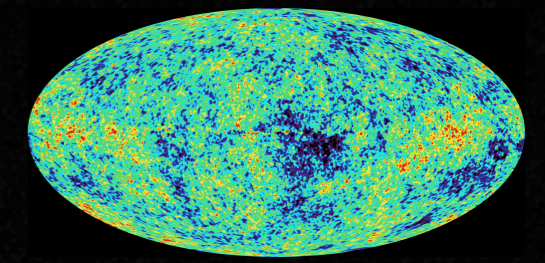


Peaks in the WMAP 1st year data

Rita Tojeiro (IfA Edinburgh)
Alan Heavens (IfA Edinburgh)
Patricia Castro (IfA Edinburgh)
Sujata Gupta (IGC Portsmouth)

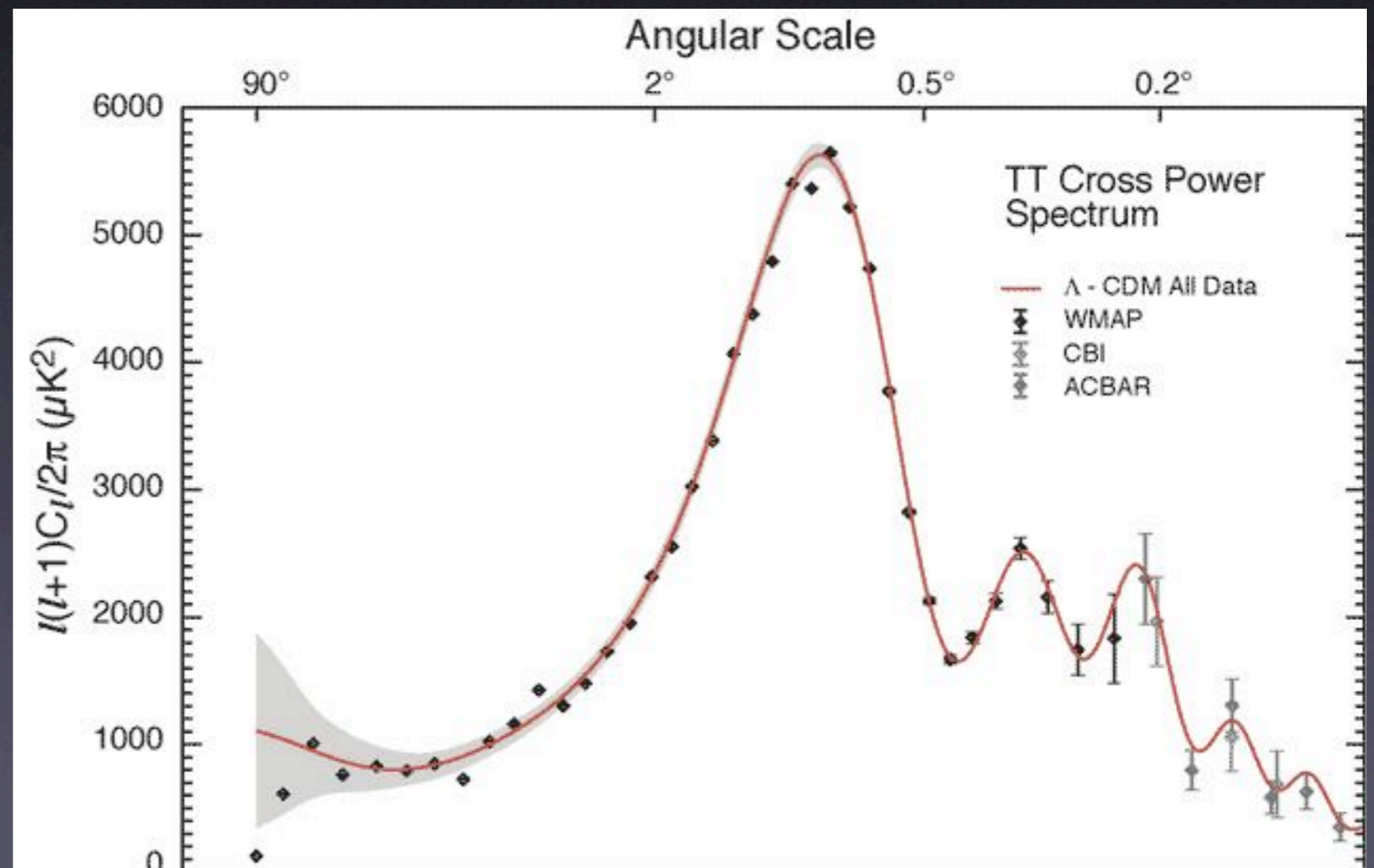


Some formalisms:

