Pico

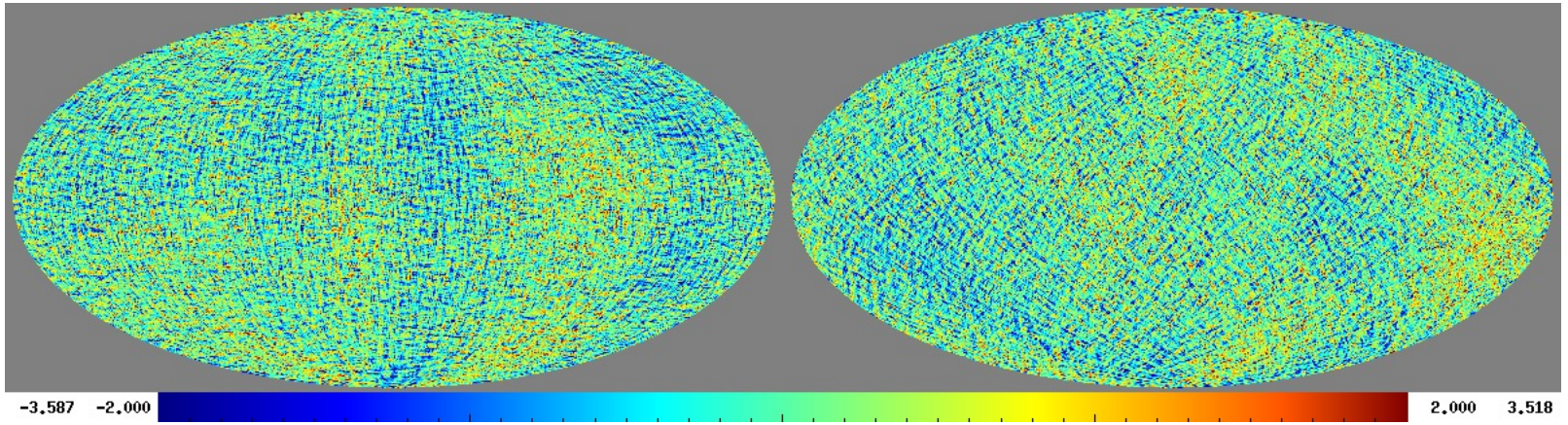
Commander updates 13.01.2022

Ragnhild Aurlien and the Oslo group

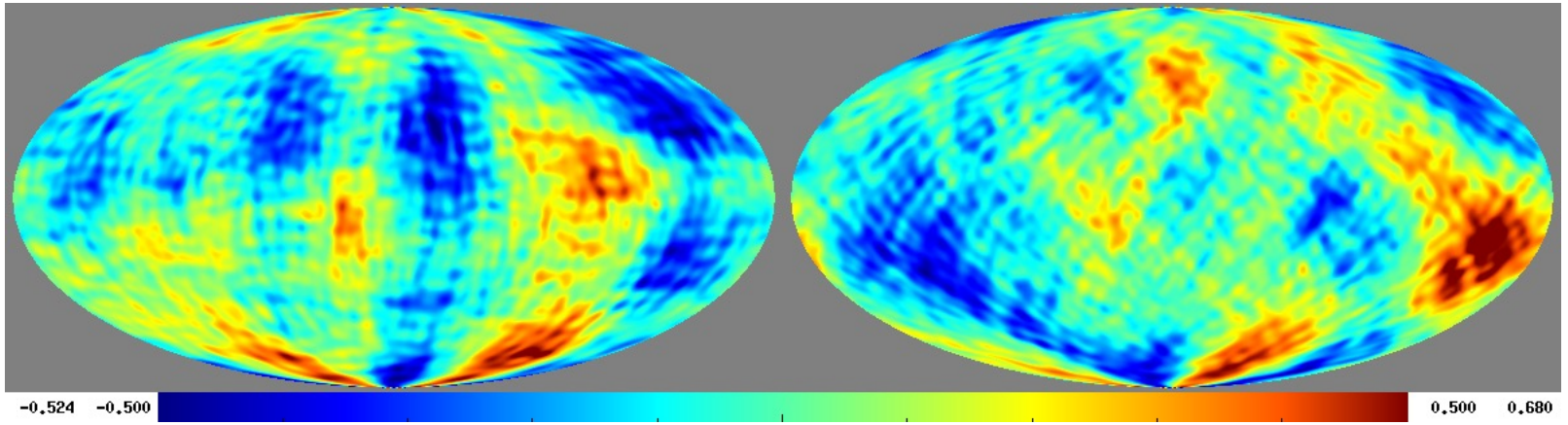
90.91

- Running Commander1 fitting 6 parameters pr pixel
  - CMB (A_{cmb})
  - One dust model ($A_{dust}, T_{dust}, \beta_{dust}$) (nside 256)
  - Synchrotron model ($\mathrm{A}_{sync}, \beta_{synch}$) (nside64)
- 10 simulation sets with $r = 0$ and 10 with $r = 0.003$
- Masking 25% of the sky
  - Mask based on the χ^2 map
- Infilling inside mask: ~ 180 samples pr CMB realization

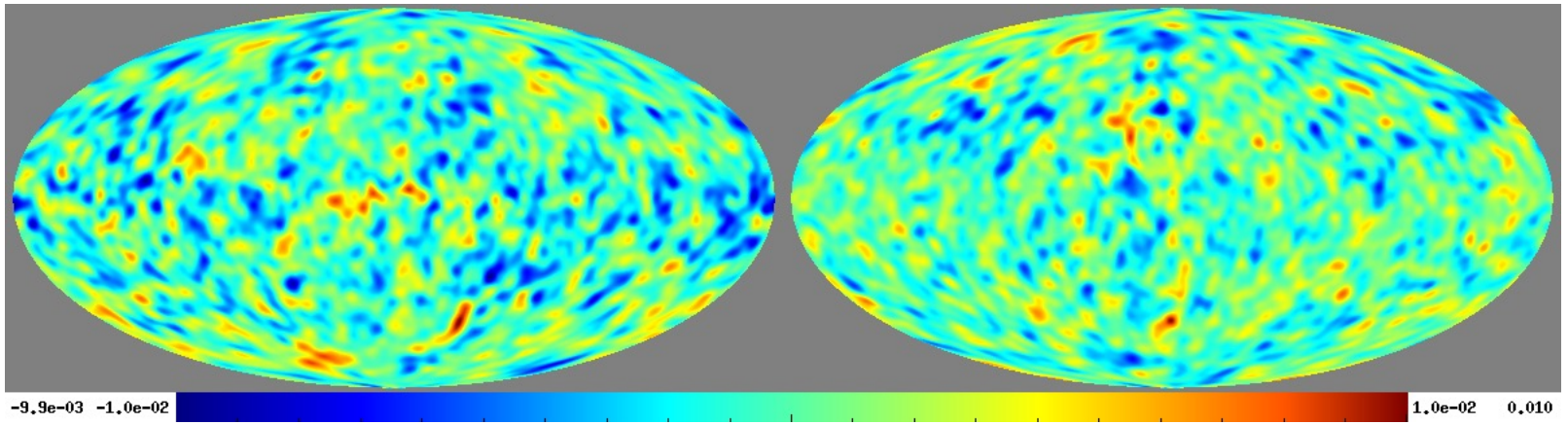
CMB map



Smoothed to a 5° beam



Input – output CMB map smoothed to a 5° beam



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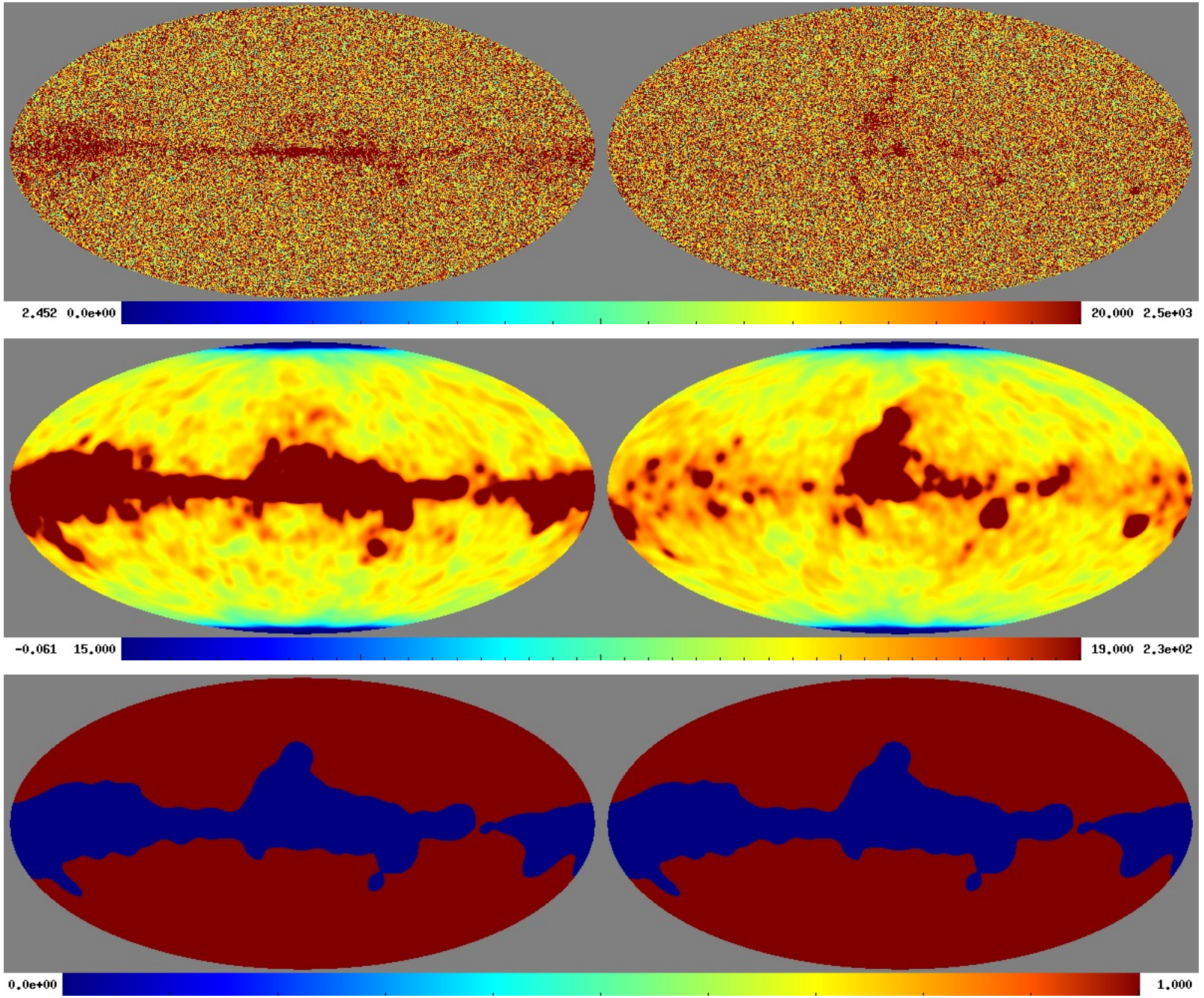
χ^2 map

