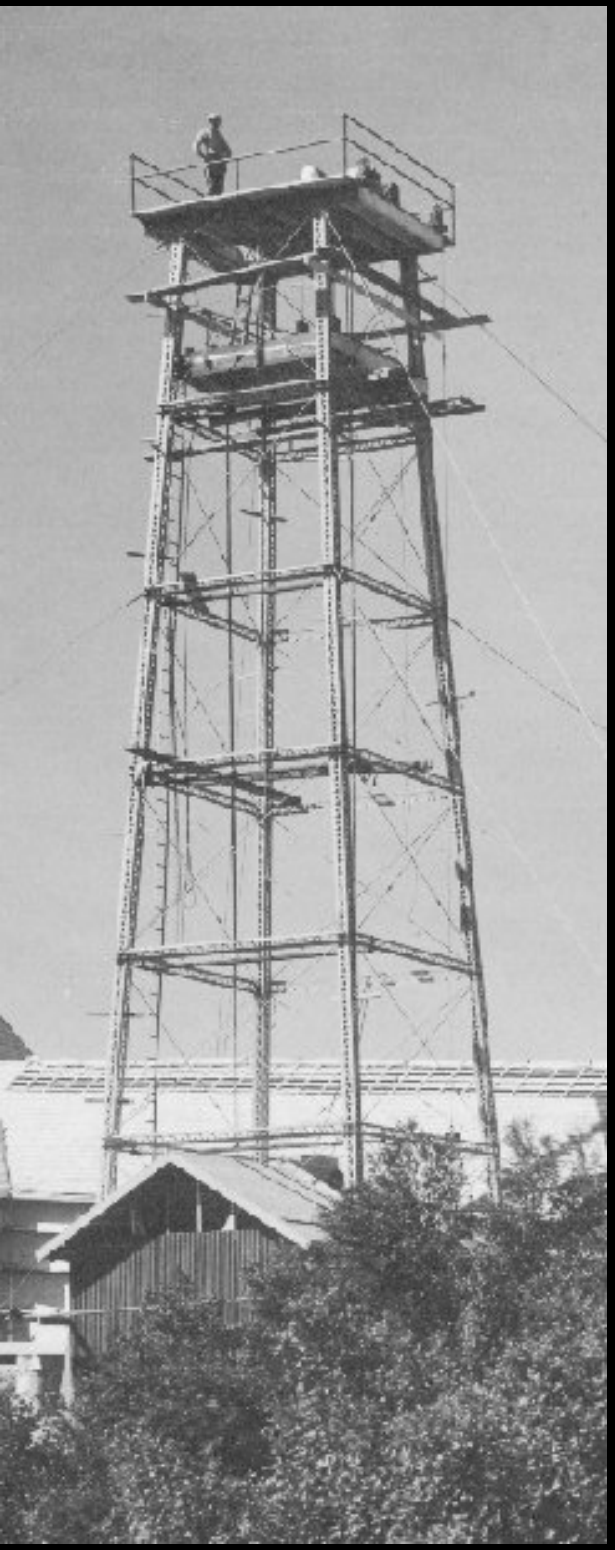
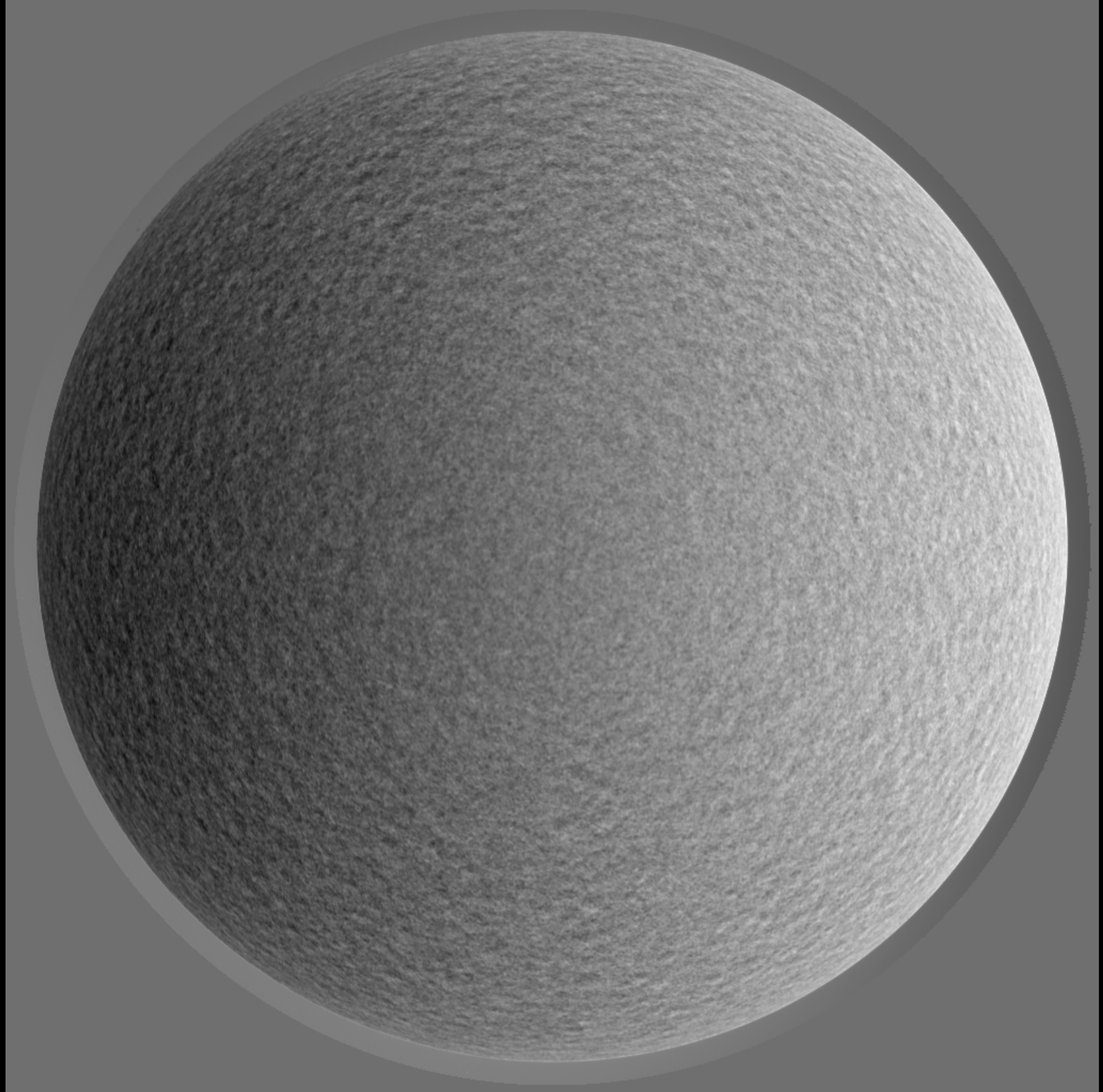