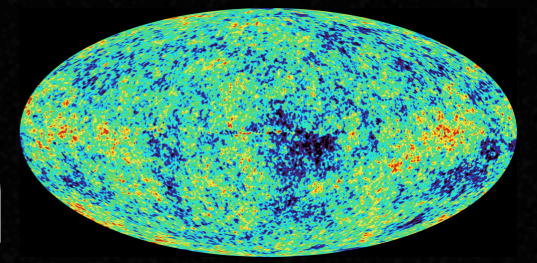
$$\Delta T = \sum_{\ell} \sum_{m=-\ell}^{\ell} a_{\ell m} Y_{\ell m}(\phi, \theta)$$

If the harmonic coefficients are Gaussian distributed:

$$C_{\ell} = \langle |a_{\ell m}|^2 \rangle$$

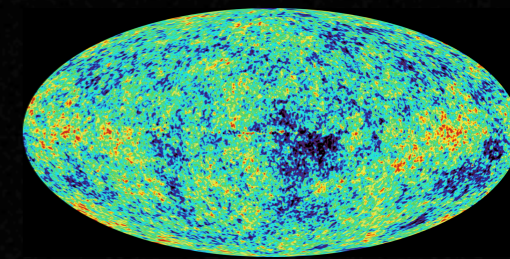


The 2-pt correlation function of peaks

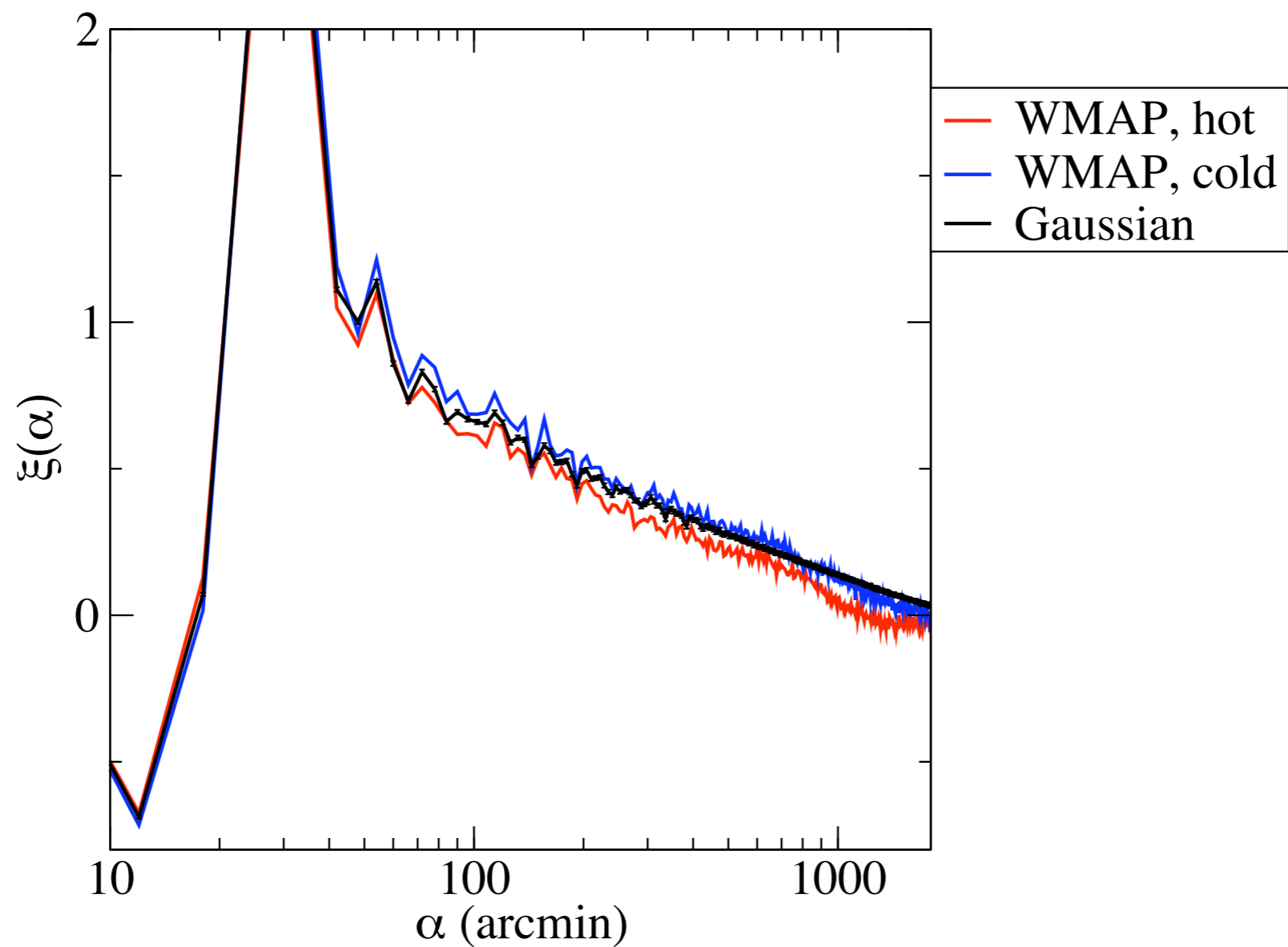
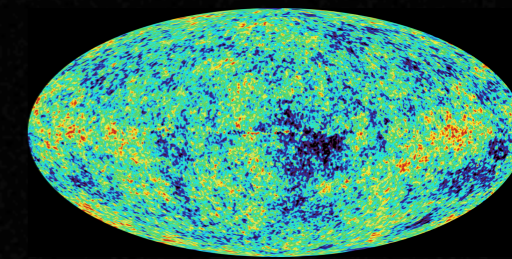


