

Inversions of averaged GPS RO bending angles for climate applications

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The magnitude of noise on the raw observed ionosphere-free GPS RO bending angles (BA) exceeds the magnitude of their variability above a certain height in the stratosphere. Commonly, BA are optimized, i.e. replaced or mixed with the background BA obtained from an atmospheric model or climatology or another model with or without fitting to observed BA at lower heights. The replacement of larger observational errors by smaller background errors, though it does not make BA at large heights more useful, reduces error propagation to lower heights after the Abel inversion. Commonly, the weight of background is determined individually for each occultation based on the magnitude of BA noise. When GPS RO refractivity or other retrieved products are averaged in time and space for climate applications, it appears more efficient to first average BA and then subject them to inversion. This approach has been applied in this study. It allows reduction of the weight of background in the averaged GPS RO retrieved products. Besides, it allows reduction of the bias errors when applying non-linear fitting of the background to observed noisy BA. The approach has been tested with two months of COSMIC data.