Foreground cleaning for COrE+ using NILC

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Objective

Measurement of CMB polarization maps and angular power spectra
Internal Linear Combination (ILC) method on a frame of spherical wavelets called needlets.
Needlets (spherical wavelets) allows localized filtering both in pixel space and harmonic space, so that the ILC weights are adjusted as a function of location on the sky and of angular scale.
NILC CMB MAP

NILC CMB
Field: Q  FWHM: 60 arcmin
Configuration: COre+  T/S: 0.001

NILC CMB
Field: U  FWHM: 60 arcmin
Configuration: COre+  T/S: 0.001

(NILC – INPUT) CMB
Field: Q  FWHM: 60 arcmin
Configuration: COre+  T/S: 0.001

(NILC – INPUT) CMB
Field: U  FWHM: 60 arcmin
Configuration: COre+  T/S: 0.001
NILC weights

Frequency channels around 150 and 220 GHz have contributed the most to the final reconstruction of CMB polarization maps.
Angular Power Spectrum (COrE+ $f_{\text{sky}}=0.900$, $T/S=0.001$)

$N\ell (\ell+1)C_{\ell}/2\pi$ in mK$^2$

Recovered CMB
Input CMB

Sky fraction: 90%
Angular Power Spectrum (COrE + f\text{sky} = 0.55, T/S = 0.001)

Recovered CMB
Input CMB
Recovered CMB (Lensing subtracted)
Input CMB (Lensing subtracted)

Sky fraction: 55%
Summary

• We have analyzed simulated sky maps for COre+ configuration, with the main scientific objective of measuring of B-mode of CMB by removing the foreground signals and instrumental noise.
• The method used is an implementation of a constrained linear combination of the channels with minimum error variance on a frame of spherical wavelets called needlets, allowing localized filtering in both pixel space and harmonic space.
• We have obtained a full sky CMB polarization map, which can be used to study the scientific potential of the mission.
• The frequency channels around 150 and 220 GHz contribute the most to the final reconstruction of CMB polarization maps.
• We have been able to measure angular power spectrum of B-mode only at very large angular scales.
Thank you