

Advances in Global Mode Analysis

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Pipeline Summary

Start: Dopplergrams

Spherical Harmonic Decomposition

Retime into timeseries

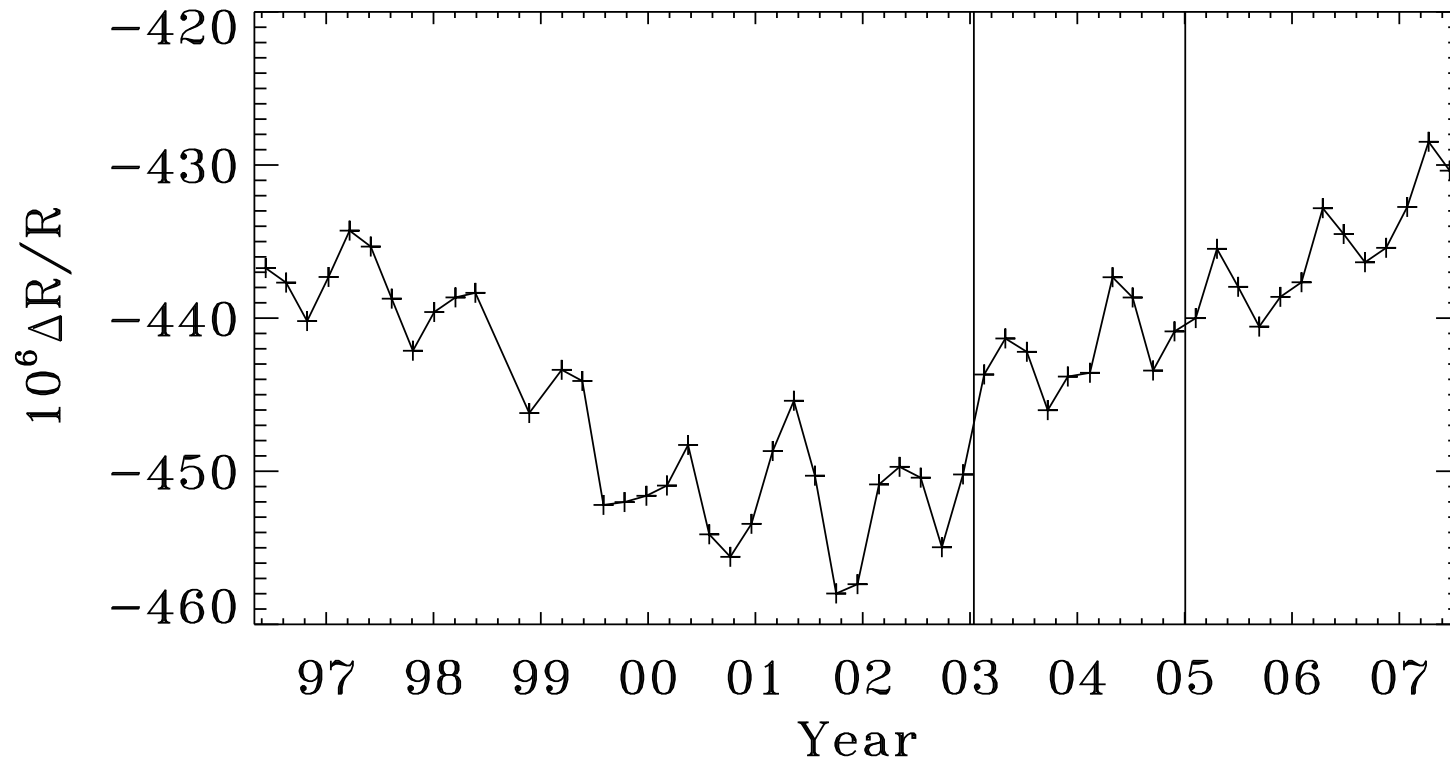
Detrending and Gapfilling

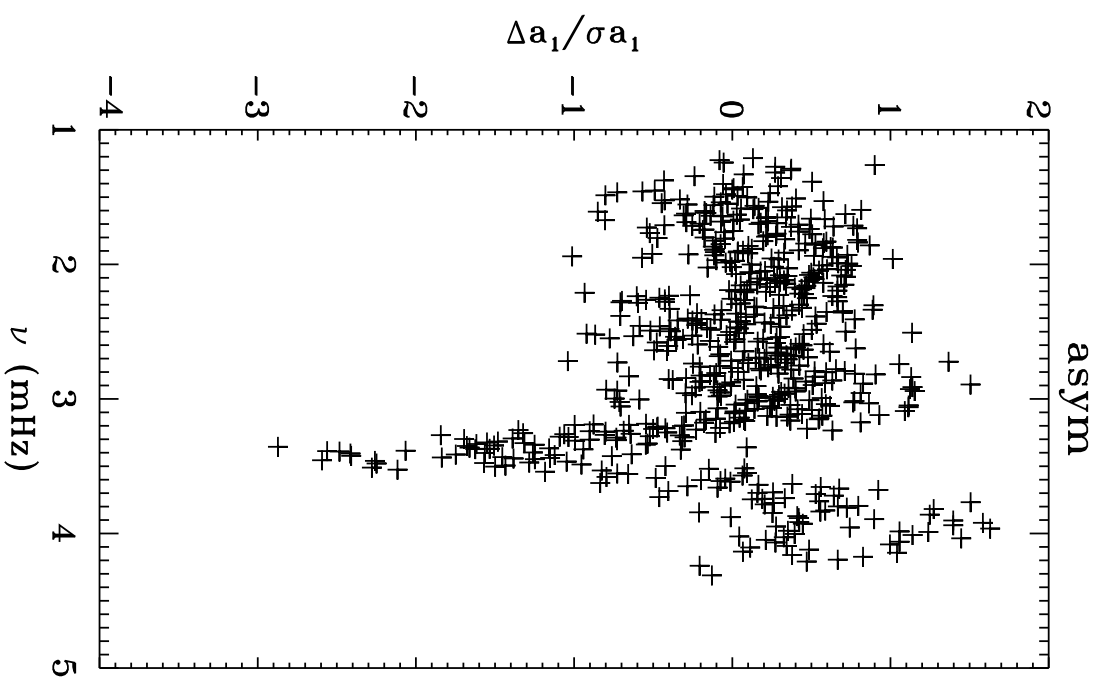
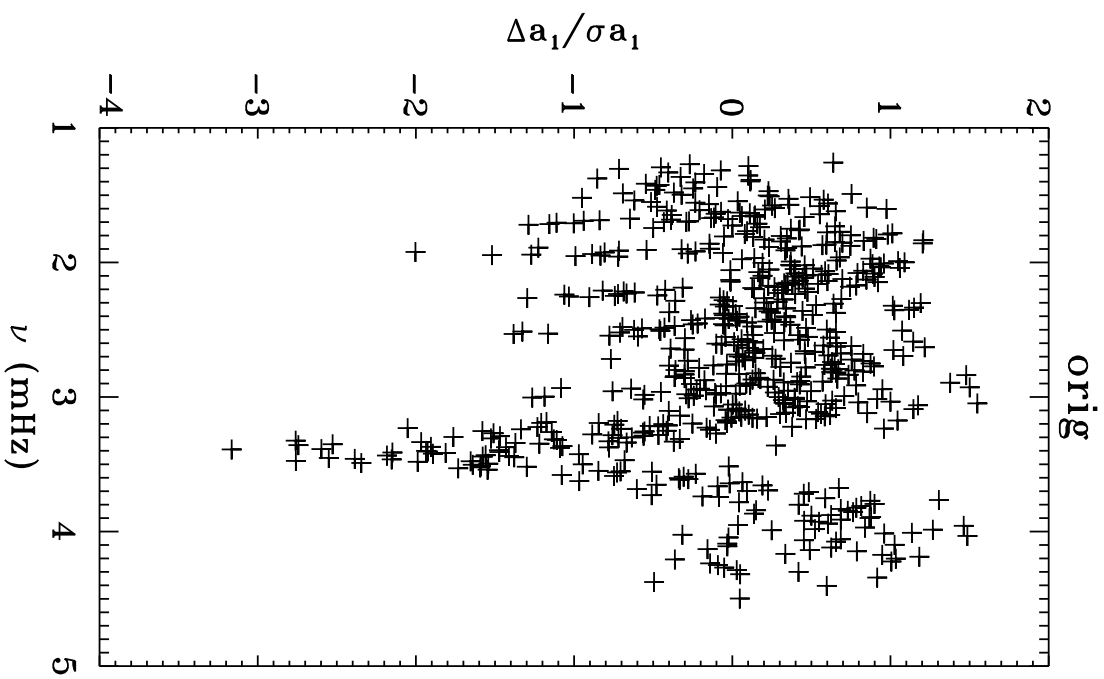
Peakbagging to fit for mode parameters

