



Insights into filtering on the sphere offered by the polar form of spherical harmonics

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Representing the spherical harmonic spectrum of a field on the sphere in terms of its amplitude and phase is termed as its polar form. In this study, we look at how the amplitude and phase are affected by linear low-pass filtering. The impact of filtering on amplitude is well understood, but that on phase has not been studied previously. Here, we demonstrate that certain class of filters only affect the amplitude of the spherical harmonic spectrum and not the phase, but the others affect both the amplitude and phase. Further, we also demonstrate that the filtered phase helps in ascertaining the efficacy of decorrelation filters used in the GRACE community. Based on these results we investigate the practice of filtering Earth system models to compare them with filtered GRACE datasets.