Chipod Analysis Summary - Jan 9

Andy Pickering

January 4, 2017

Contents

1 Goal

Compute χ and ϵ from χ-pod (ie fast thermistor) profiles. Show that this method works.

2 Approach

Use data from Chameleon profiler, which has thermistor and shear probe. Apply χ-pod method to thermistor data only, and compare results to the 'true' data calculated with thermistor and shear probe.

3 Results

Good agreement for χ, but ϵ is off by about a factor of 10.

3.1 Why is epsilon off by so much?

If we compute gamma from the binned chameleon data we get about 0.01. If that gamma is used in the chipod calculations instead of 0.2, we get about the right epsilon.

But how do we determine the correct gamma to use when we don't have shear probe data (the whole point of the chipods is to avoid having to make those measurements).

4 Try doing computations over patches:

If we compute N^2,dT/dz,χ,ϵ over patches, we get gamma is about 0.2. So this is good. Also, the method to compute N^2 and dT/dz matters. Bill's 'bulk' gradient method works better.

If we use the N^2 and dT/dz computed using the bulk formula, and a constant gamma of 0.2, we get about the right epsilons.

5 What to do about rest of the profile (non-patches)?

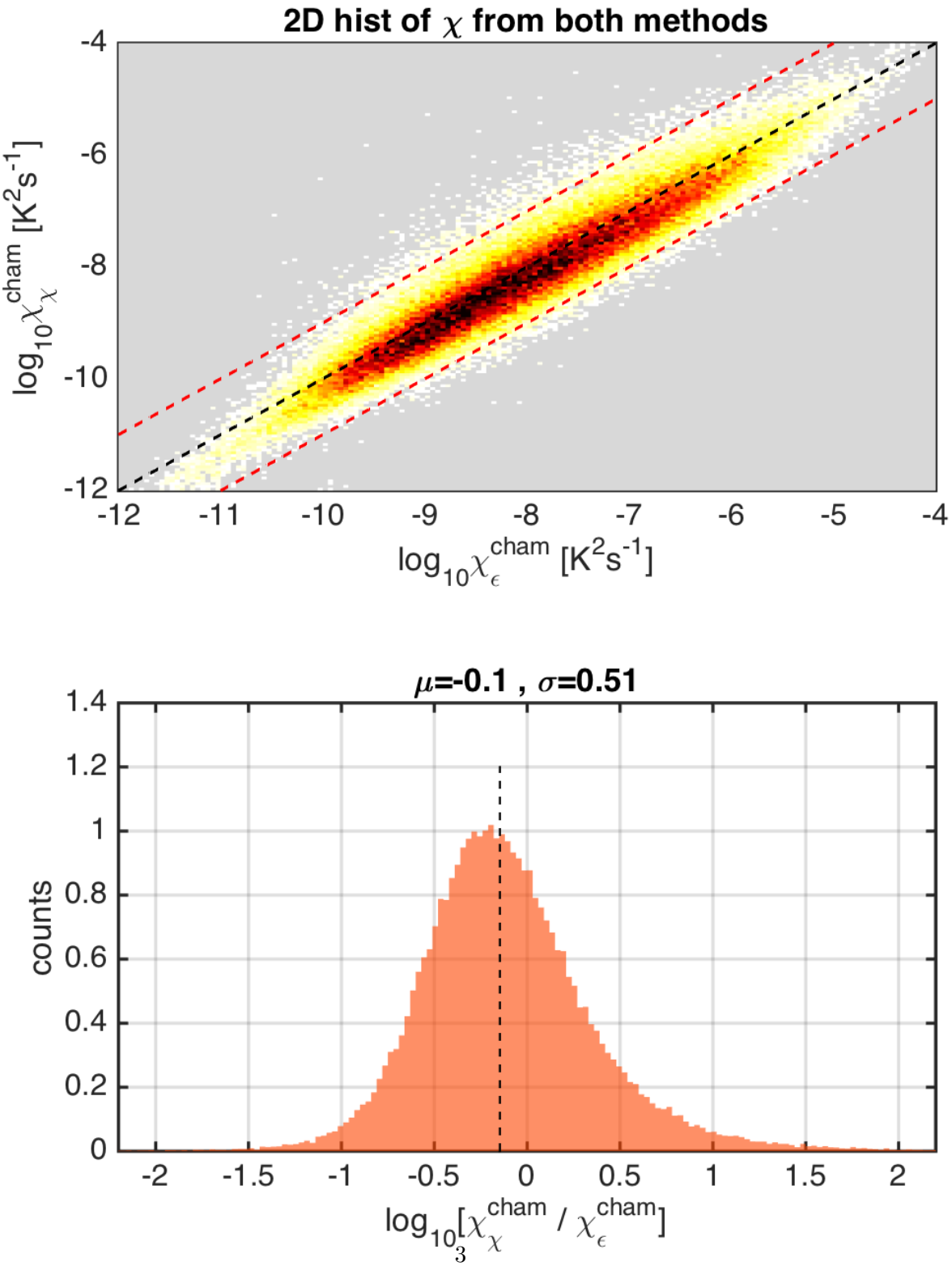

Figure 1: 2D histogram of χ computed with chipod method on binned chameleon data Vs chameleon data w/ shear probe.

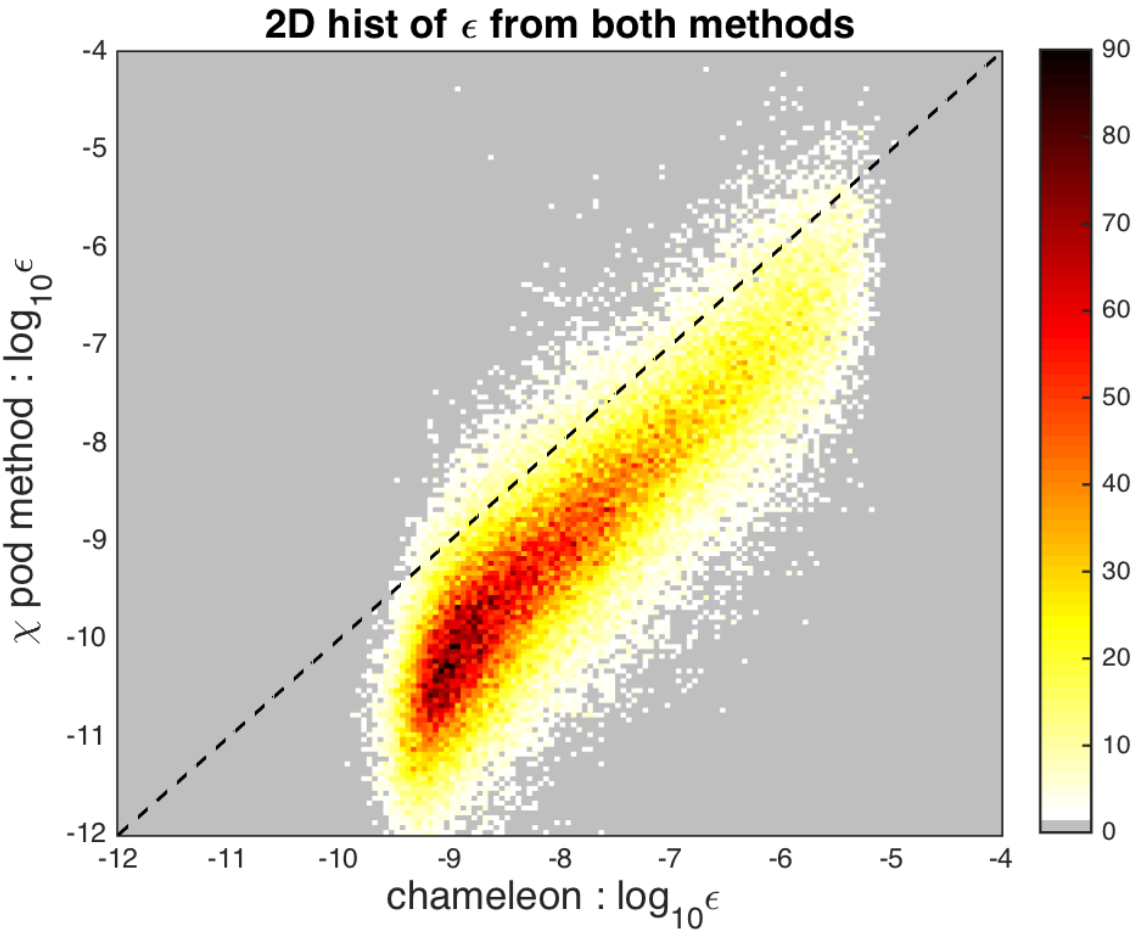

Figure 2: 2D histogram of ϵ computed with chipod method on binned chameleon data Vs chameleon data w/ shear probe.