- $dP = n(1 + \xi(\alpha))dV$
- General estimator.
- Can be calculated analytically [Heavens and Gupta 2001] - but we take different route.
- Two main goals:
 - Look for any statistically significant deviation from Gaussianity
 - To constrain the non-linearity parameter f_{NL}

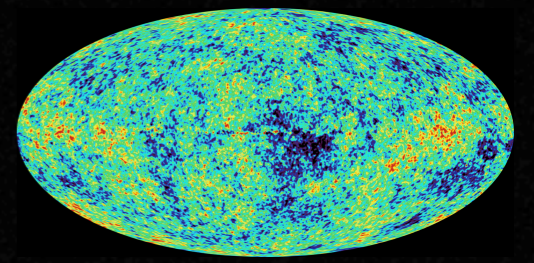
“Full-sky”



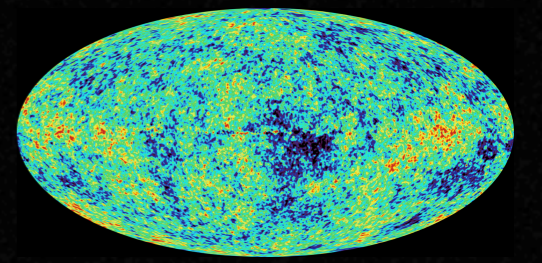
“Full-sky”