Inversion of splittings

Finish: Internal Rotation Profile

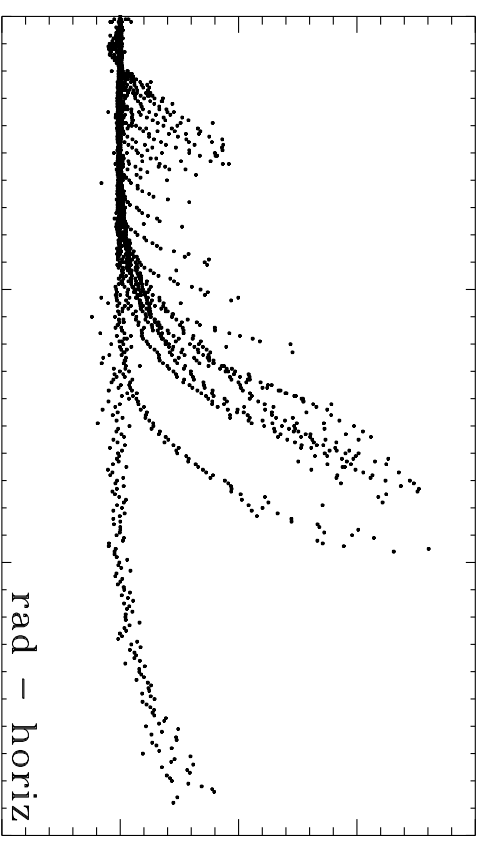
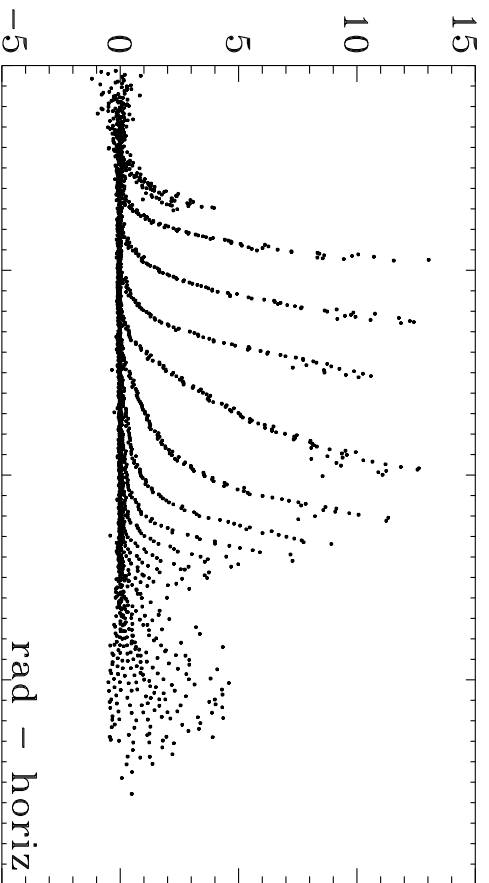
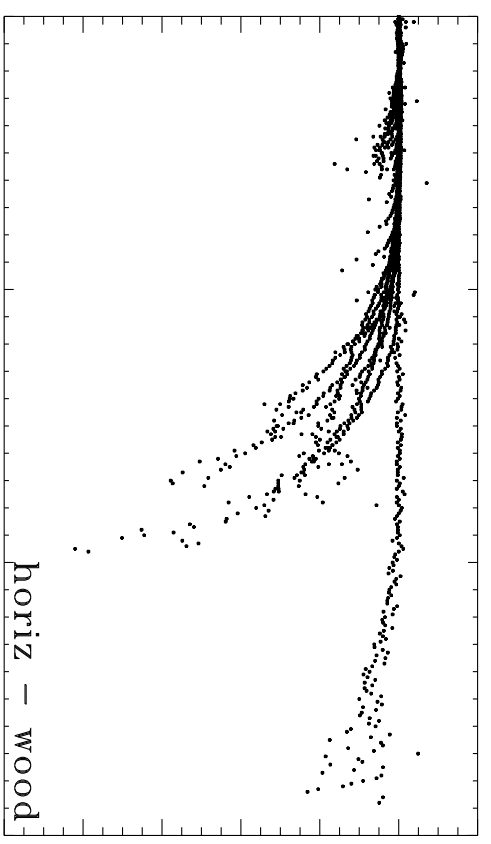
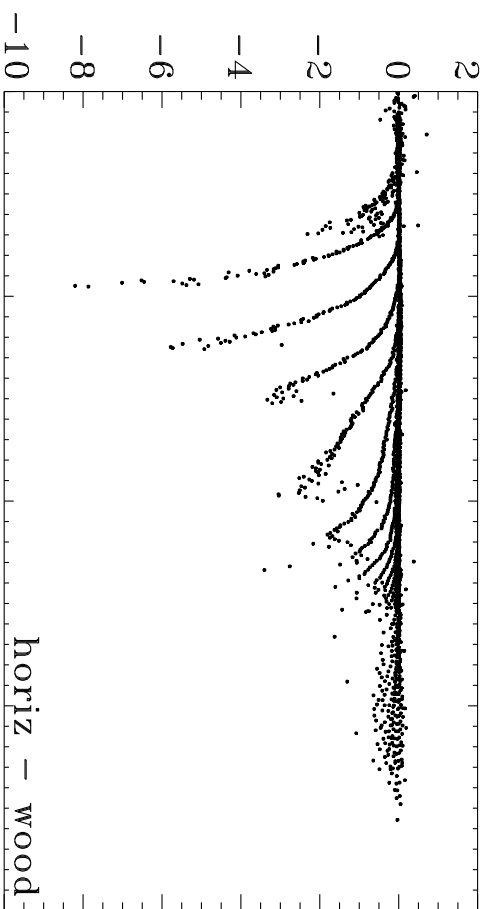
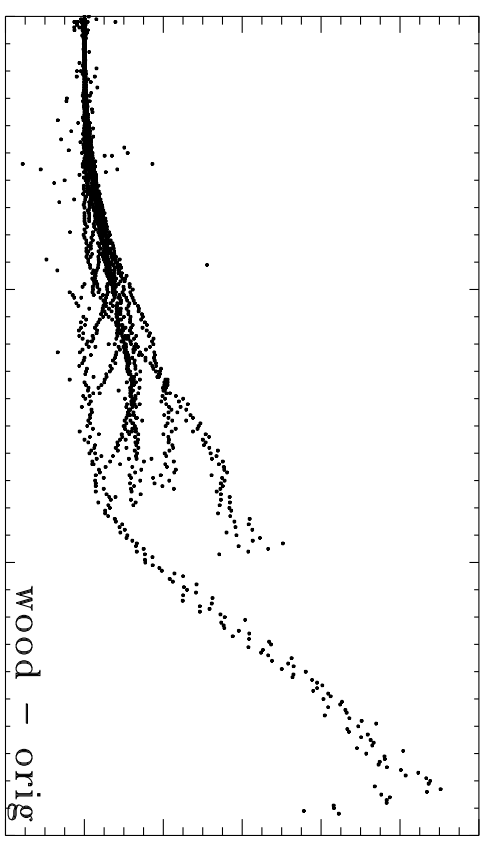
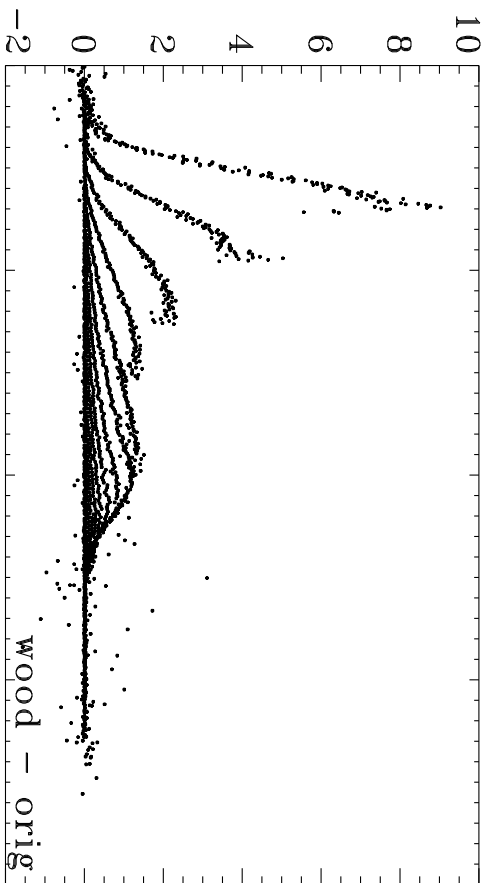
Problems...

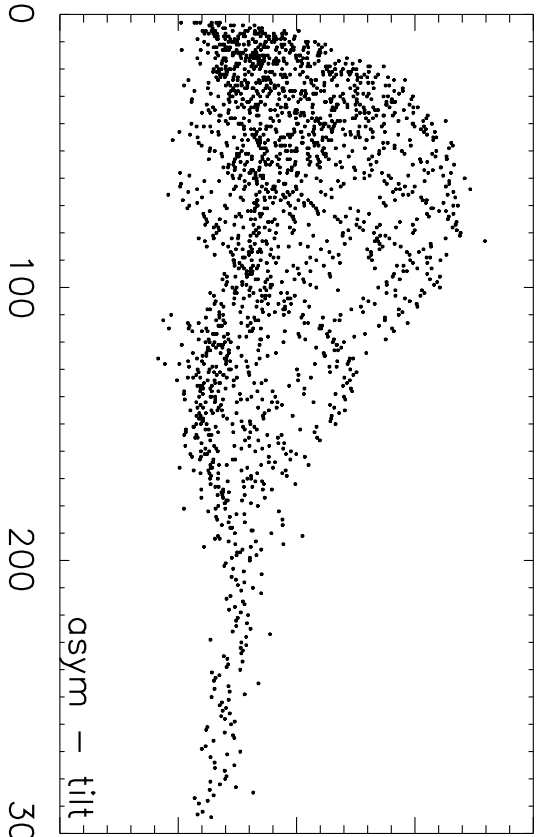
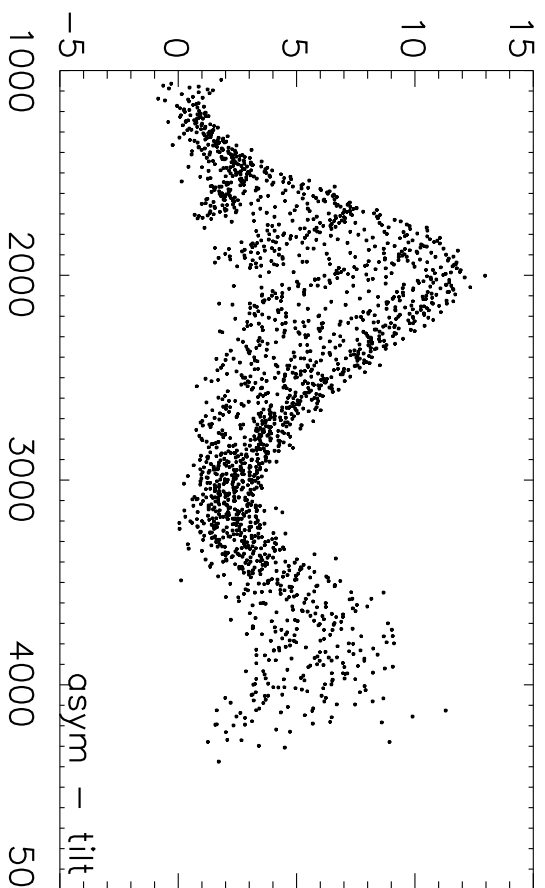
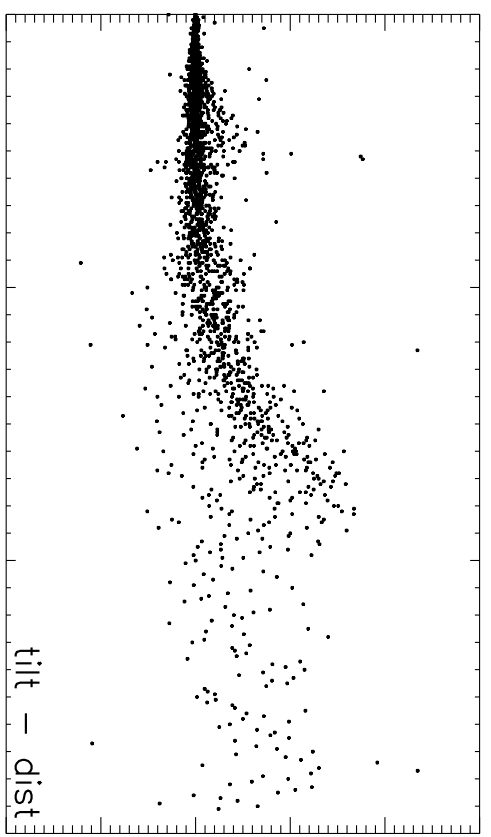
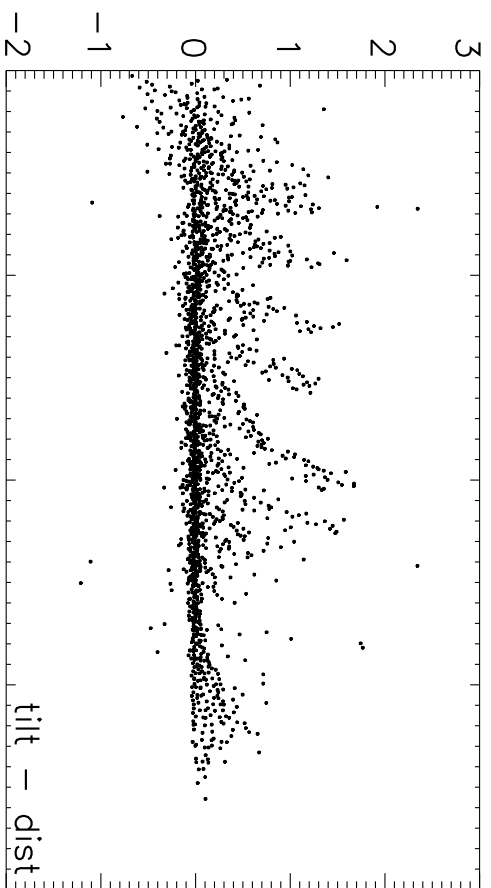
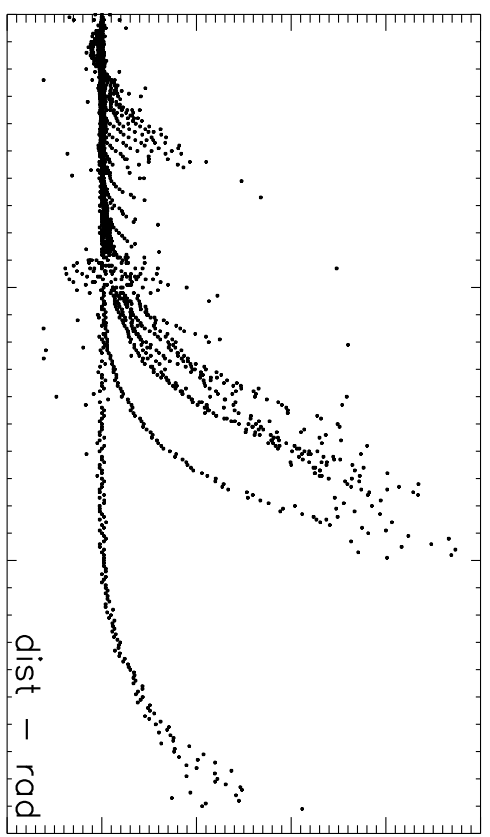
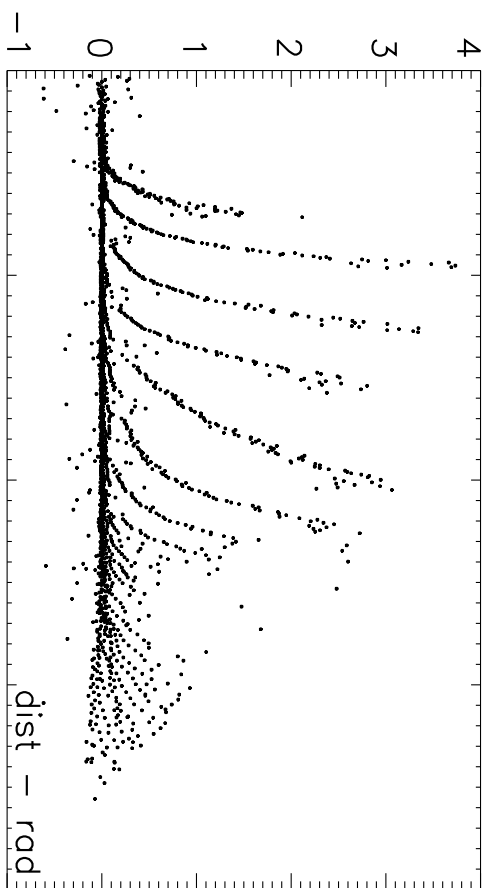




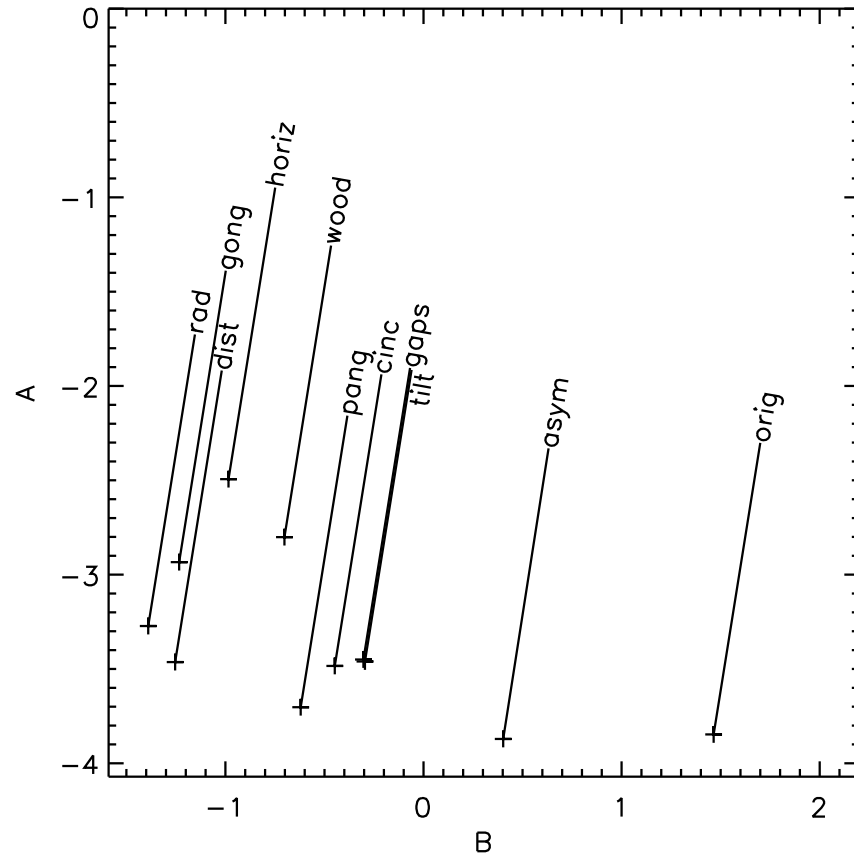
Corrections

| | Abbr. | Takes into account... |
|----|-------|---|
| 1 | wood | Woodard effect: distortion of eigenfunctions by differential rotation |
| 2 | horiz | Horizontal displacement at the solar surface |
| 3 | rad | Correct radius of the sun in SHT's |
| 4 | dist | Cubic distortion from optics in leakage matrix |
| 5 | pang | Correct P-angle in SHT's |
| 6 | cinc | Correct Carrington inclination in SHT's |
| 7 | tilt | Tilt of CCD, cubic distortion now corrected in SHT's |
| 8 | gaps | New algorithm for gap-filling and detrending |
| 9 | asym | Asymmetric line profiles |
| 10 | gong | Same as gaps but using 108 day timeseries beginning every 36 days |

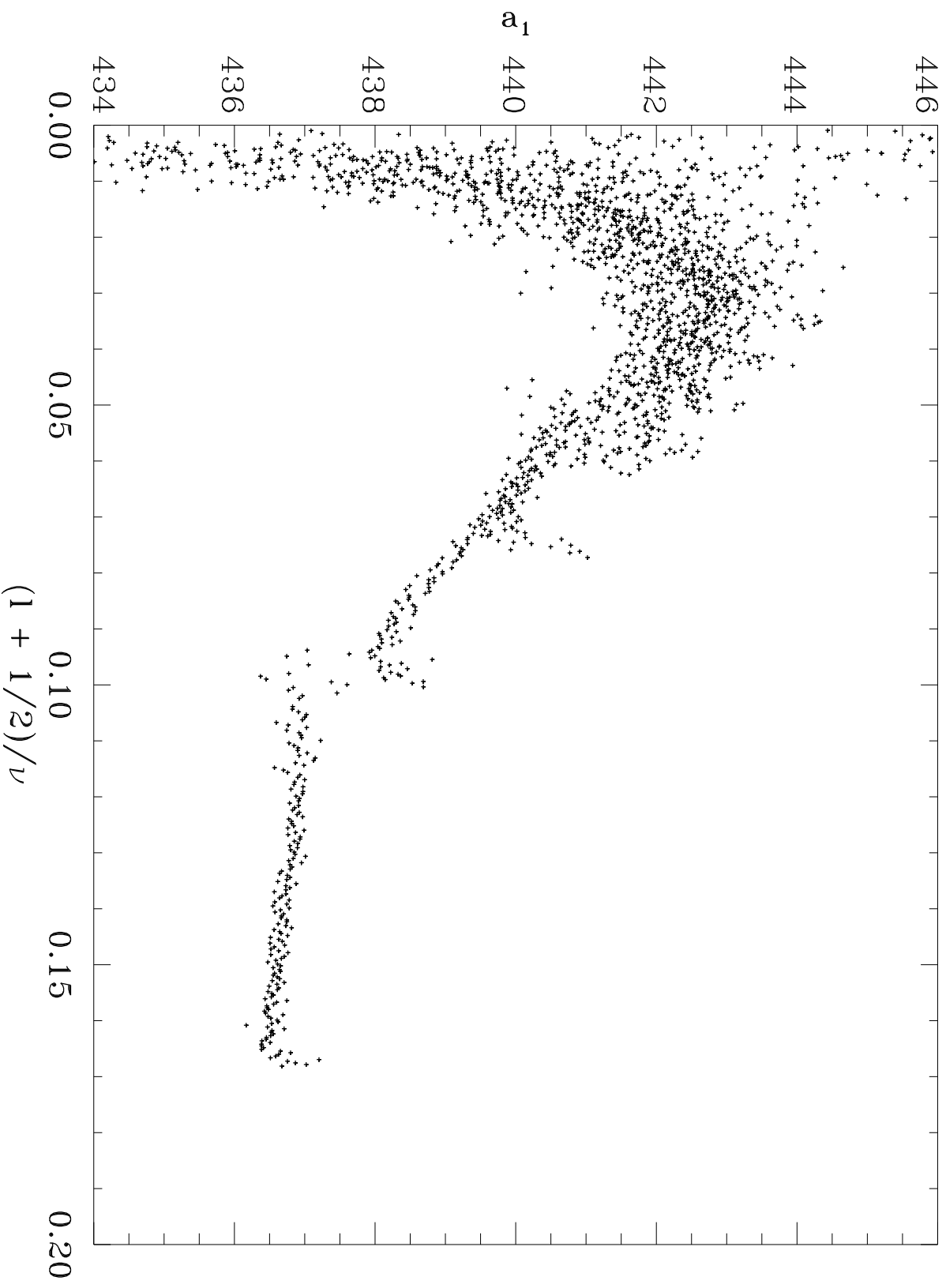




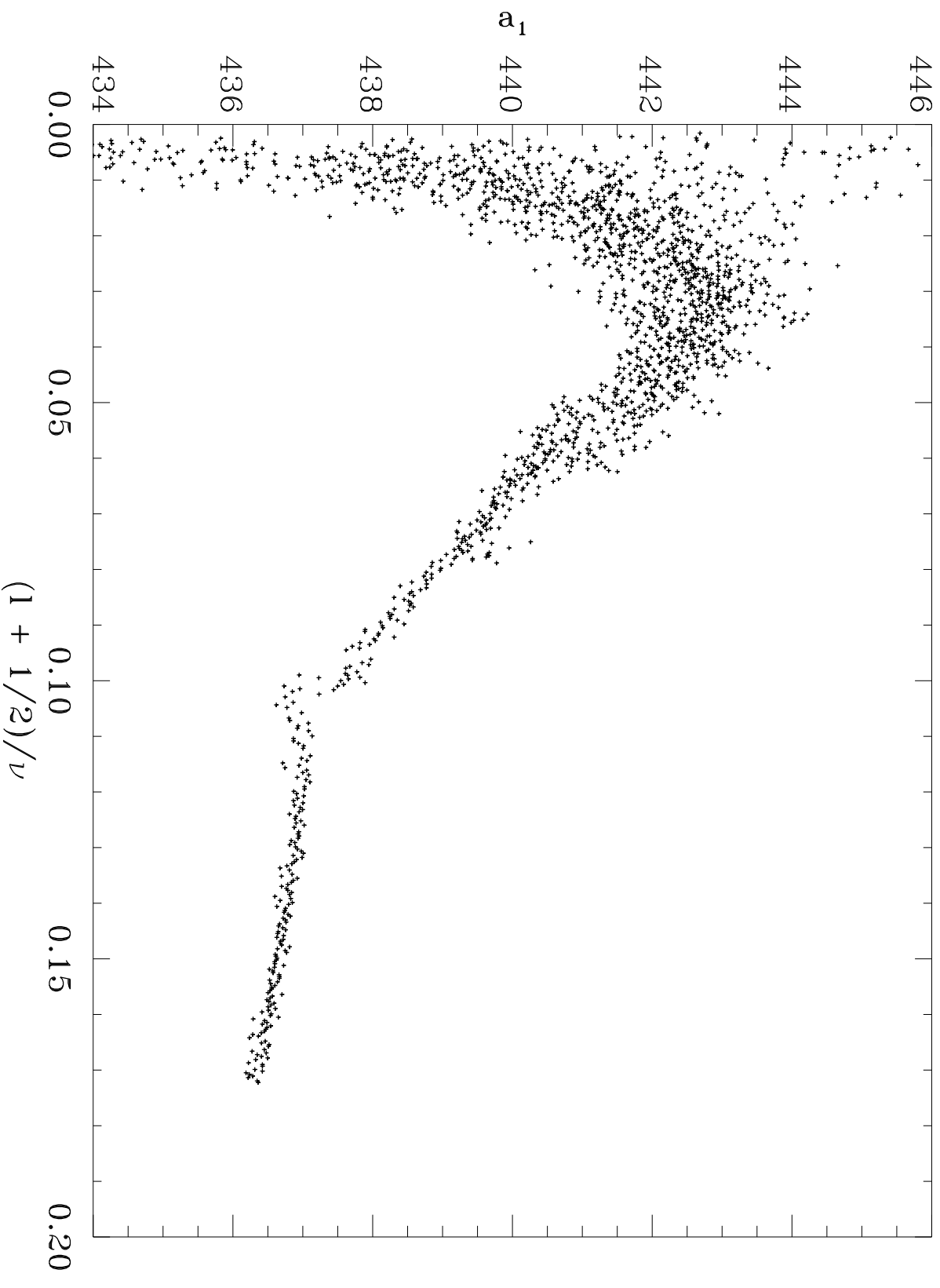
$$\Delta\nu/\nu = A \sin(\omega_{yrt}) + B \cos(\omega_{yrt}) + Ct + D$$



original



all corrections



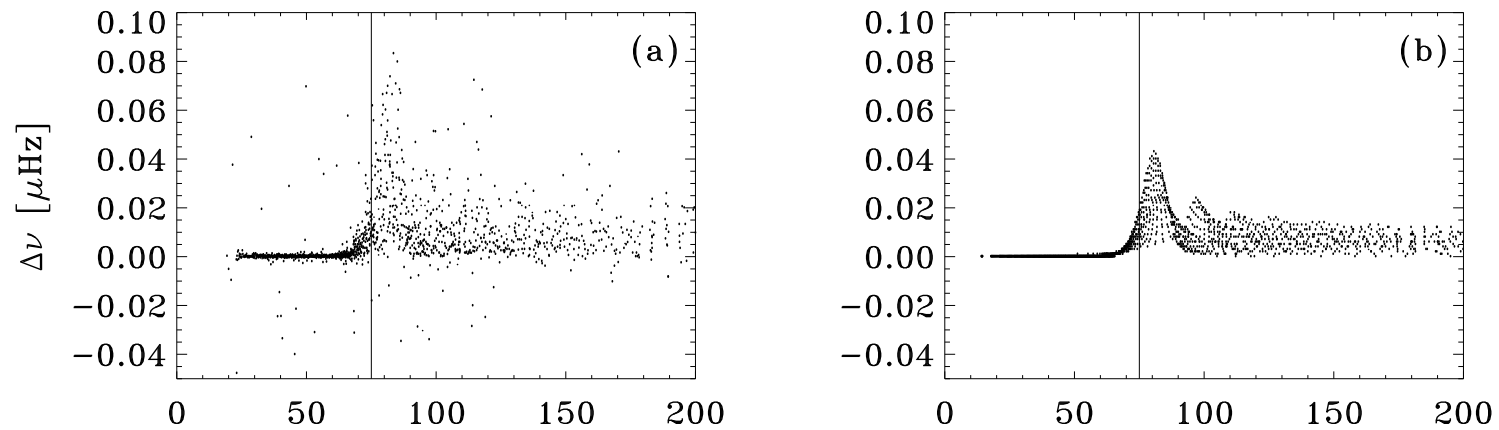
What we can now do

- Provide updated mode parameters for the entire mission
- Provide detrended and gapfilled medium- l timeseries with arbitrary length and starting day
- Automatically generate data at any level of processing with an arbitrary range in l

What we plan to do before launch

- Provide the same products using full disk data
- Port the pipeline to DRMS
- Add option to correct for time dilation in timeseries and/or pad with zeroes

Potential for Validation



perturbation: $8^\circ \times 8^\circ$ (in longitude and latitude) with FWHM in radius of $2\%R_\odot$ (13.9 Mm) at $r = 0.7R_\odot$ with an amplitude of $+5\%$ of the local sound speed.

the wavelength at $r = 0.7R_\odot$ is 76 Mm or $11\%R_\odot$

THE END

Suggestions? Get in touch!

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