Smoothed to a 5° beam

25% mask



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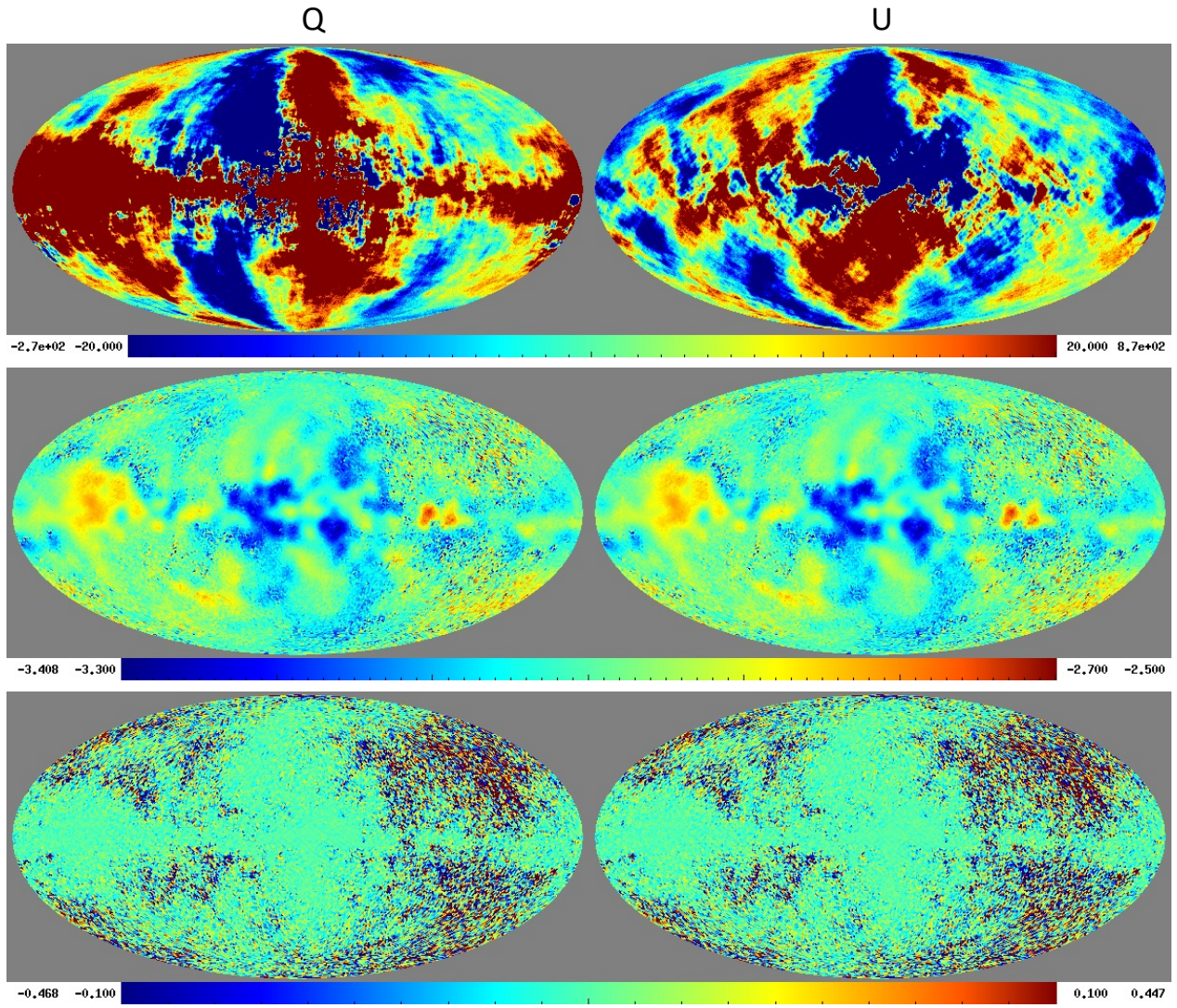
Synchrotron maps

Amplitude

Spectral index, β_s

Spectral index diff
(input-output)



Dust maps

Output maps

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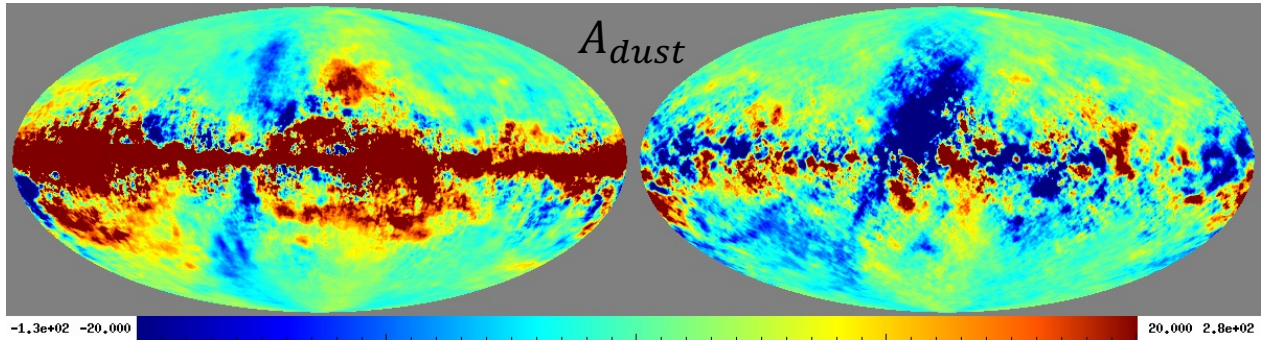

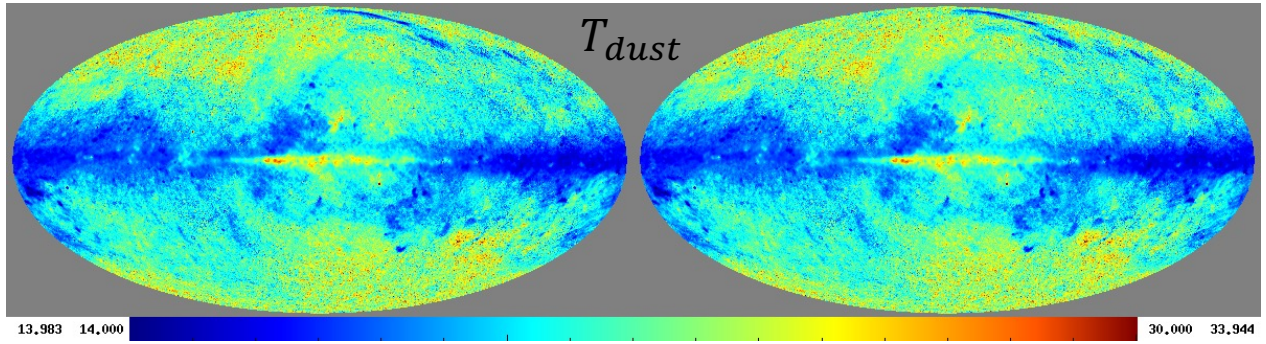

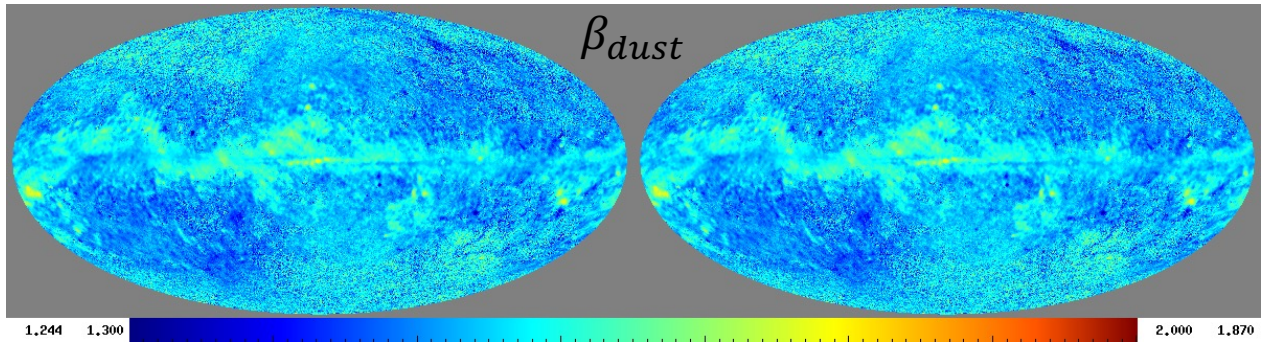

Difference maps
(input – output)