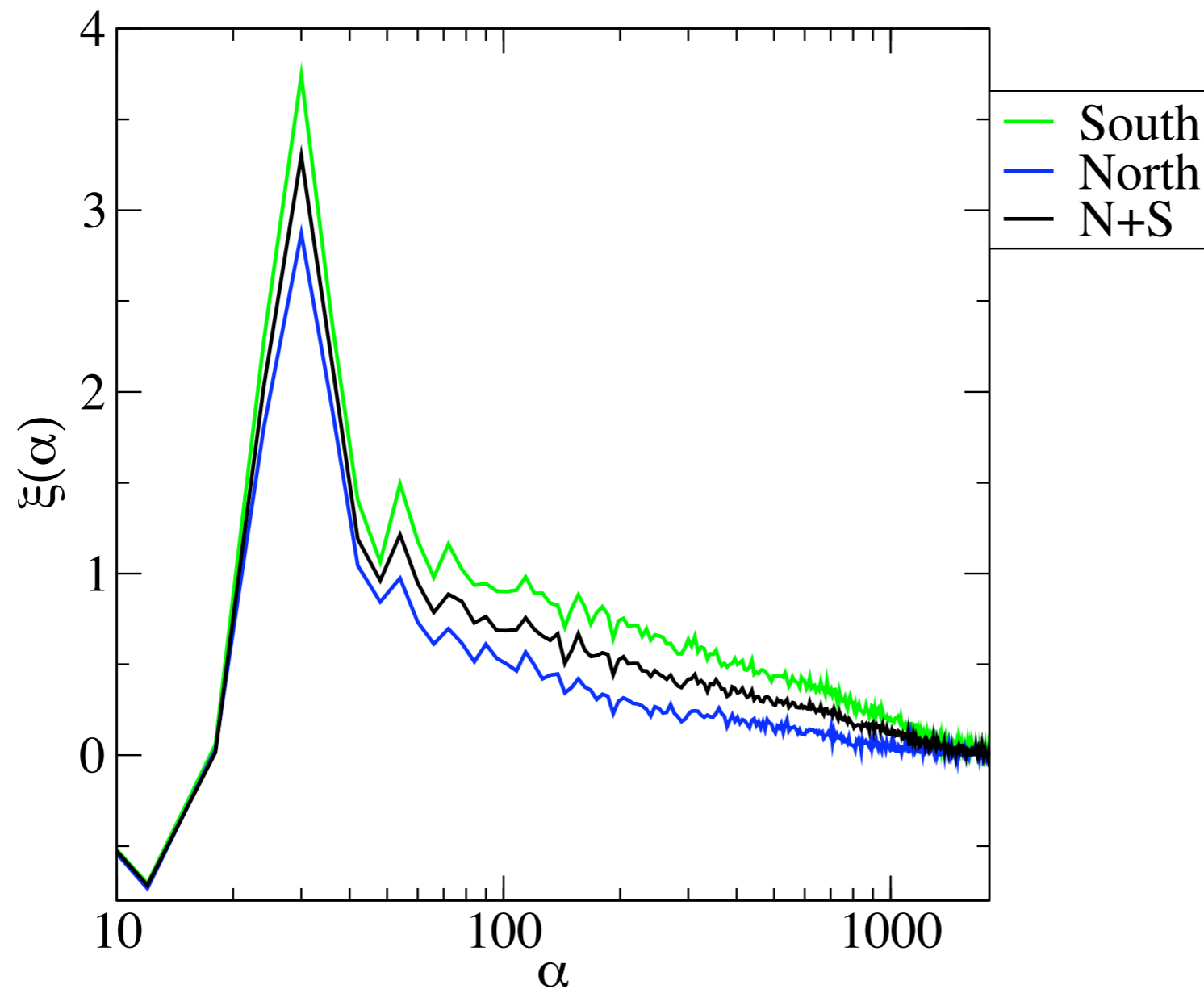
A North-South study

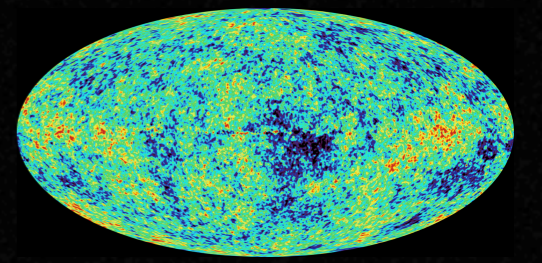


- **Motivated by literature** [Cruz et al 04, Eriksen et al 03, Eriksen et al 04]
- **Point sources approach was going nowhere**

