HMI Ring-Diagrams Pipeline and Analysis Datasets

(see http://hmi.stanford.edu/teams/rings/)

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Synoptic: flows (and structure) on a regular spatial/temporal grid

Targets: structure (and flows) for targeted analysis regions
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:

\[
\begin{align*}
5°: & \quad 1/72 \text{ synodic rotation (} \sim 545 \text{ min} \rightarrow 768 \text{ HMI records)} \\
15°: & \quad 1/24 \text{ synodic rotation (} \sim 1635 \text{ min} \rightarrow 2304 \text{ records)} \\
30°: & \quad 1/12 \text{ synodic rotation (} \sim 54.5 \text{ hr; } \rightarrow 4608 \text{ records)}
\end{align*}
\]

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

LoHCo Workshop, Stanford, 8-9 February 2011
Synoptic pipeline targets: 5° and 15° regions

$|B_0| < 3.625$

$|B_0| > 3.625$
Ring-diagrams Synoptic Processing Status

30° tiles, 12 frames per Rotation

hmi.rdVtrack_fd30 69 records per frame
hmi.rdVpspec_fd30 69
hmi.rdVfitsf_fd30 69
hmi.rdVfitsc_fd30 17
hmi.rdVflows_fd30_frame
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

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Ring-diagrams Synoptic Processing Status

5° tiles, 72 frames per Rotation

Processing Status as of 7 Feb 2011

hmi.rdV*_fd05

CMLon [deg]

CarrRot

hmi.rdVtrack_fd05 2727–2748 per frame
hmi.rdVpspec_fd05 2727–2748
hmi.rdVfitsf_fd05 2727–2748
hmi.rdVfitsc_fd05 2727–2748
Sample fitsc spectra at disc centre

5° tile

15° tile

30° tile
Sample flow maps
30° tile frames
Differential Rotation coefficients as functions of depth

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Meridional flow at selected depths, CR 2101

15° tiles

Target depth: 0.975

Target depth: 0.980

Target depth: 0.985

Target depth: 0.990

30° tiles

Target depth: 0.960

Target depth: 0.970

Target depth: 0.980

Target depth: 0.990
Meridional flow at selected depths, CR 2102

15° tiles

30° tiles

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Meridional flow at selected depths, CR 2103

15° tiles

30° tiles
Ring-diagrams Target Region Processing

AR 11092
AR 11092

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