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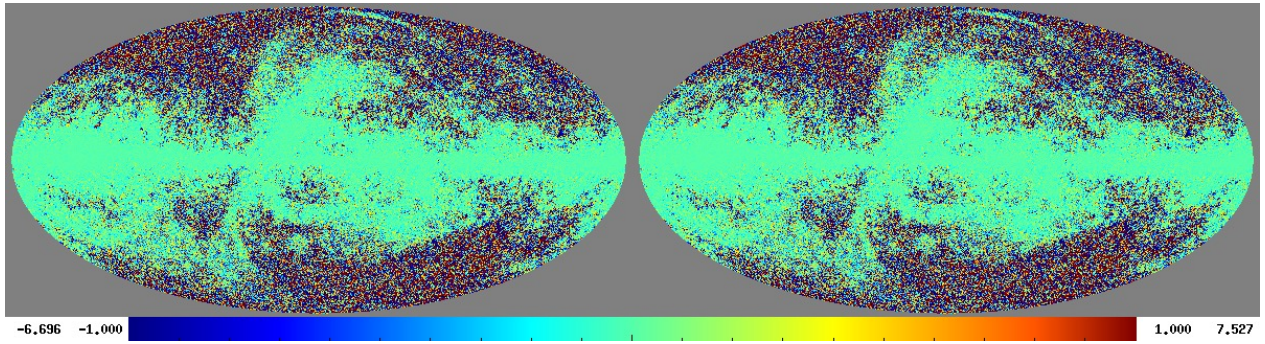
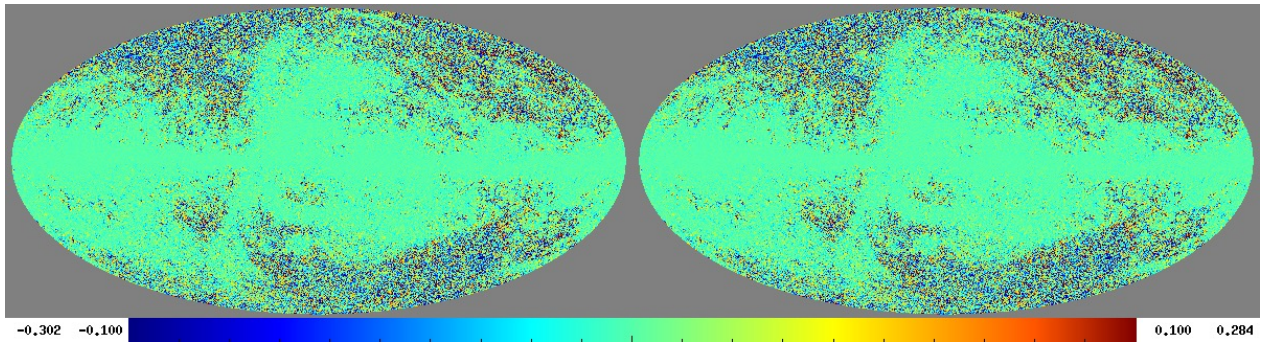
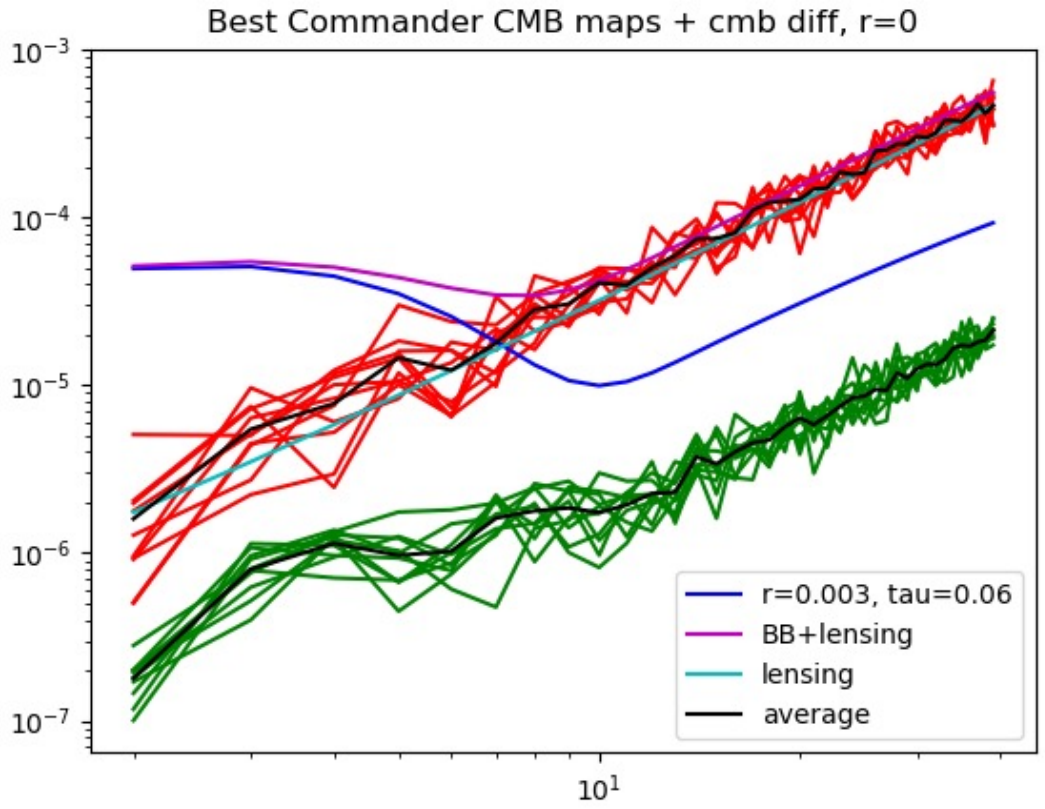




Powerspectrum of CMB maps and CMB difference maps $r = 0$

- Unmasked maps
- Best CMB map for all 10 simulation set (red lines)
- Subtract input and output CMB map (green lines)
- No masking or infilling



Powerspectrum of CMB maps and CMB difference maps

$$r = 0$$

New, improved dust priors

- Unmasked maps
- Best CMB map for all 10 simulation set (red lines)
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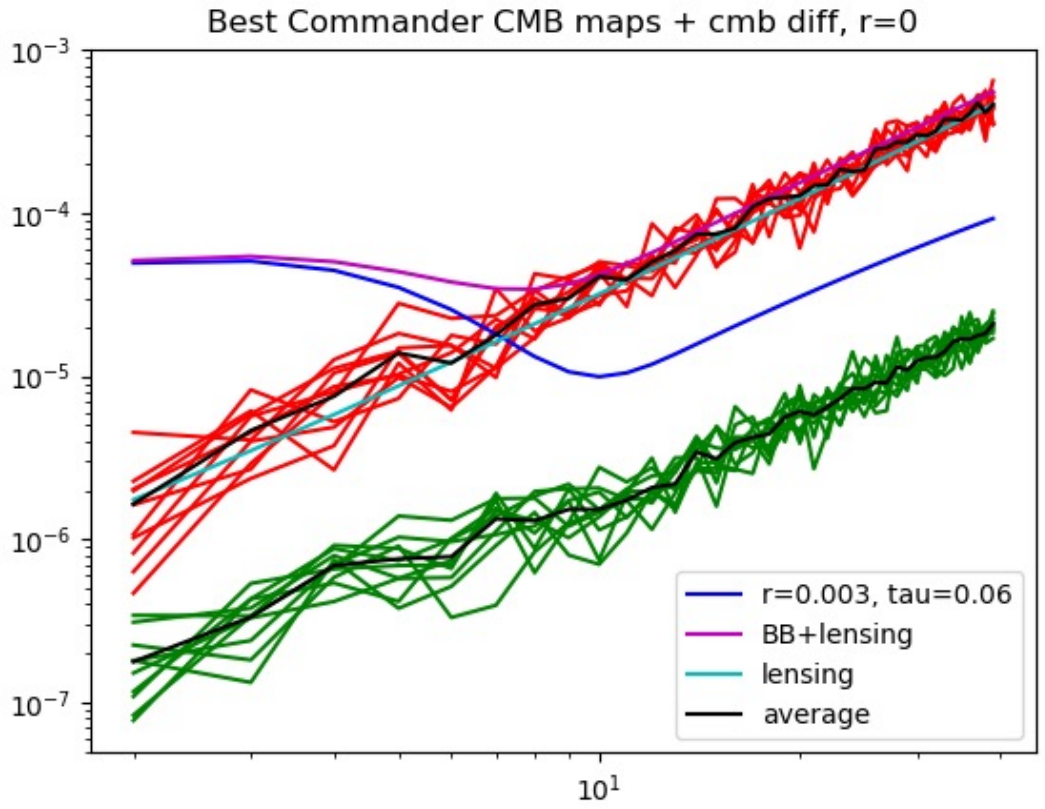
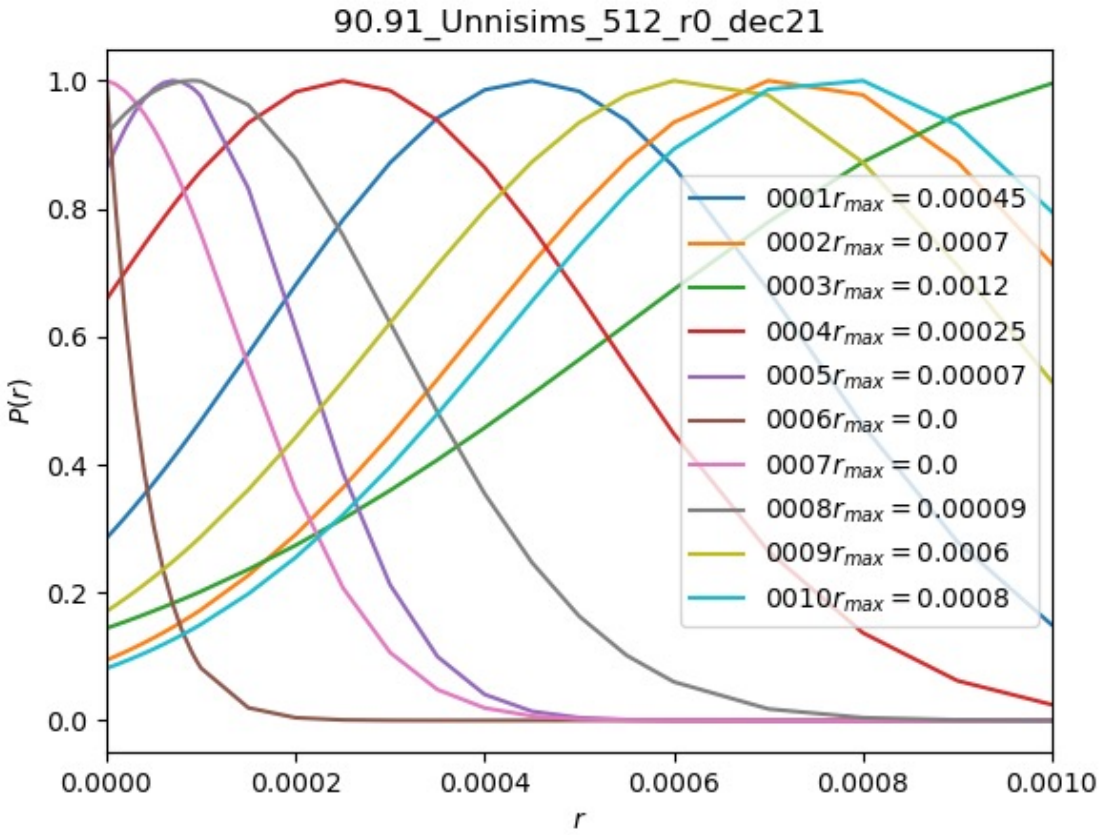
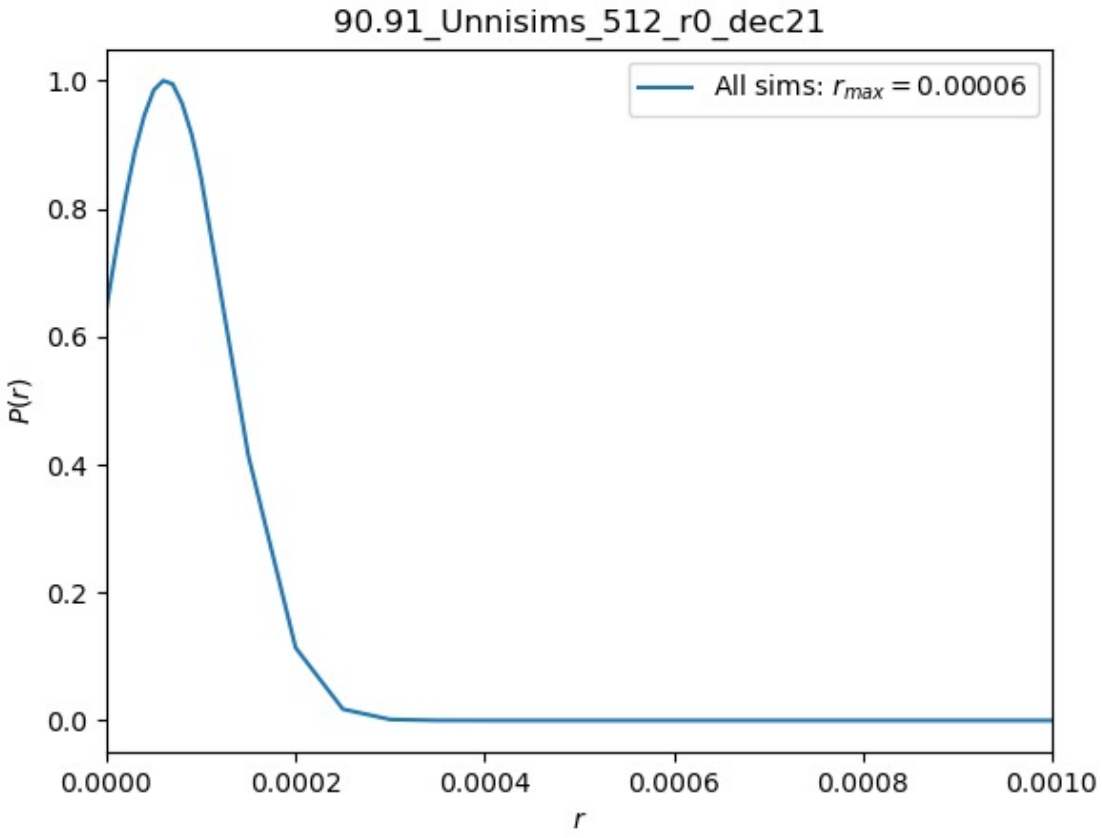
- No masking or infilling