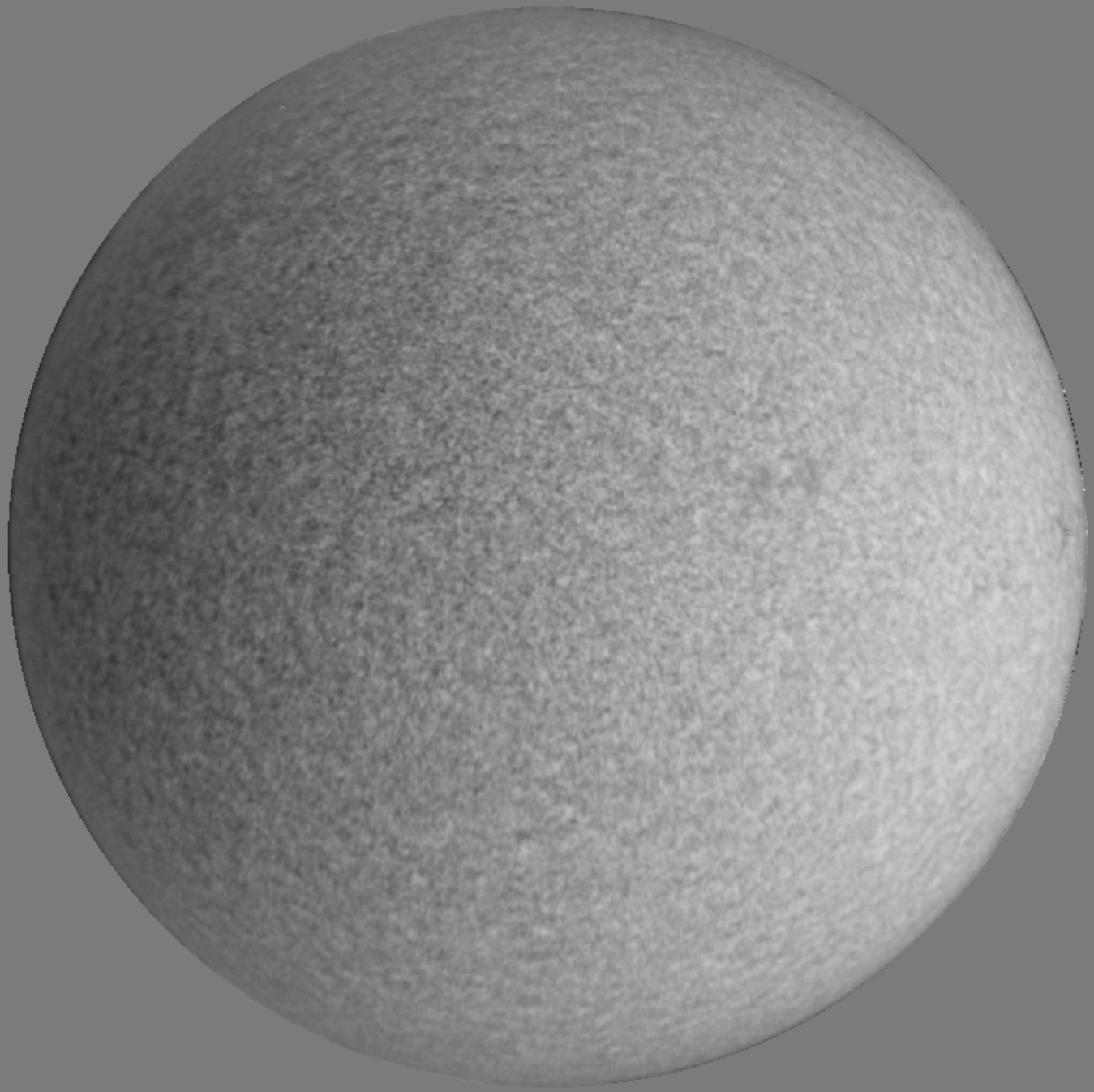
Medium-l Analysis of Mount Wilson Data