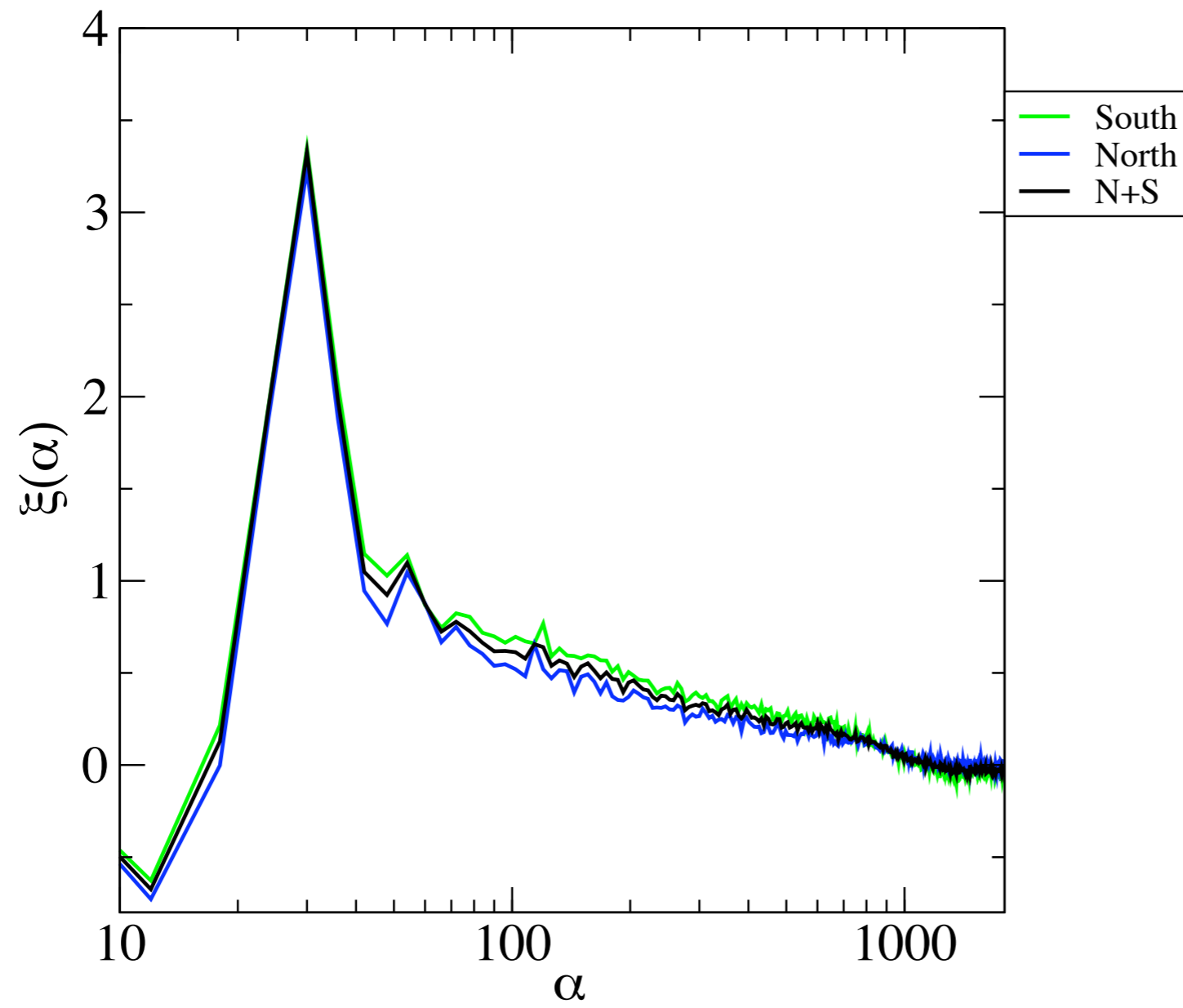


Coldspots

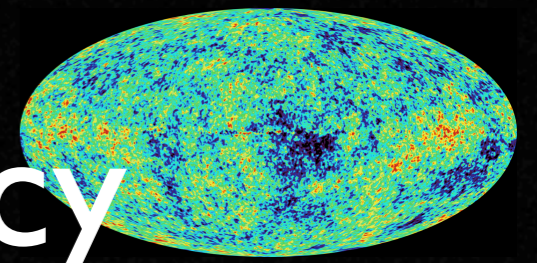