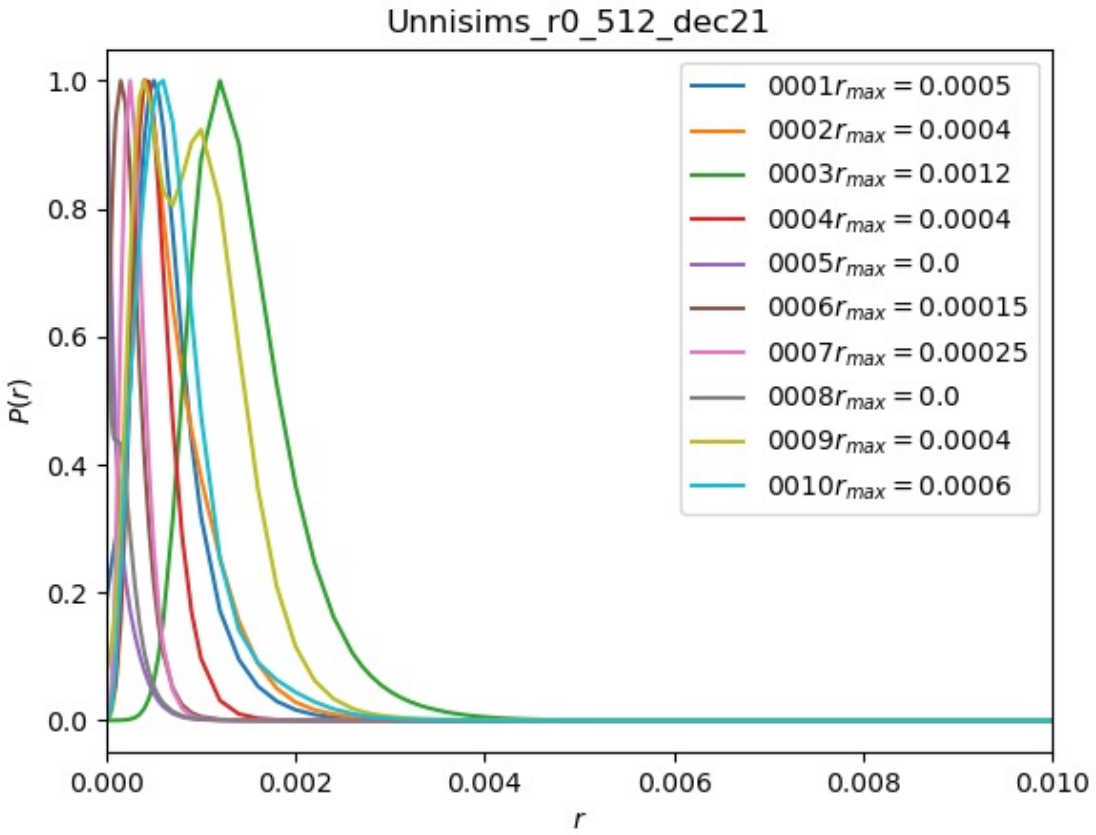
Gaussian likelihood, $r = 0$



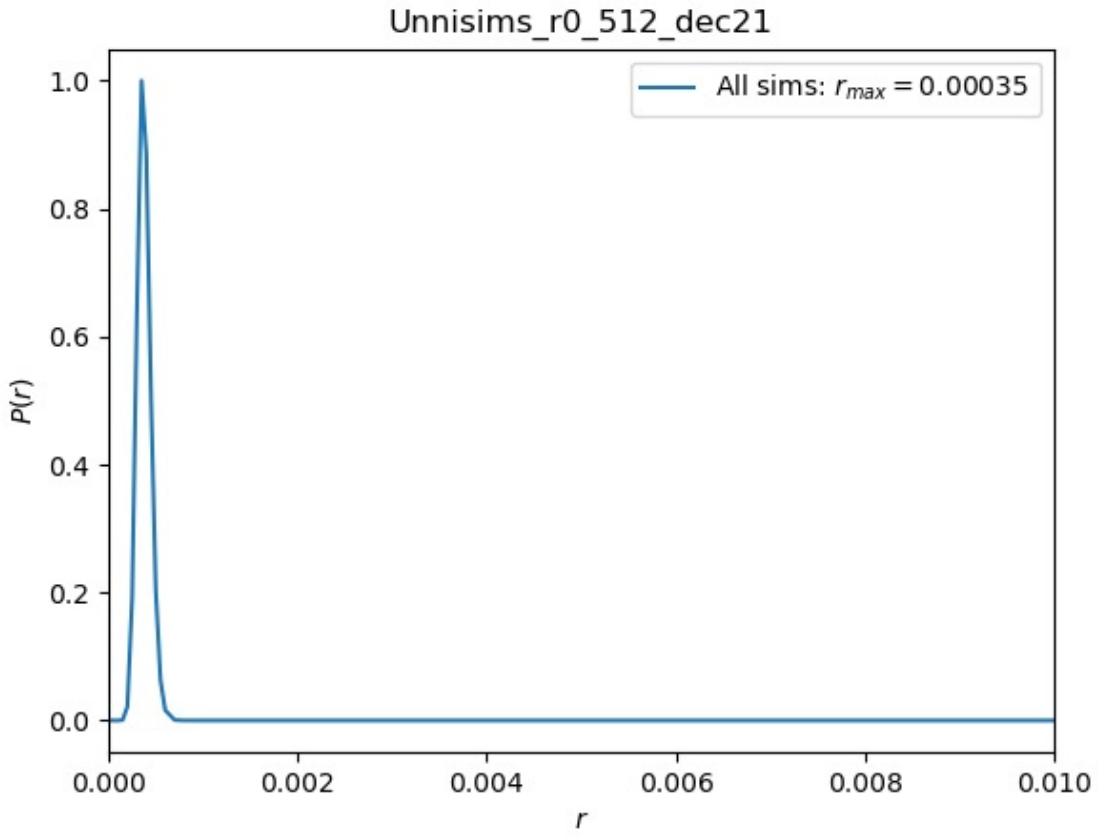
Gaussian likelihood – total for all 10 realizations, $r = 0$