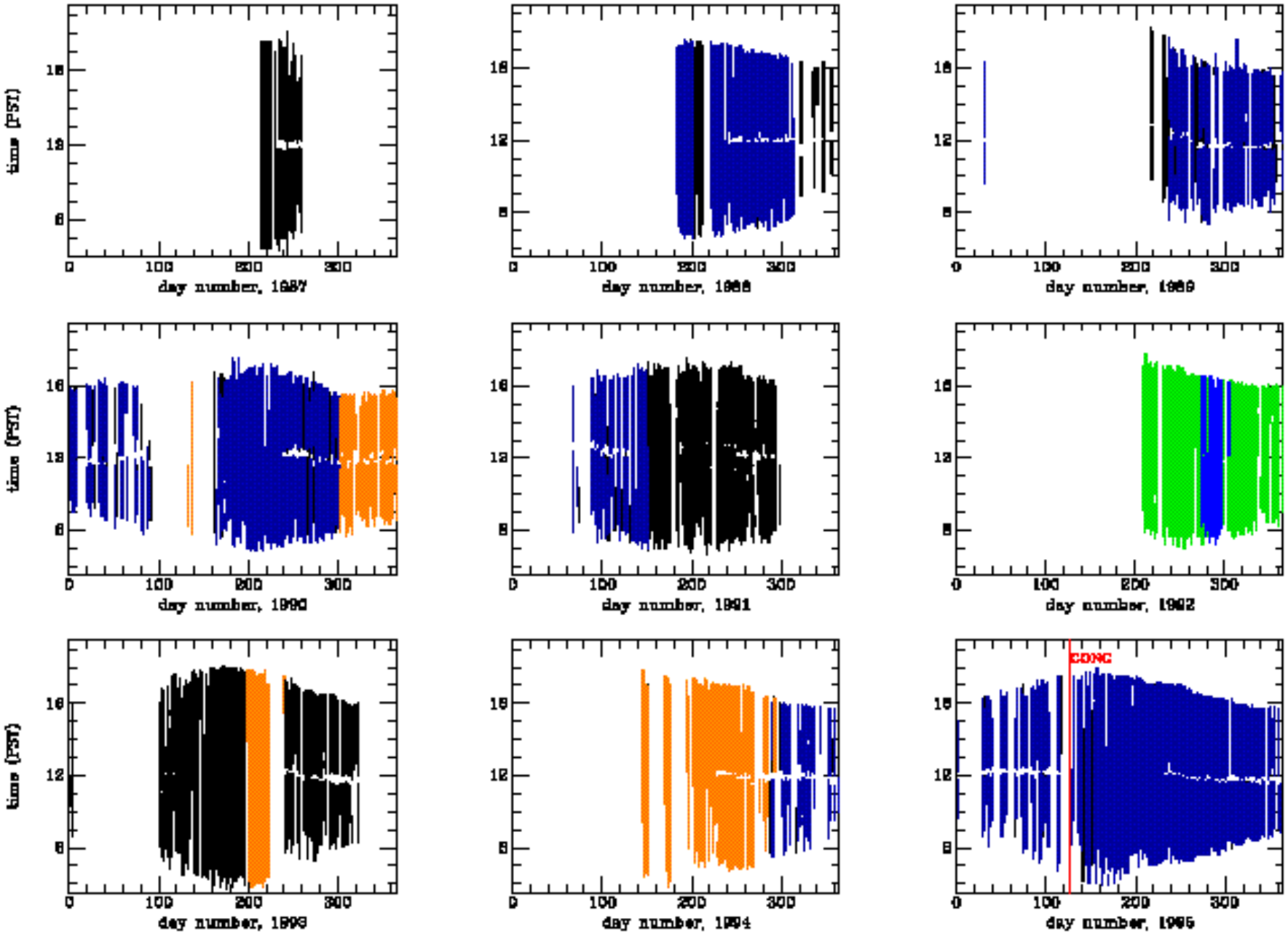
tim larson
tplarson@sun.stanford.edu
Stephen Pinkerton, Ed Rhodes
USC
Jesper Schou
MPS