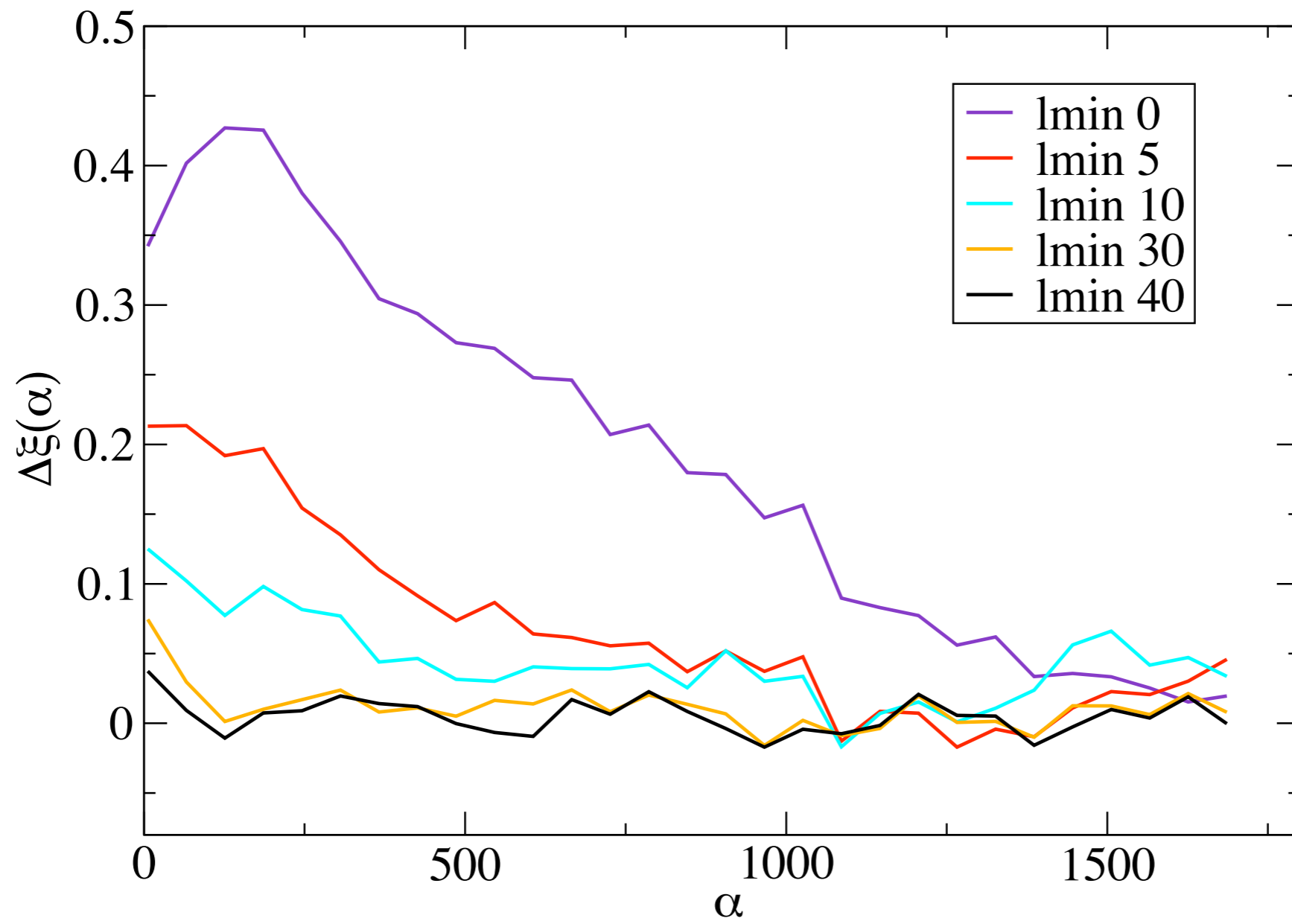
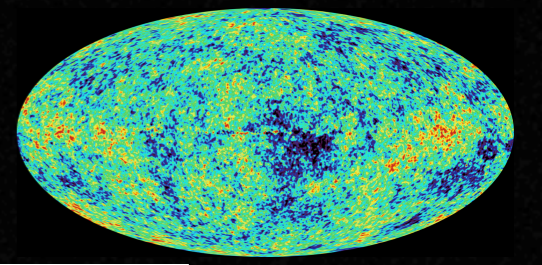
Hotspots

