Improving Leakage Matrix Calculation

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Previous work has revealed discrepancies between the analysis of MDI full disk data and medium-l data from the same time period. Most notably, the full disk analysis lacks some systematic errors and generally results in better fits to the data. One of the differences between the two analyses is the leakage matrix used in the peakbagging. In this poster we discuss the effect of such things as proper pixel integration, higher resolution spherical harmonics, improved interpolation in the remapping, and various point spread functions on the leakage matrix itself and the resulting mode parameters.

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How to Calculate a Leakage Matrix

To find out how much each spherical harmonic leaks into every other spherical harmonic, we simply create artificial spherical harmonic images and run them through the same pipeline we use for real data. The challenge is to create the artificial images as they would be seen by the actual instrument. This requires an estimate of optical distortion and the point spread function.

Due to the computational expense, only some leaks are "measured" directly in this fashion. The rest of the leakage matrix is filled in by interpolation, which has the added advantage of smoothing the leaks.

Progress

We now have a module, ported from IDL, that creates the needed artificial images and inserts them into JSOC dataseries. Unfortunately we have not yet gone beyond this implementation to complete the proposed study, but work is still ongoing.