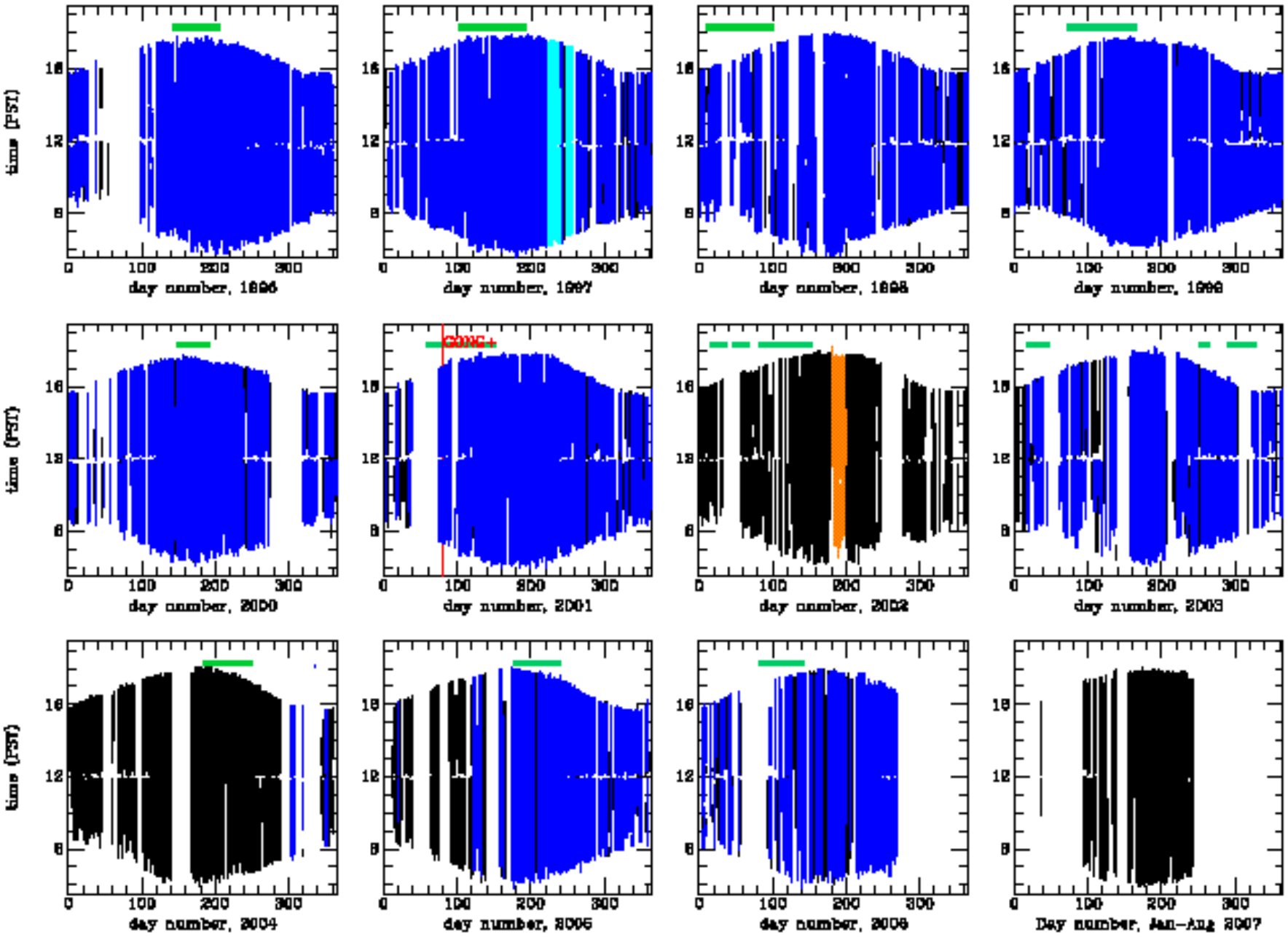




MWO data before MDI



MWO data during MDI



Types of Data

- Filters: Na (mostly) or K (1997)
- Cameras
  - JPL: 1024x1024, 1987-1991
  - PANASONIC: 512x512, 1992-1994, 2007-2009
  - JPL-TALK: 1024x1024, 1994-2007
  - TALKTRONICS: 1024x1024, 2002 (testing)
- Intensity: 1990, 1993-94, 2002

P-angle Drift

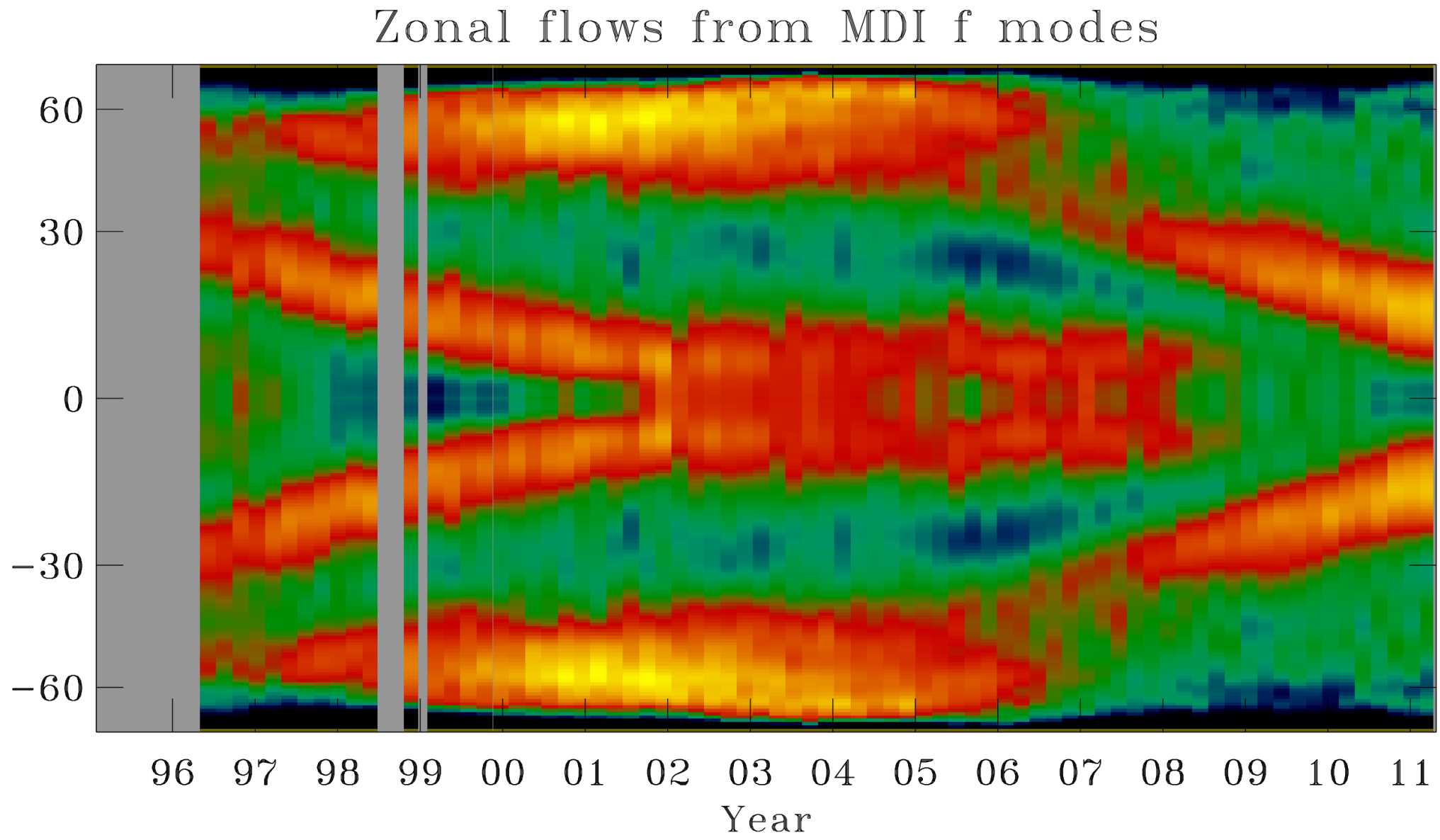
- Ring diagram analysis reveals “washing machine” effect
- Auto-correlation with averaged images throughout the day indicates value of 0.018 degrees/hour
- Cross-correlations with MDI indicates value of 0.012 degrees/hour

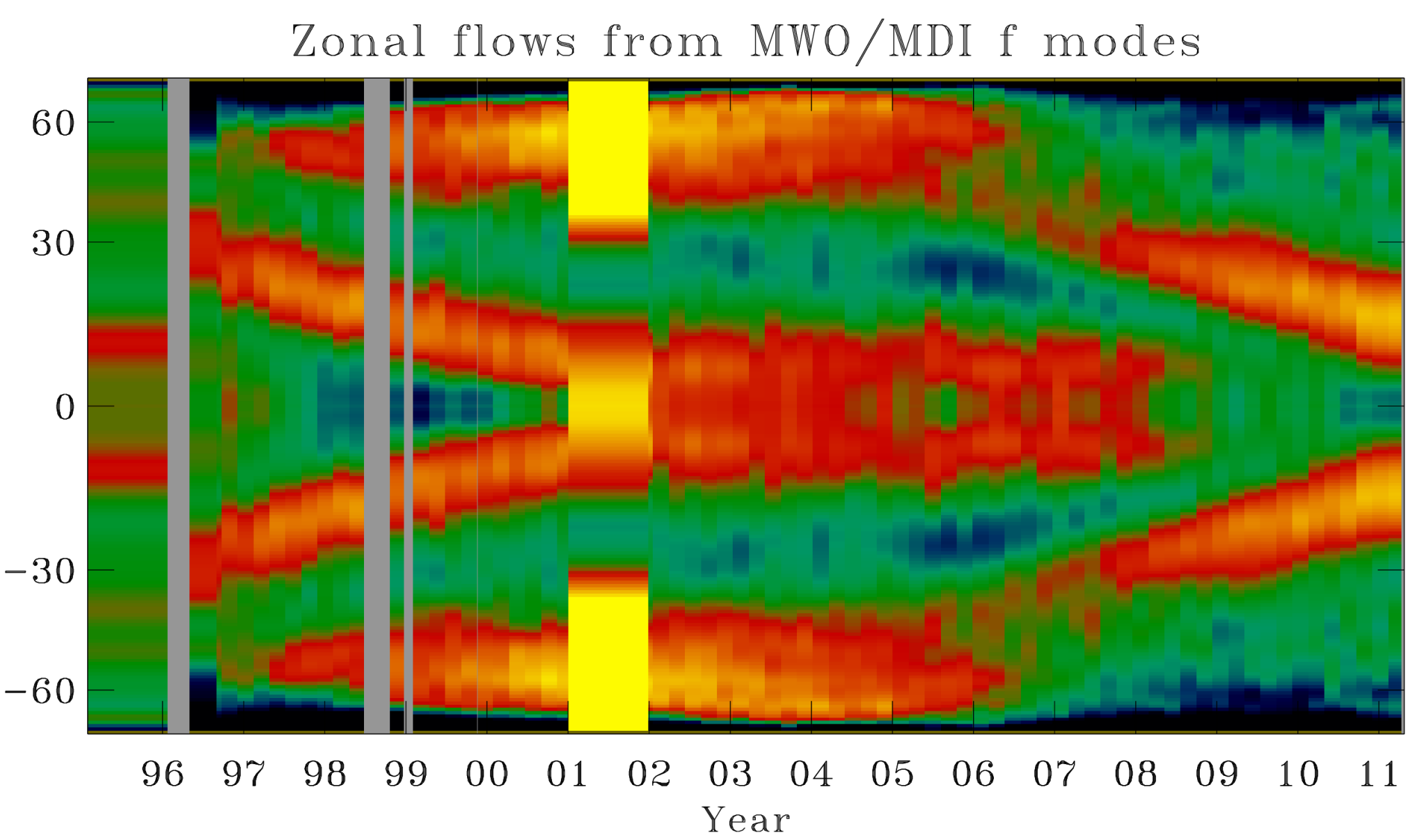
Modifications to Standard Pipeline

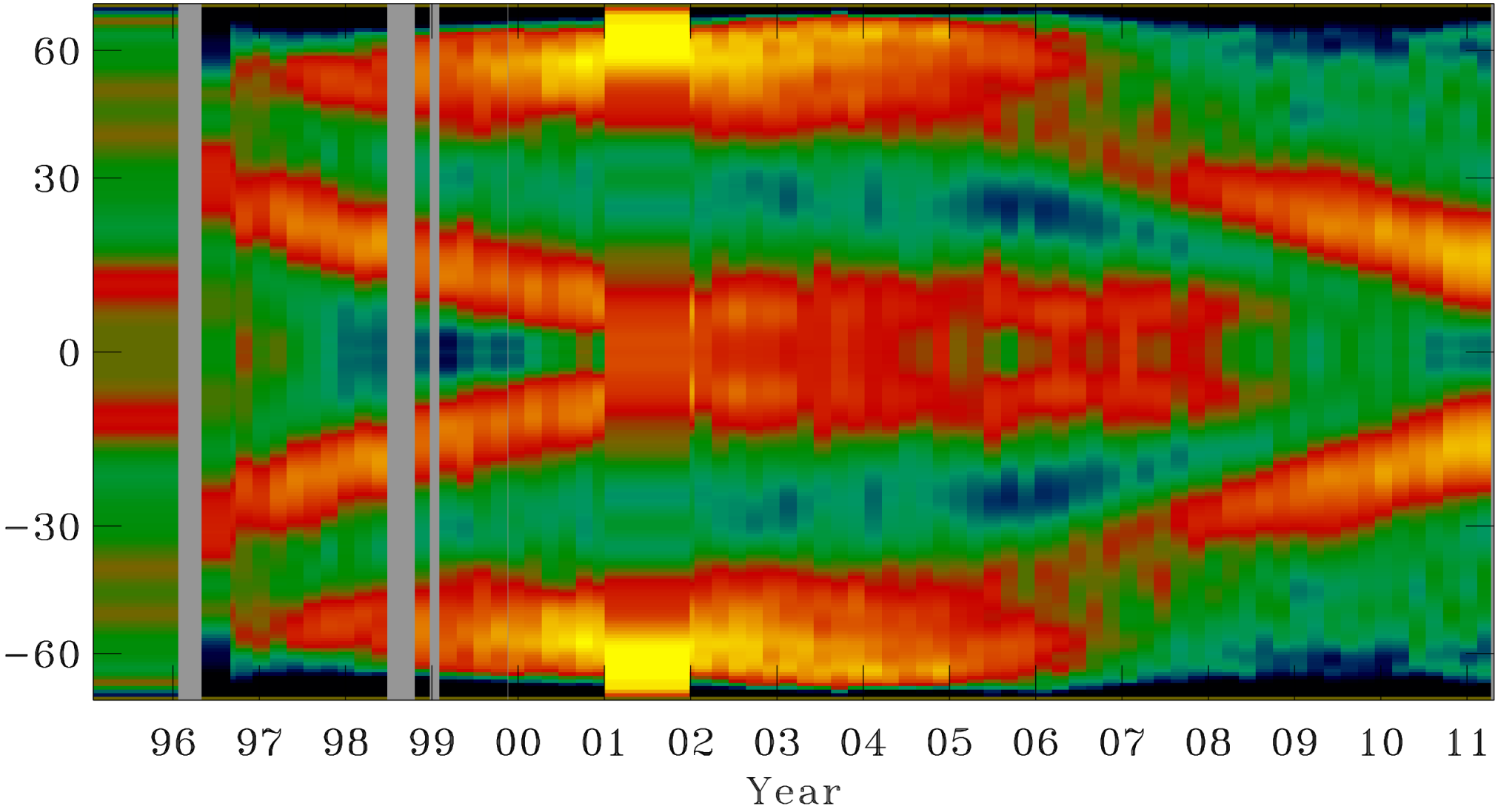
- Normally noise covariance between m's is measured in a frequency range high above the fitting interval.
  - Since the f-mode is so noisy, we used a frequency range centered on the ridge.
- Normally modes are rejected if their frequency error estimates are large given their width, or if they differ by more than 10 sigma from a model.
  - Modes are still required to converge within 0.25 sigma, but the above tests are skipped.

