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Atmospheric Measurement Techniques Discussions

Interactive comment on "Parameterizing the instrumental spectral response function and its changes by a Super-Gaussian and its derivatives" *by* Steffen Beirle et al.

Anonymous Referee #2

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The publication introduces several relevant improvements in the parameterisation process of the ISRF. The methodology for parameterising changes to the ISRF and the interaction with wavelength calibration are quite relevant, as previous missions suggest significant in-orbit changes of the ISRF over the mission (e.g. the article reference for "Azam, F., and Richter, A."). Also the paper provides various interesting possibilities for optimising ISRF parameterisation computational performance.

After having read the article I was wondering whether the super-Gaussian definition could be extended in a systematic way with additional terms for improving the accuracy of the ISRF in describing a measured response: stimuli such as tunable lasers enable very accurate measurements of the ISRF shape with high spectral resolution

during on-ground calibration and potentially also during in-flight calibration. These high accuracy measurements are typically driven by demanding mission requirements on ISRF accuracy. For example for OMI/TROPOMI target accuracies for the parameterised ISRF were defined that require the parameterisation fit error to be within 1% of amplitude value within a spectral range covering 2-3 times FWHM. With such target accuracies, small asymmetries in the measured peak and wings of the ISRF then might lead to out-of-range fit errors when limiting the number of shape fit parameters to 4 as discussed for the asymmetric Gaussian. Adding additional shape parameters improves the accuracy. The challenge would then probably be to find additional shape parameters that have low correlation to the existing super-Gaussian parameters, and that would fit within the presented approach for describing changes.

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