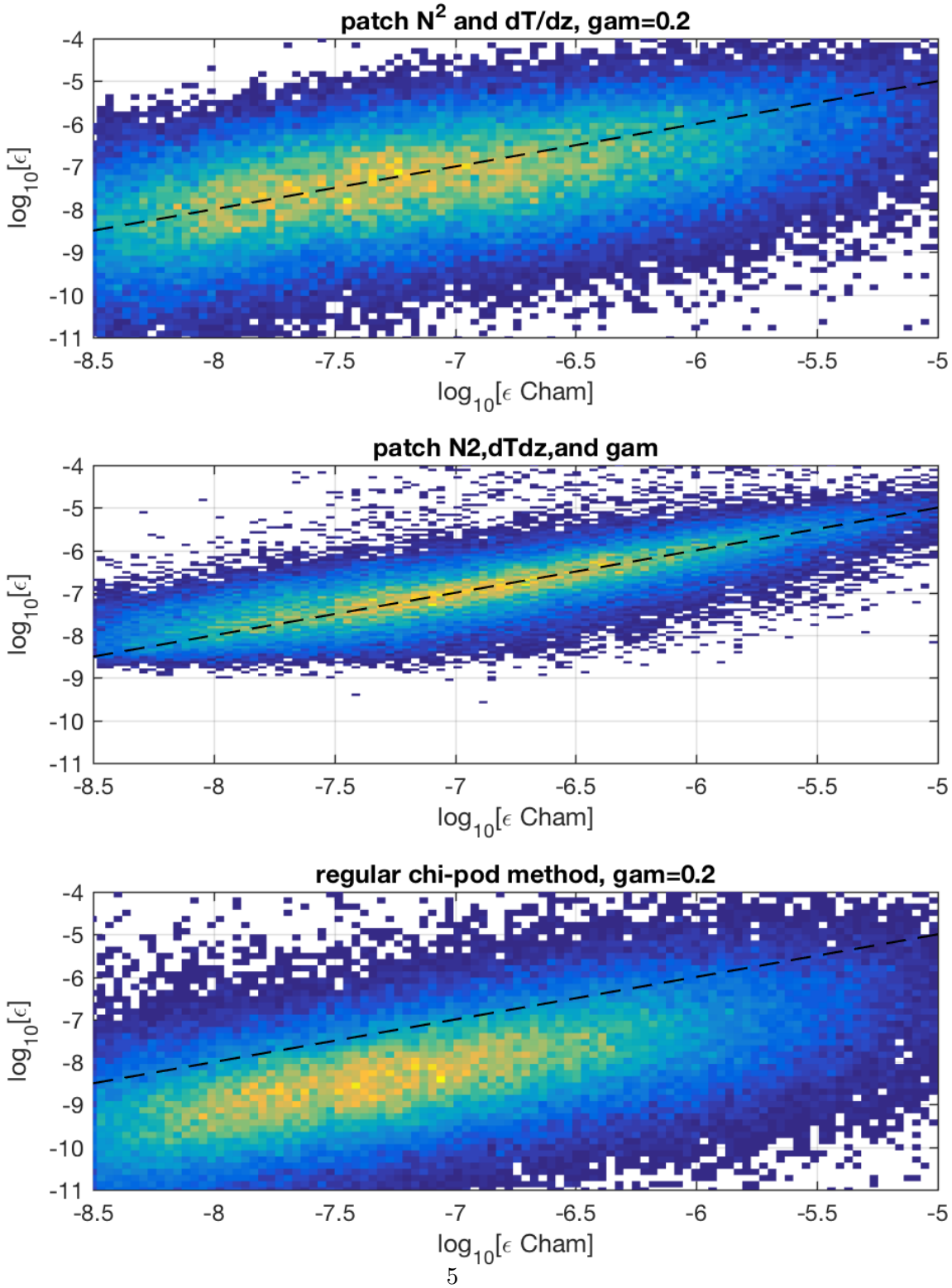

Figure 3: 2D histograms of ϵ computed with chipod method to chameleon ϵ. Top: χ-pod method with N2 and dTdz computed for patches, and constant gamma 0.2.

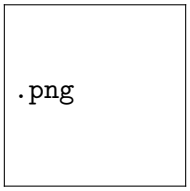

Figure 4: