# HMI Local Helioseismology Pipelines and Analysis Datasets

## Ring Diagrams

**Development Team:**
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- NSO: Olga Burtseva, Irene Gonzalez-Hernandez, Frank Hill, Rachel Howe, Kiran Jain, Rudi Komm, Sushant Tripathy

## Time Distance

**Development Team:**
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- GSFC: Tom Duvall
- CORA: Aaron Birch

## Farside Imaging

**Development Team:**
- NSO: Irene Gonzalez-Hernandez
- Stanford: Phil Scherrer, Rick Bogart, Junwei Zhao
- CORA: Charlie Lindsey

Farside Processing

hmi.fsVbinned_nrt

*(near-real-time data product, not archived)*

Seismic images of magnetic activity on the farside of the Sun that we cannot directly see from Earth. The images show sound wave travel time variations, with locations of shorter travel times appearing darker. These darker regions indicate locations where there is an accumulation of magnetic field on the far surface. Both a Line of Sight projection (left) and a Longitude Sine of Latitude projection (right) of the farside images are shown. *(more info)*

The method for estimating far-side magnetic activity was developed by Charles Lindsey and Doug Braun of Colorado Research Associates, a division of Northwest Research Associates, Boulder, Colorado. *(references and links)*
Ring-Diagrams Synoptic Pipeline Grid

Tiles at three size scales: 32°, 16°, and 5.12° “squares”

(Uniform apodization to: 30°, 15°, and 5° circles)

Tile spacings: s = 15°, 7.5°, and 2.5°

Latitude spacing uniform, with tiles centered at 0, ±s, ±2s, ...

Longitude spacing depends on latitude, same as latitude spacing at equator, and subject to constraint of integer divisor of 360°

Tracking duration matched to region diameter:

  5°: 1/72 synodic rotation (~545 min -> 768 HMI records)
  15°: 1/24 synodic rotation (~1635 min -> 2304 records)
  30°: 1/12 synodic rotation (~54.5 hr; -> 4608 records)

Mapping with Postel’s projection at scale of 0°.04 / pxl (5° tiles) and 0°.0625 / pxl (others)

  512*512, 256*256, 128*128

Regions tracked within 80° of disc center

  Three different sets, depending on heliographic latitude of SDO

  3007 5° tiles, 307 15° tiles, 73 30° tiles (2722/2748, 281/284, & 69 at any time)

Regions tracked at Carrington rate
Ring-Diagrams Synoptic Processing Status

15° tiles, 24 frames per Rotation

hmi.rdVtrack_fd15  281–284 per frame
hmi.rdVpspec_fd15  281–284
hmi.rdVfitsf_fd15  281–284
hmi.rdVfitsc_fd15  37–38
hmi.rdVflows_fd15_frame

Processing Status as of 7 Feb 2011
Processing Status as of 16 August 2011

- unprocessed
- unprocessed: DC<0.7
- incomplete
- complete: DC<0.85
- complete: DC<0.95
- complete: DC>=0.95
Magnetic Activity Index values of 5° Tiles
Ring-diagrams Target Region Processing

2010.08.02_14:55

2010.08.03_18:08

2010.08.04_21:21

hmi_test.rdVtrack_targ
hmi_test.rdVpspec_targ
hmi_test.rdVfitsc_targ

LoHCo Workshop, Stanford, 17–19 August 2011
AR 11093

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New Ring-Diagrams Products

- **hmi.rdVavgpspec_fd15**: 281–284 per rotation
- **hmi_test.rdVfitsf_avg15**: 281–284 per rotation
- **hmi_test.rdVfitsc_avg15**: 37–38 per rotation

- **hmi.rdVavgpspec_fd30**: 69 per rotation
- **hmi_test.rdVfitsf_avg30**: 69 per rotation
- **hmi_test.rdVfitsc_avg30**: 17 per rotation

**Single ring cut, 4813 µHz**

**Average ring cut, 4813 µHz**
Time-Distance Synoptic Processing Status

hmi_test.tdVtrack_synop 25 per 8 hr
hmi_test.tdVtimes_synop 25 per 8 hr
hmi_test.tdVflows_synop 100 per 8 hr