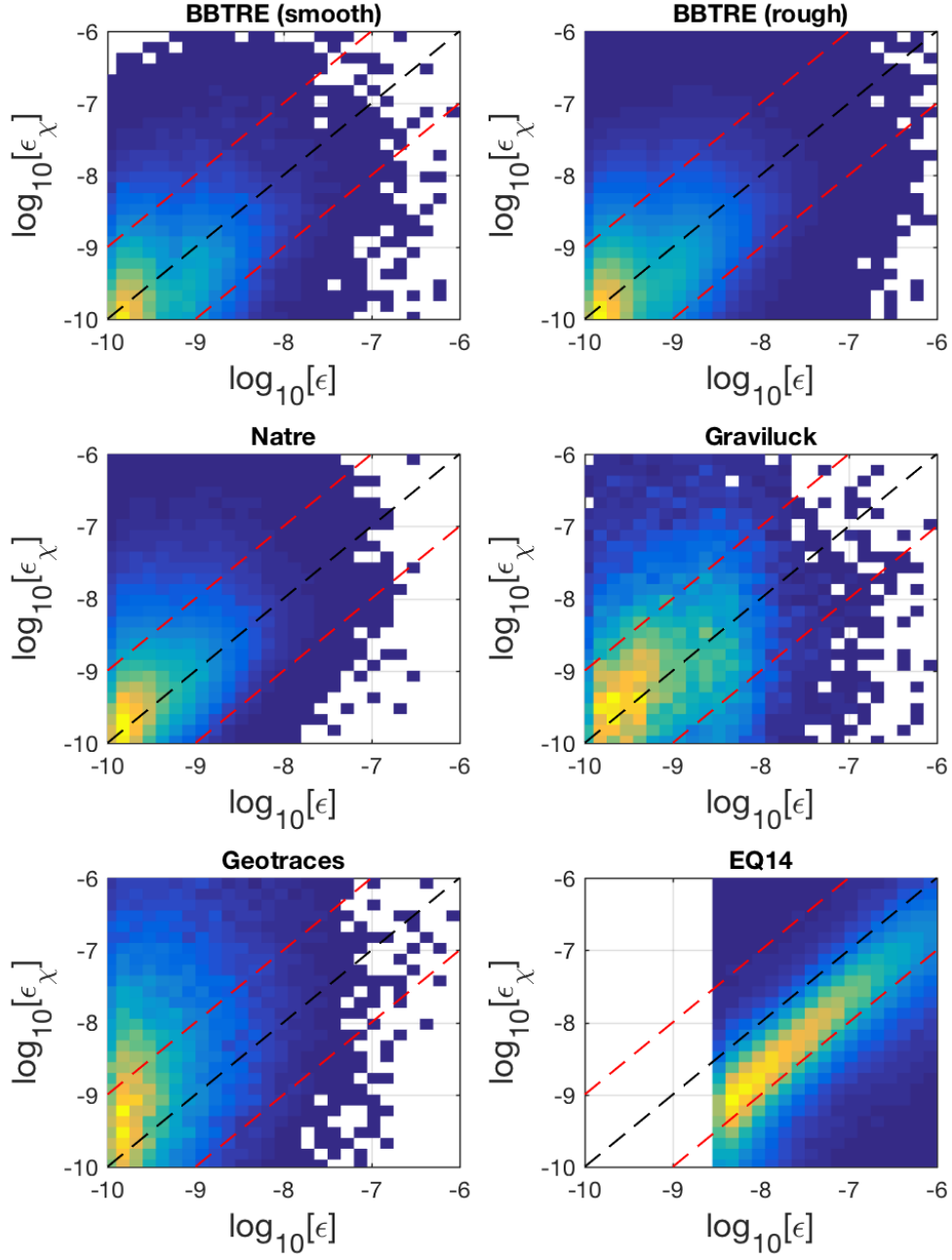


Figure 7: 2D histograms of ϵ_χ vs ϵ . Values below estimated noise level of $\log_{10}[\epsilon] = -10$ discarded.

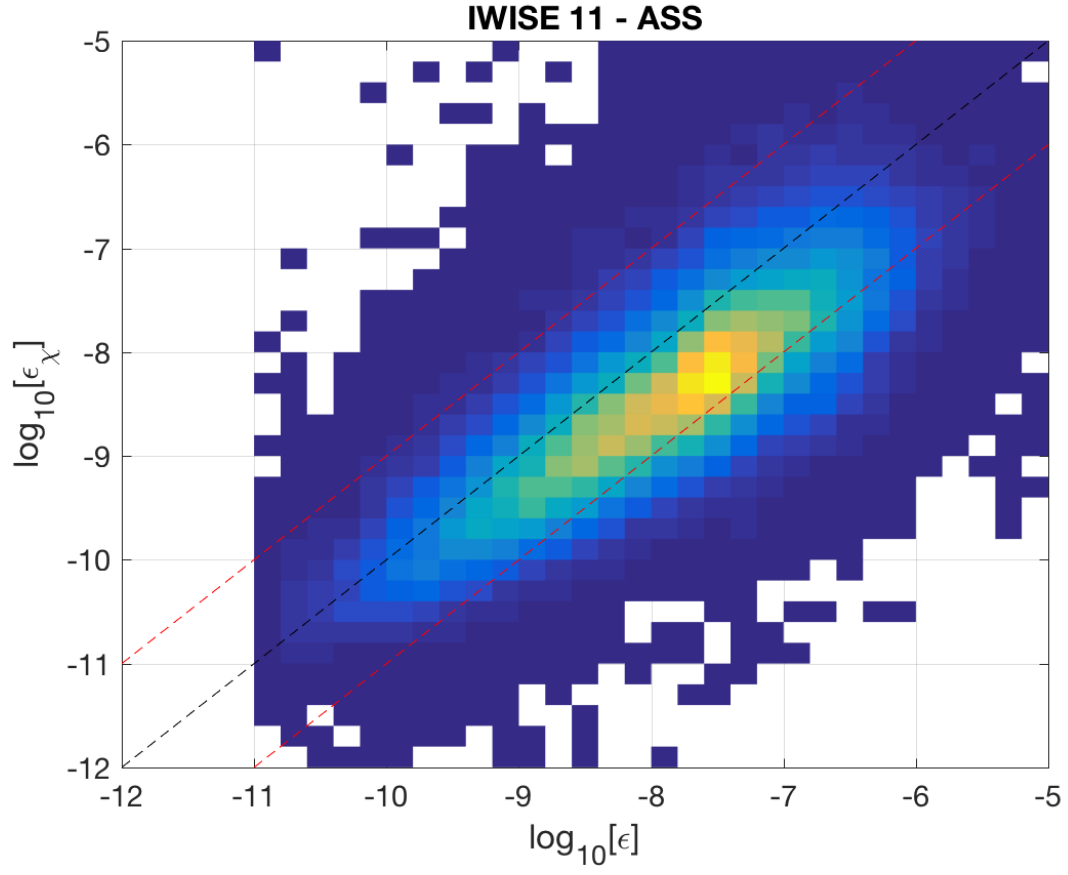


Figure 8: 2D histograms of ϵ_χ vs ϵ .