Blackwell Rao estimation, $r = 0$

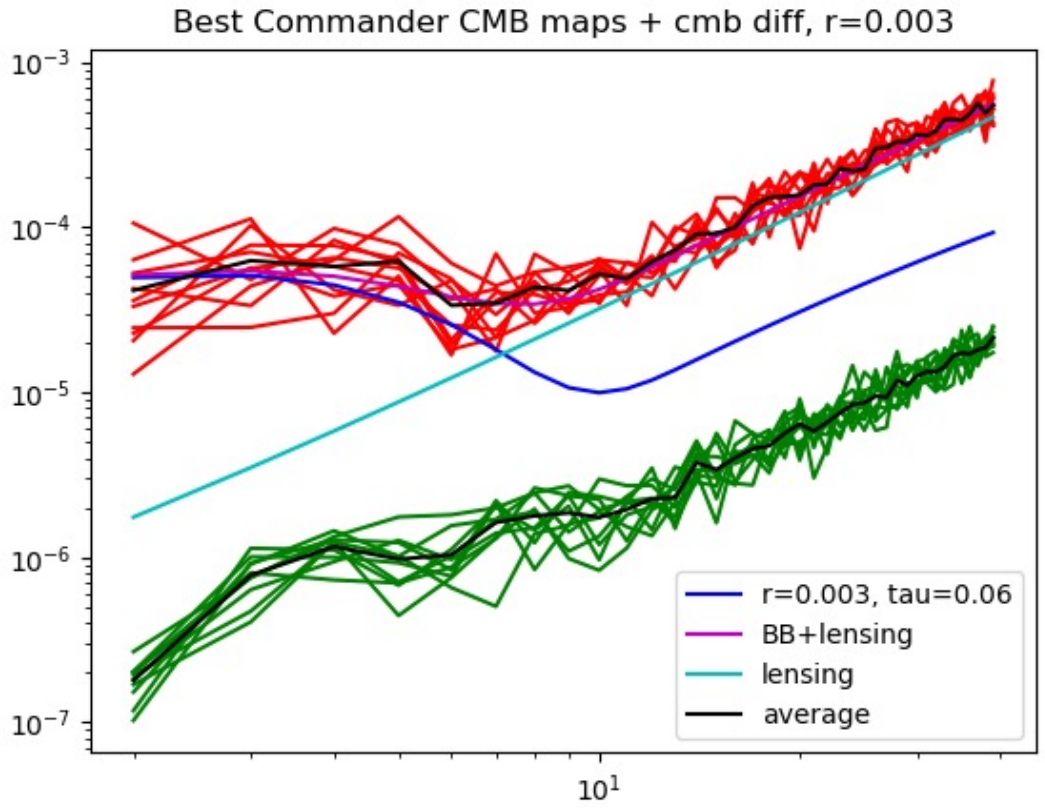


Blackwell Rao estimation – total for all 10 realizations, $r = 0$



Powerspectrum of CMB maps and CMB difference maps $r = 0.003$

- Unmasked maps
- Best CMB map for all 10 simulation set (red lines)
- Subtract input and output CMB map (green lines)
- No masking or infilling



Powerspectrum of CMB maps and CMB difference maps

$$r = 0.003$$

New, improved dust priors

- Unmasked maps
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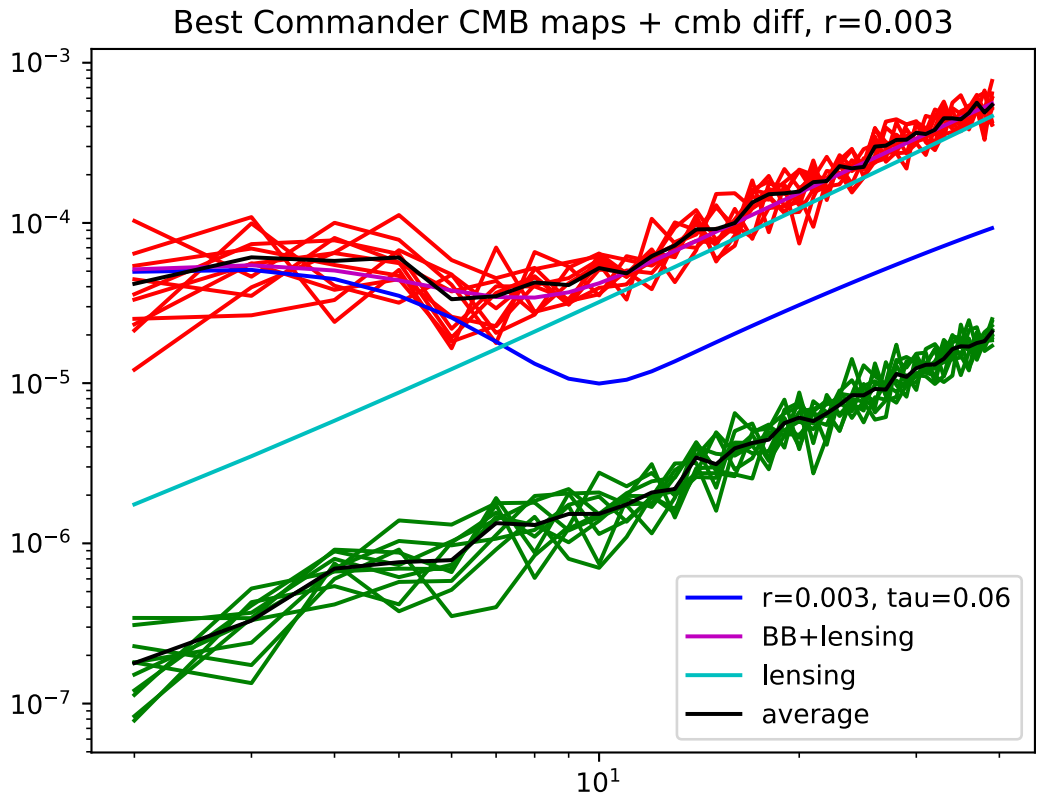
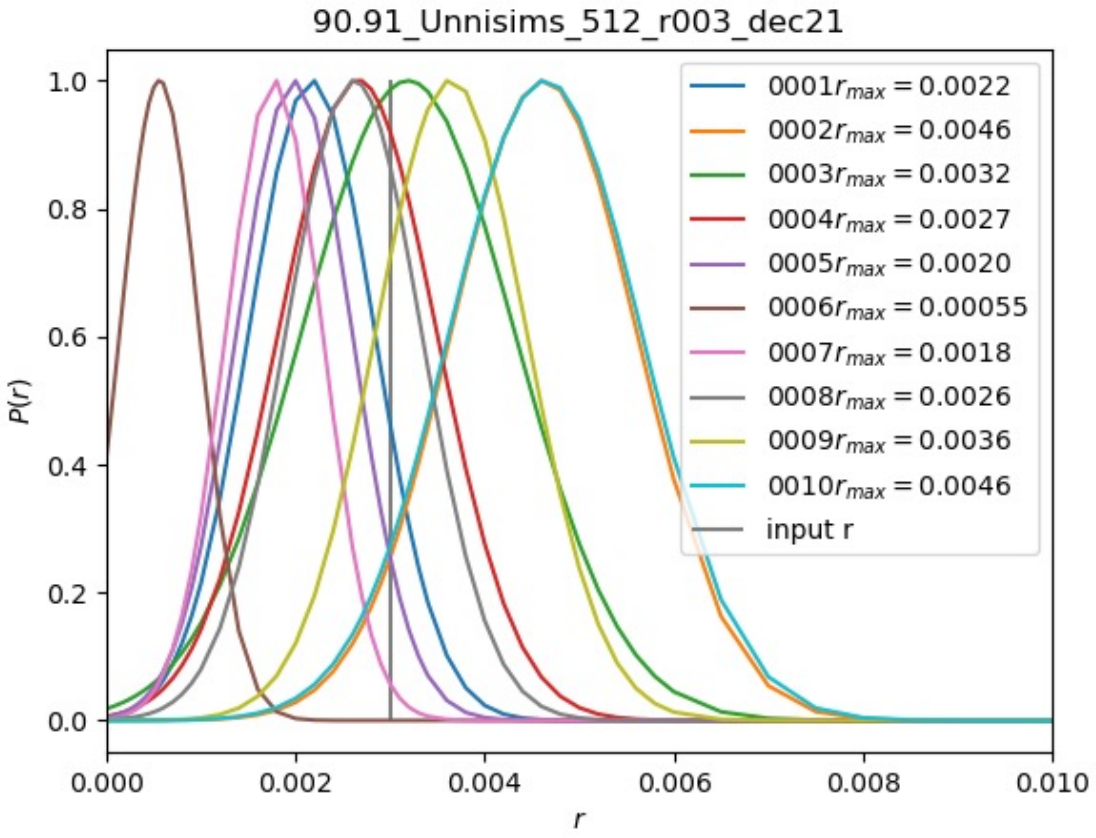
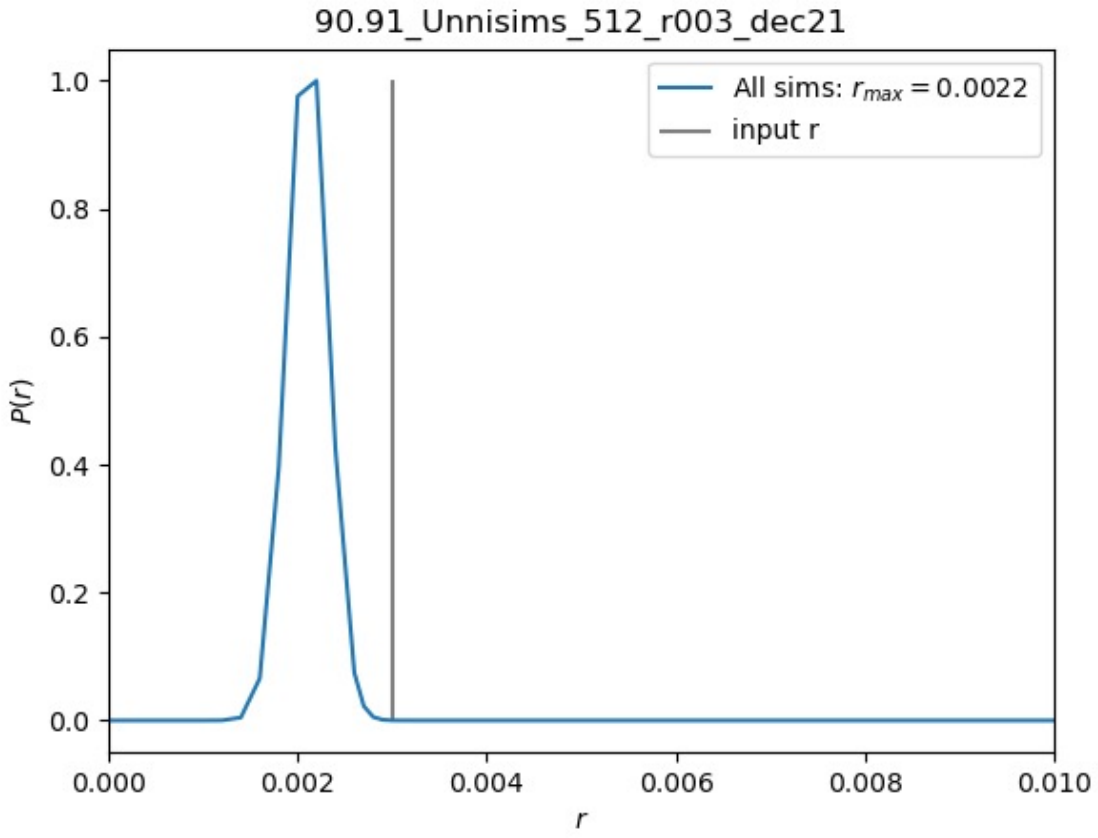