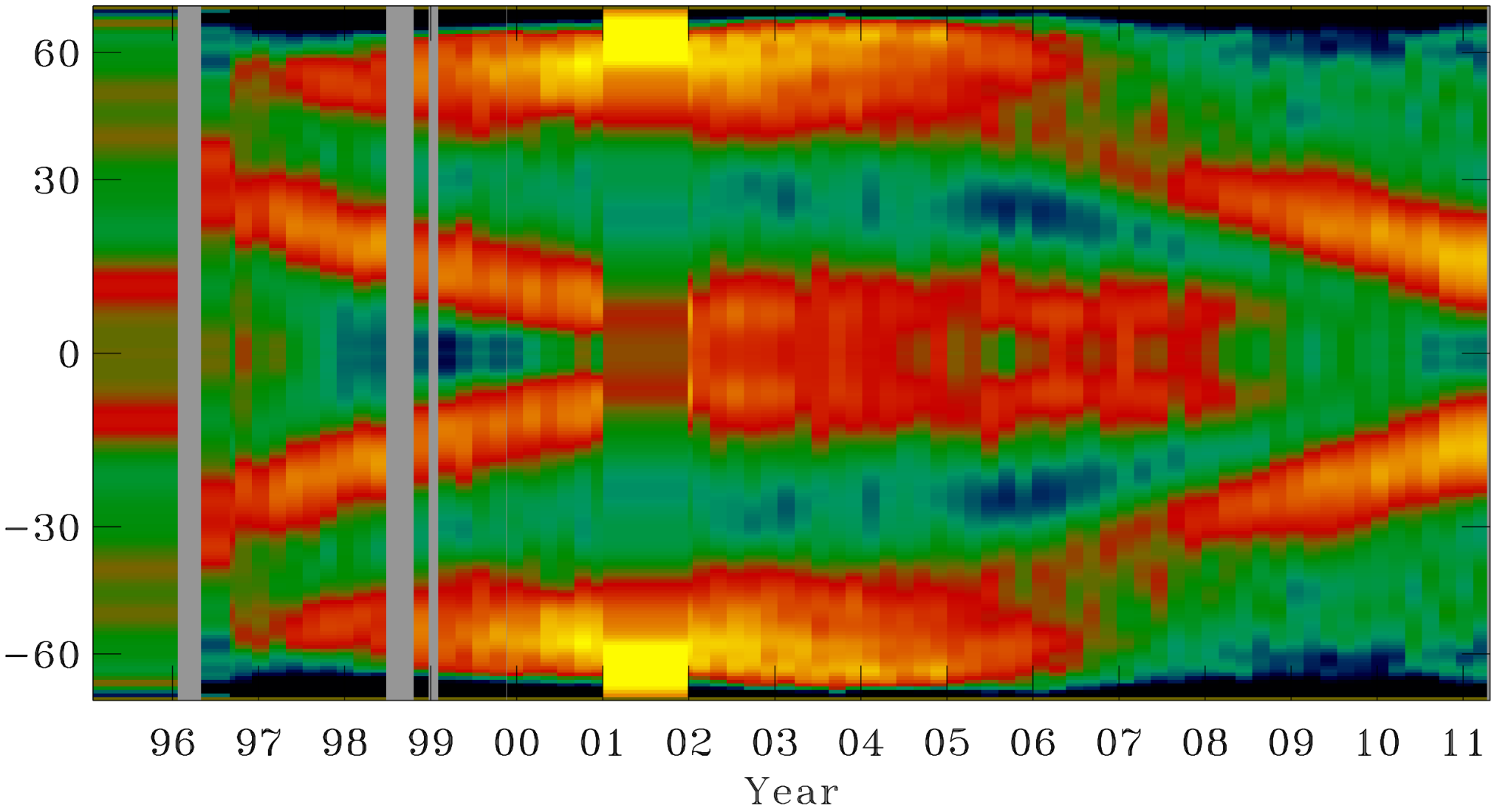
MWO data fitted

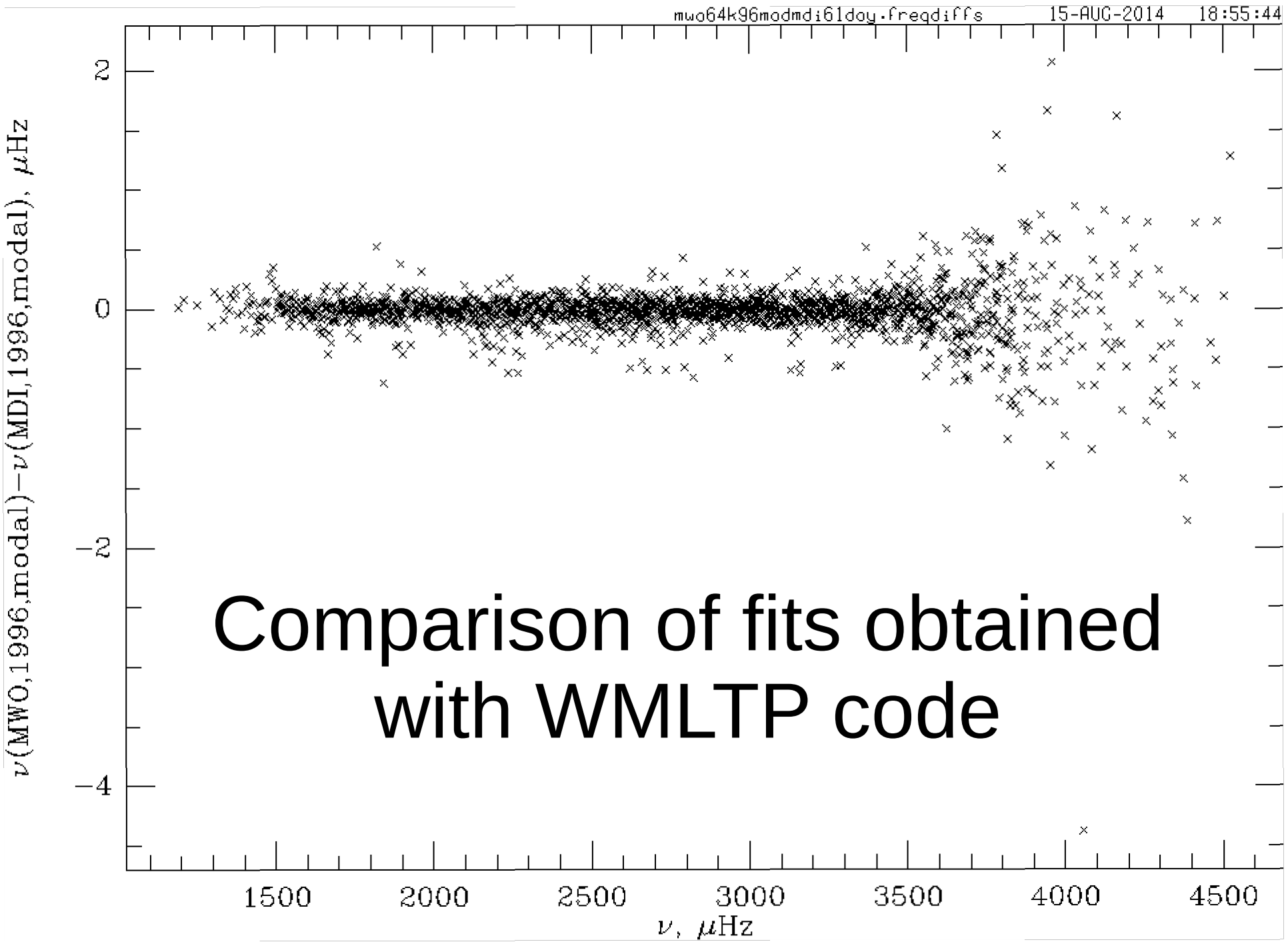
- 360 days beginning 1995.01.29
  - 92 f-modes fit
- 122 days beginning 1996.05.01 (first day of regular MDI observations)
  - 101 f-modes fit with manually optimized window function
  - 75 f-modes fit with automatic window function but updated p-angle
- 360 days beginning 2001.01.01
  - 21 f-modes fit
  - 43 f-modes fit by rejecting less data in window function
  - 59 f-modes fit using updated p-angle in addition


Zonal flows from MDI f modes
60
30
0
−30
−60
96
97
98
99
00
01
02
03
04
05
06
07
08
09
10
11
Year


Zonal flows from MWO/MDI f modes
60
30
0
−30
−60
96
97
98
99
00
01
02
03
04
05
06
07
08
09
10
11
Year


Zonal flows from MWO/MDI f modes
60
30
0
−30
−60
96
97
98
99
00
01
02
03
04
05
06
07
08
09
10
11
Year


Zonal flows from MWO/MDI f modes
60
30
0
−30
−60
96
97
98
99
00
01
02
03
04
05
06
07
08
09
10
11
Year



Comparison of fits obtained with WMLTP code


That's all Folks!