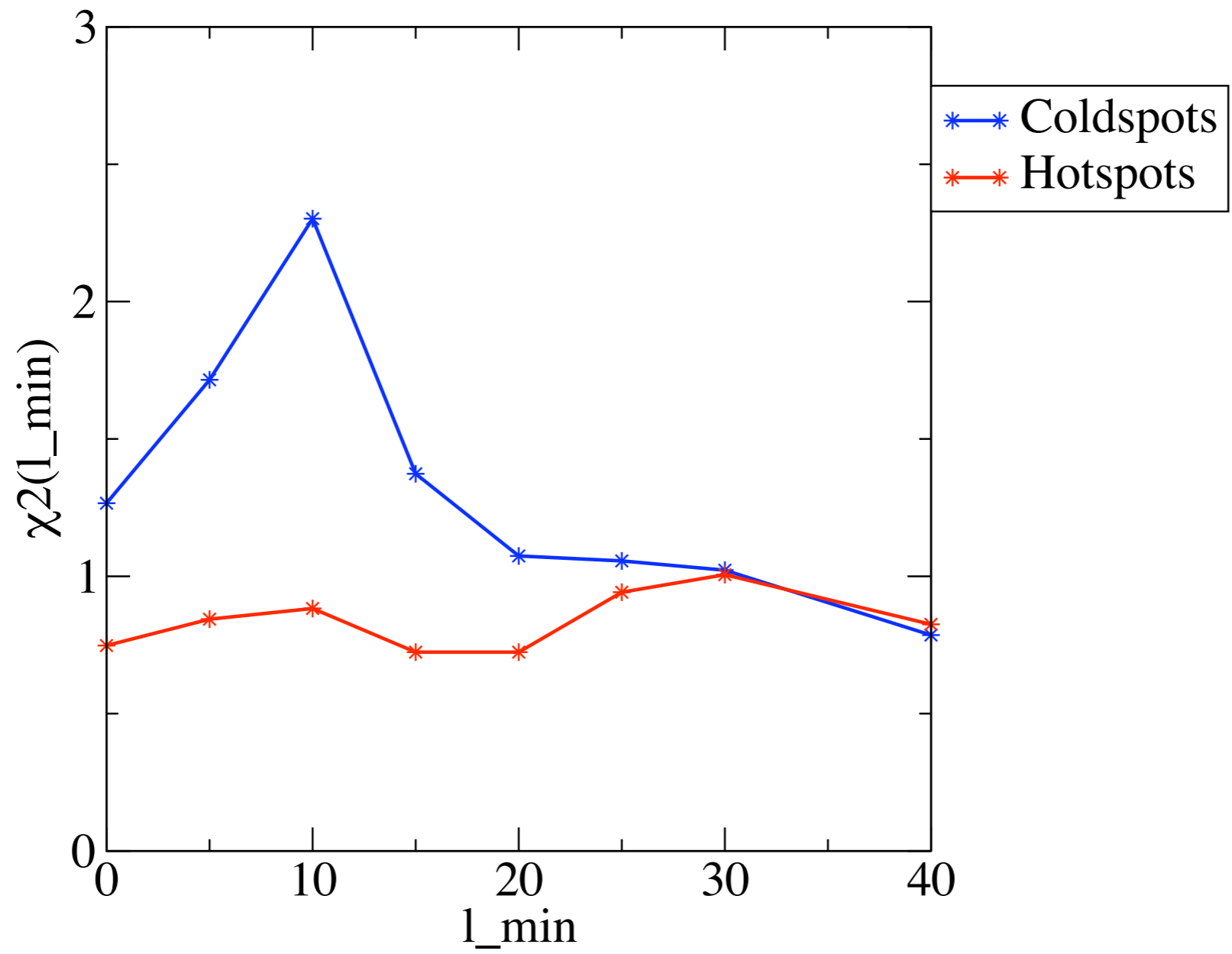
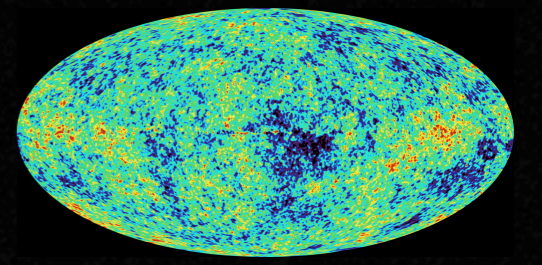


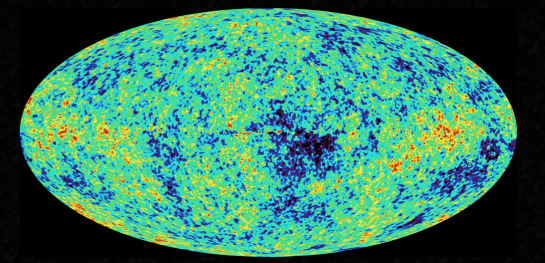
Constraining in frequency space



- Filtered the maps with high pass filters
- Looked at different cut-offs

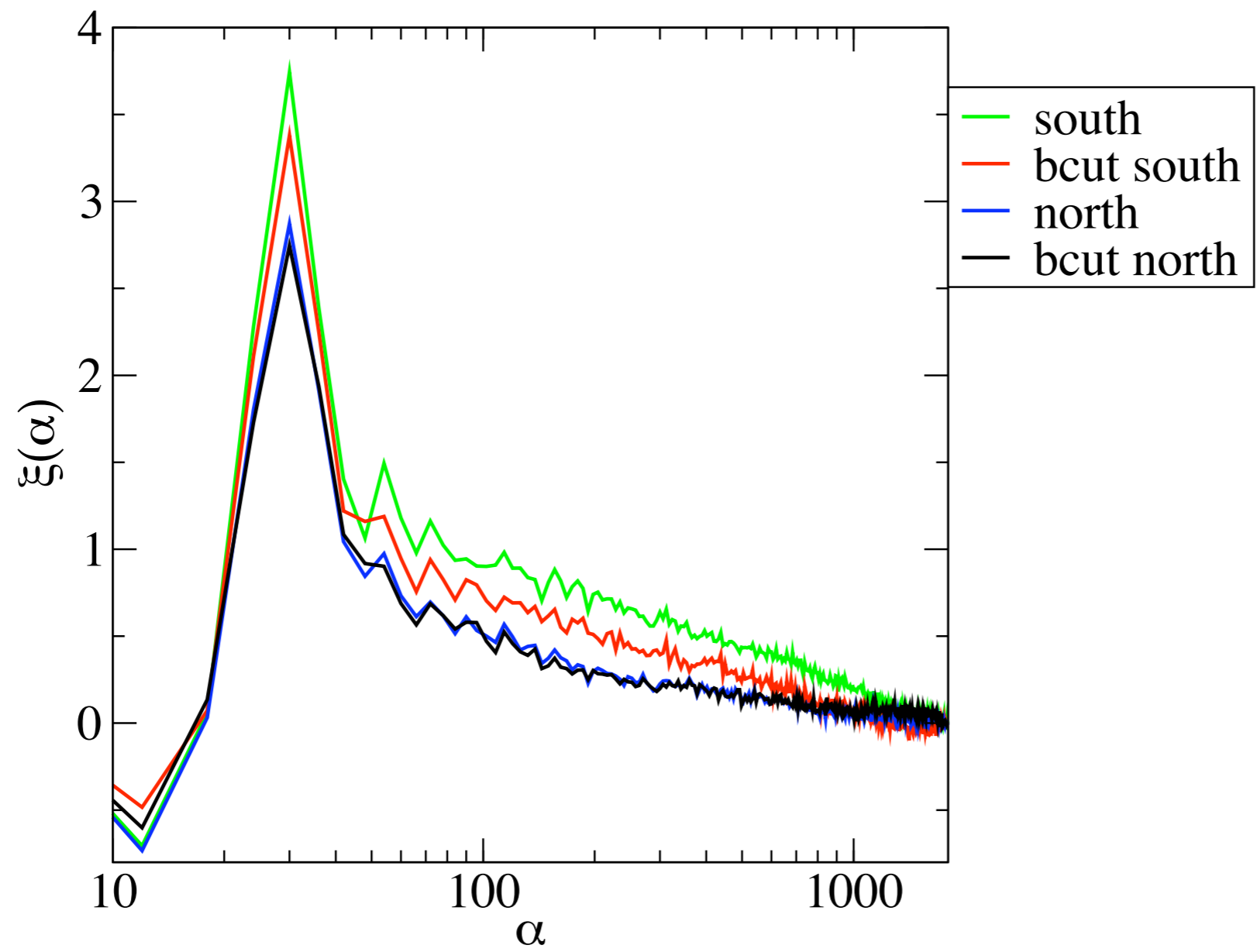
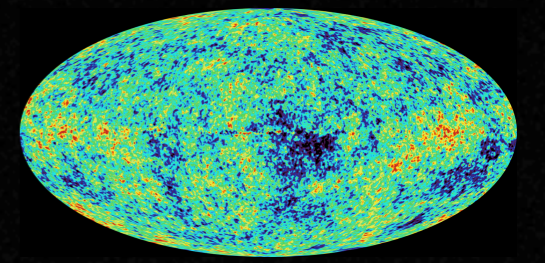




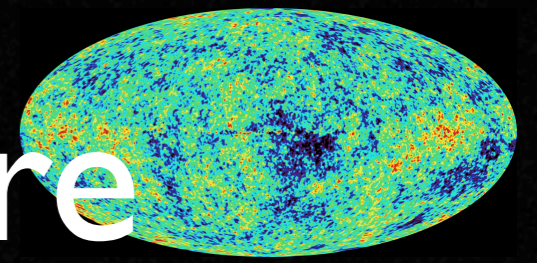


$|b|$ cuts

- Are the differences related to the galactic plane?
- Are we seeing The Spot? [Cruz et al 04]



Conclusions and future work



- Strong non-Gaussian signal seems to be constrained to low multipoles ($\ell \leq 20$).
- Non-Gaussianity associated with coldspots and the southern hemisphere, mostly within 30 degrees of the galactic plane.
- Intrinsic? Foreground related?
- Can we put good limits on f_{NL} ?