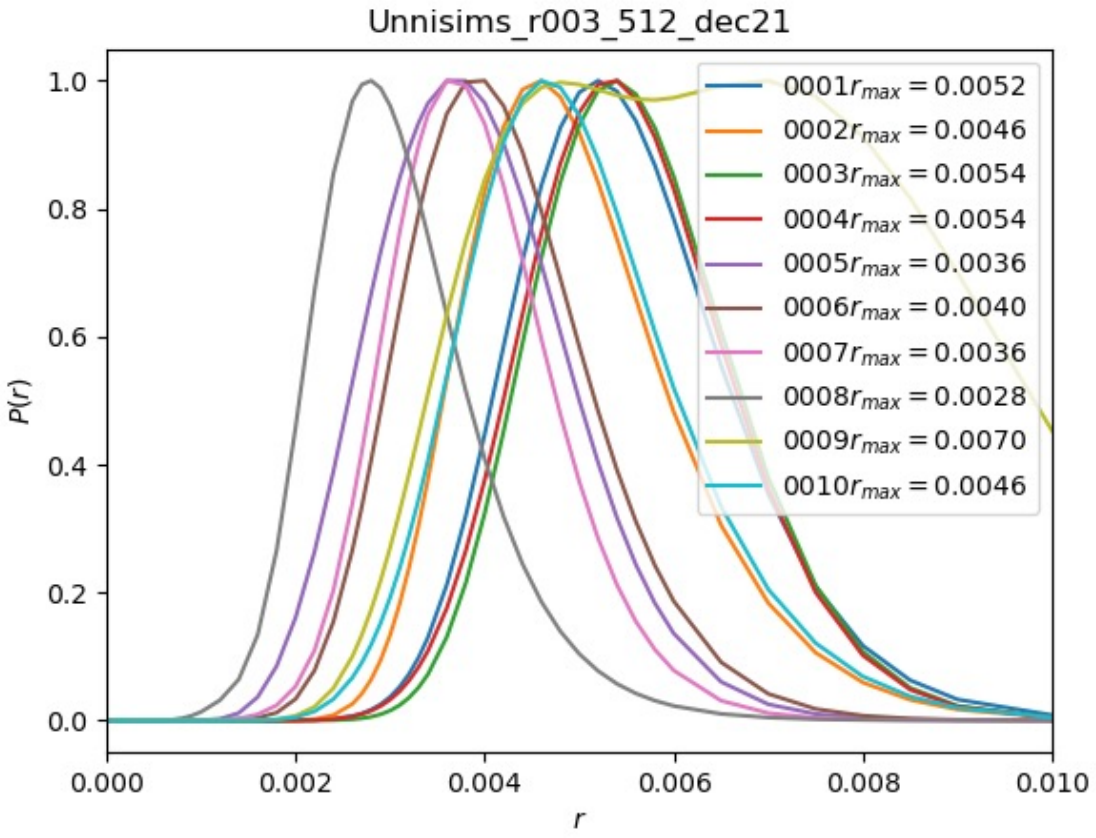
Gaussian likelihood, $r = 0.003$



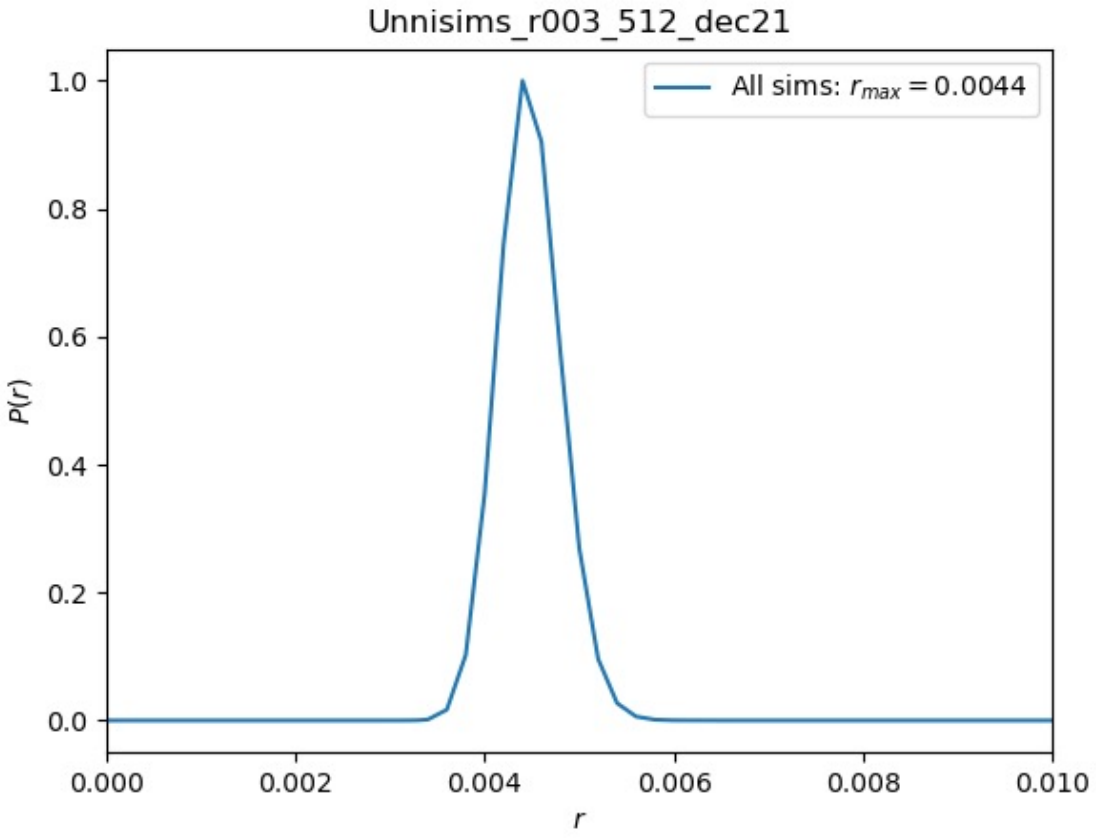
Gaussian likelihood – total for all 10 realizations, $r = 0.003$



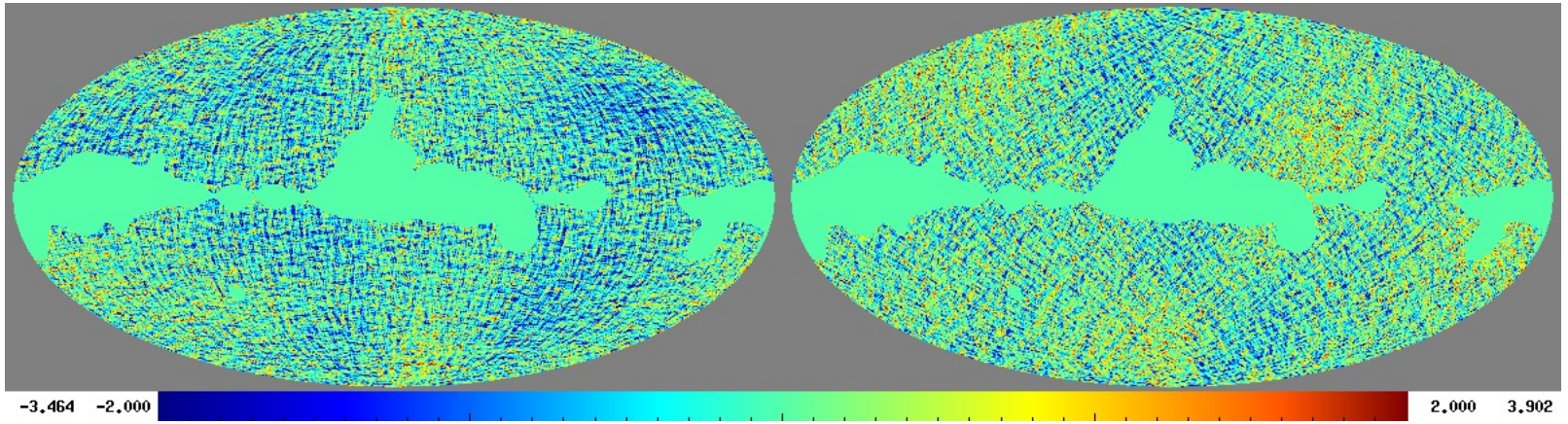
Blackwell Rao estimation, $r = 0.003$



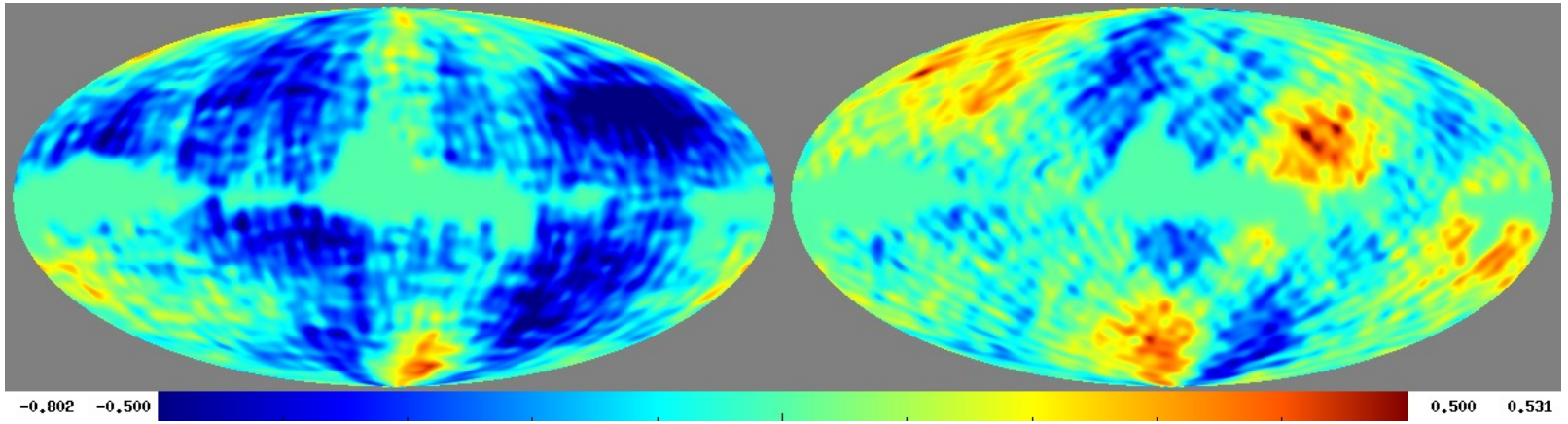
Blackwell Rao estimation – total for all 10 realizations, $r = 0.003$



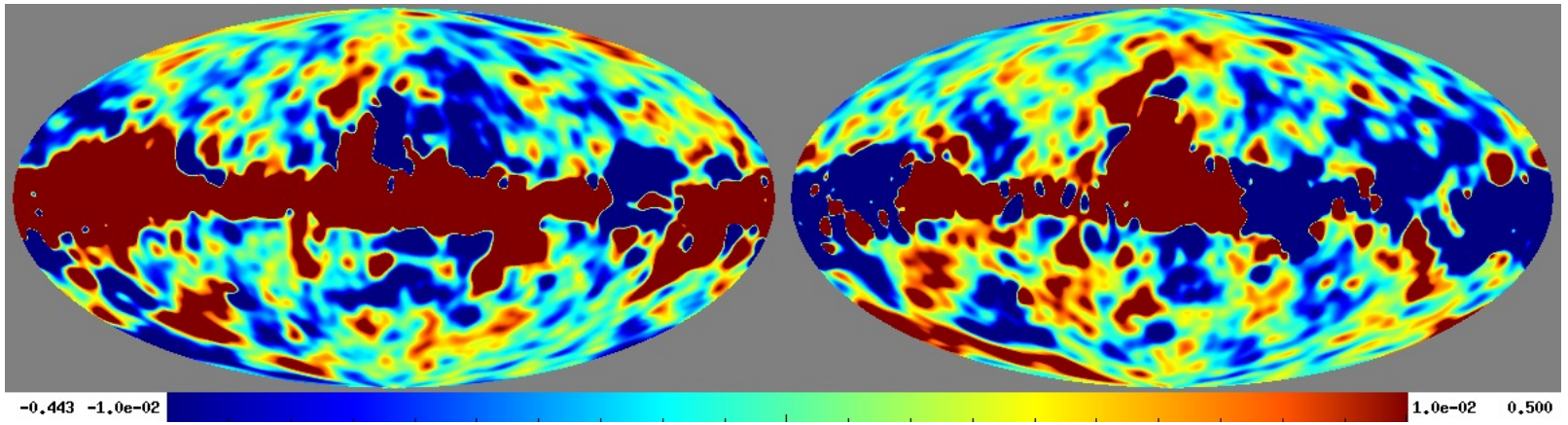
90.92 CMB



Smoothed to a 5° beam



Input – output CMB map smoothed to a 5° beam



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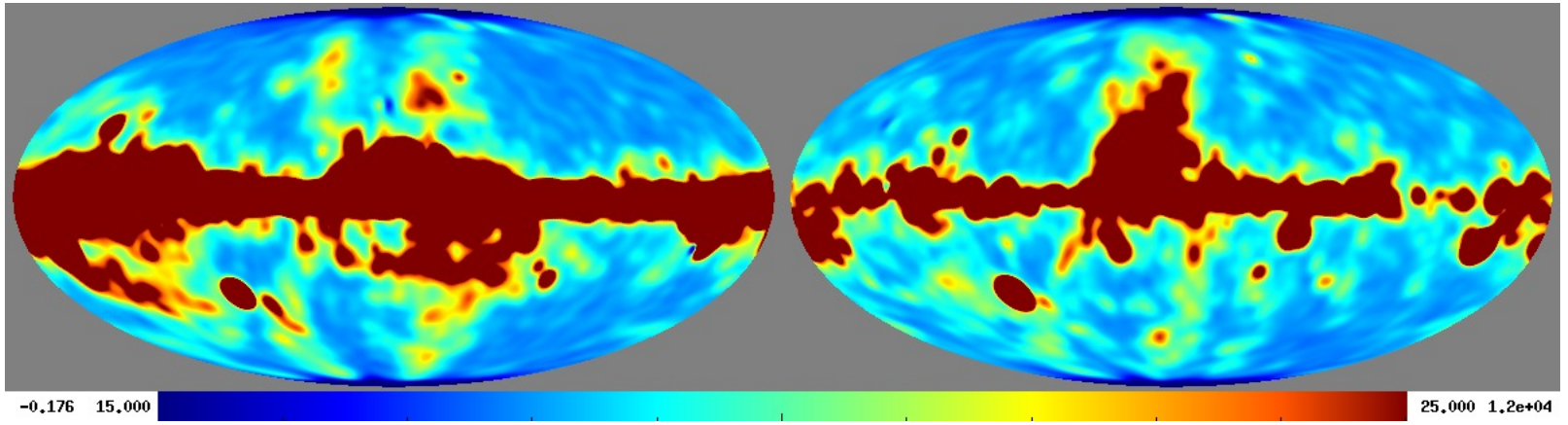
Summary

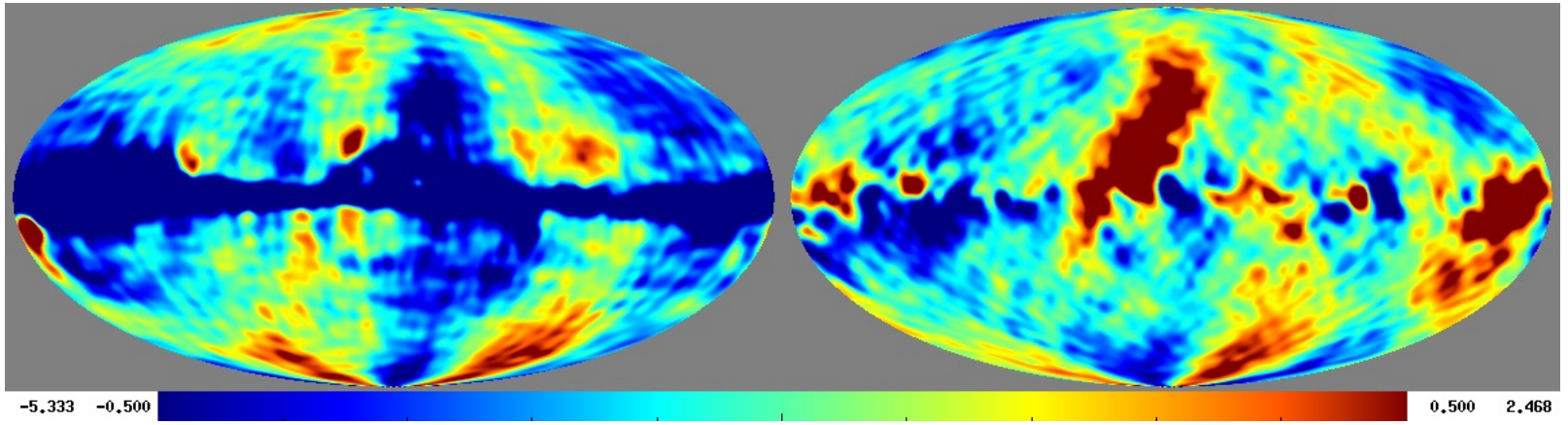
- Component separation gives results in excellent agreement with input
- Working on finding a likelihood that is both robust and unbiased
- Analysis of model 90.92 is not resulting in a clean enough CMB map

90.92 data with 90.91 model

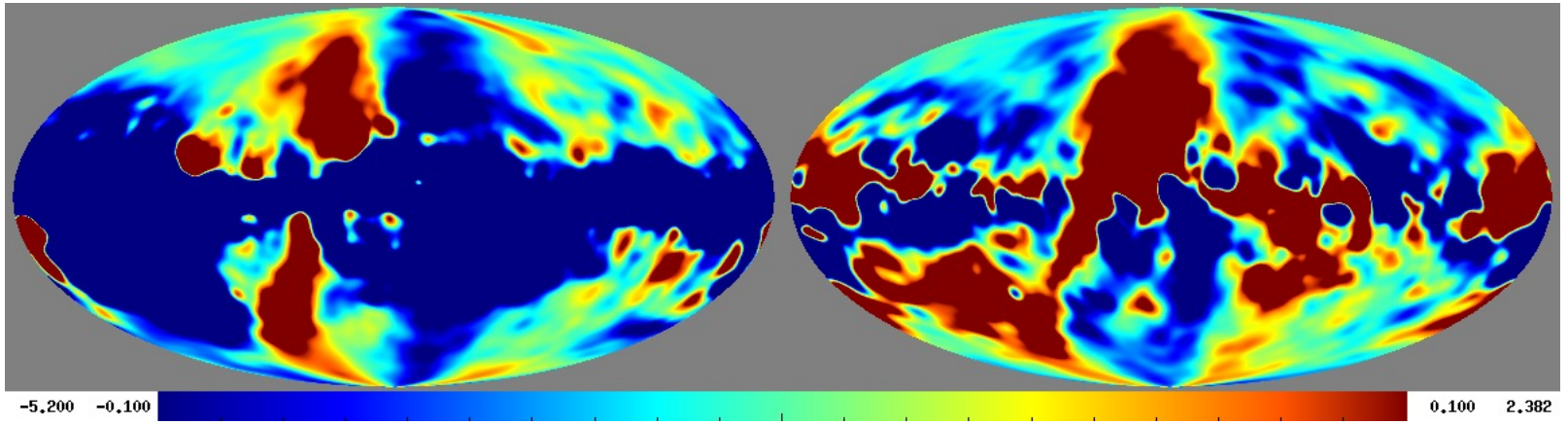
χ^2 smoothed to a 5° beam



CMB moothed to a 5° beam

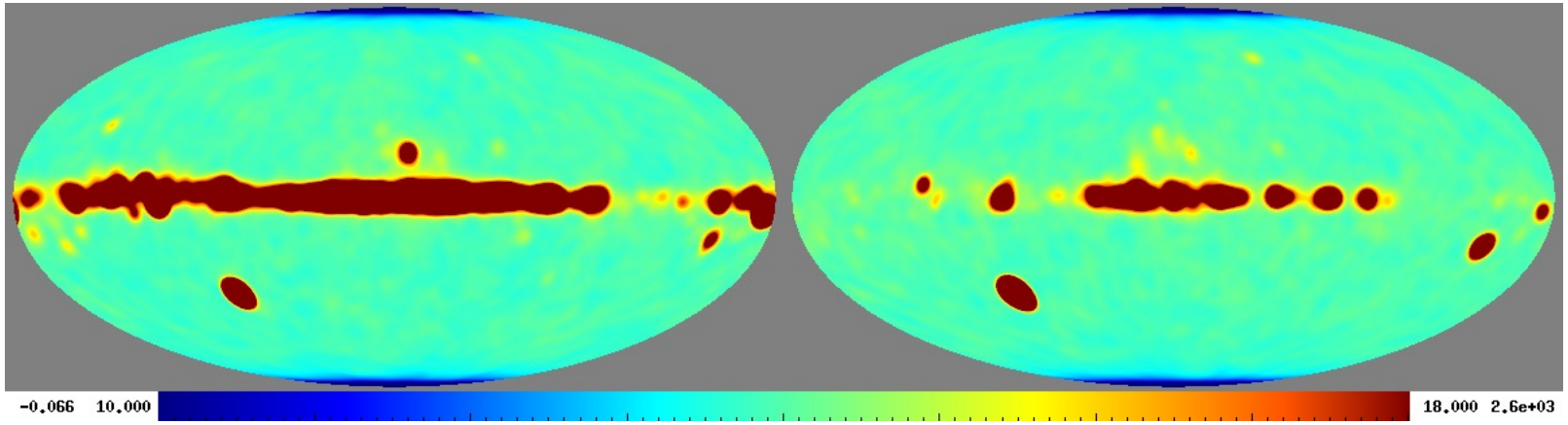


CMB diff (input – output)

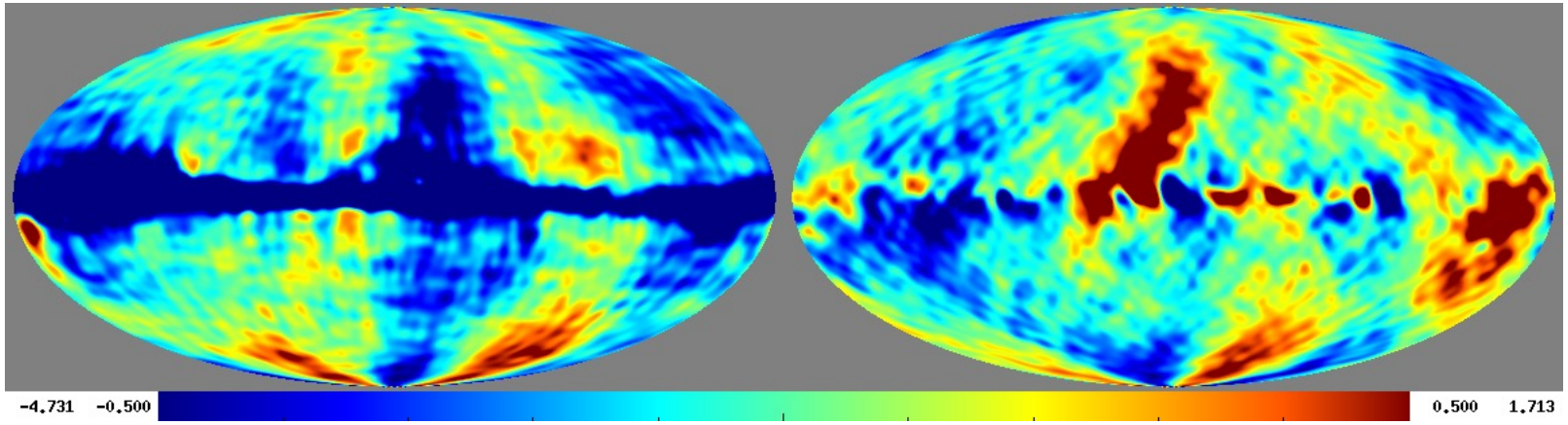


90.92 data with 90.91 model 21-385GHz

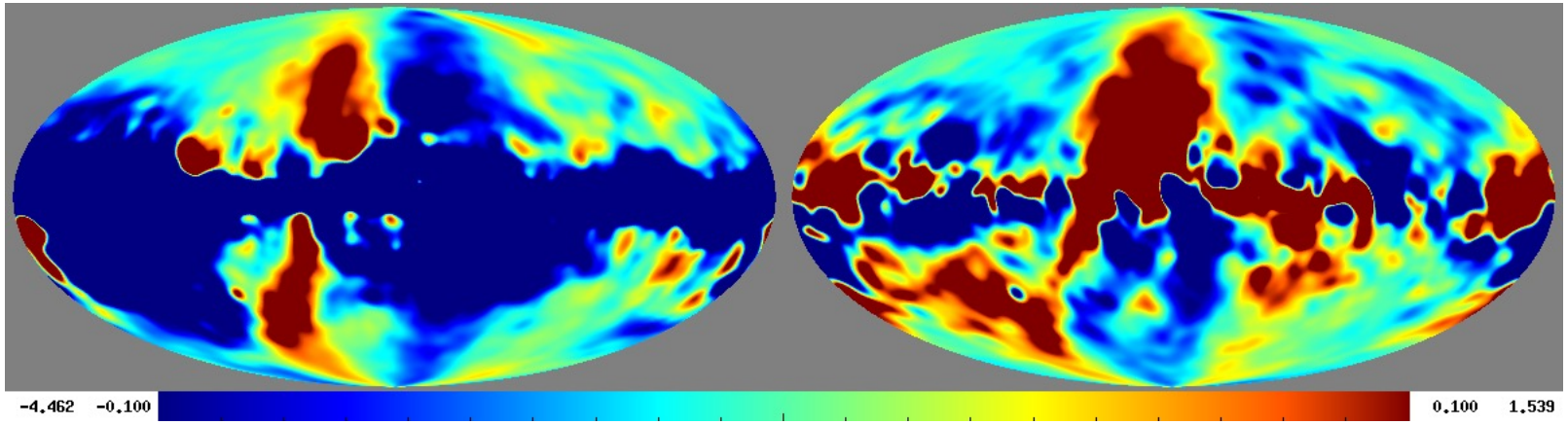
χ^2 smoothed to a 5° beam



CMB moothed to a 5° beam

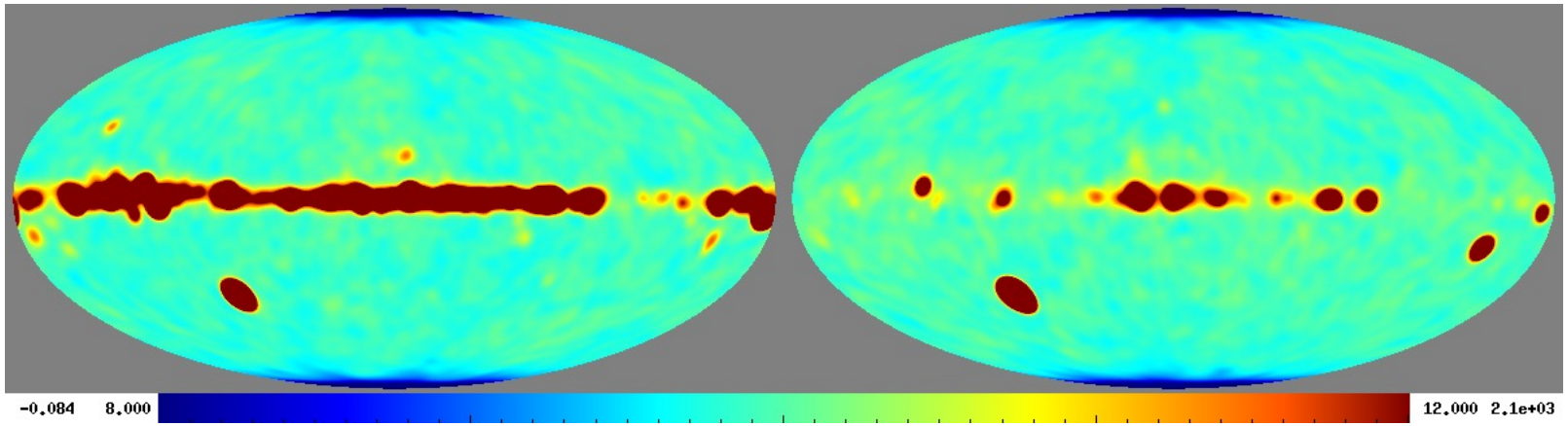


CMB diff (input – output)

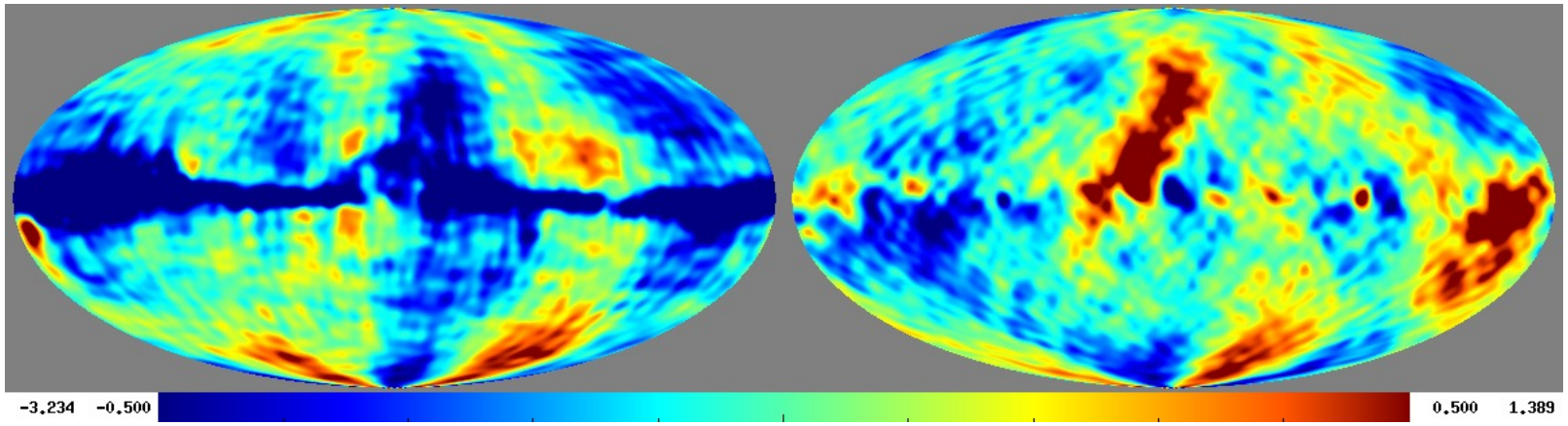


90.92 data with 90.91 model 43-385GHz

χ^2 smoothed to a 5° beam



CMB moothed to a 5° beam



Not visible in residuals

CMB diff (input – output)