HMI Magnetic Synoptic Maps and Frames

HMI Stanford Team, Sep 2009

Product Overview

Which of them are most useful?

	Product	Input	Cadence	Res.	Avail.
Vector & LoS	Synoptic Map	B_{vec} (B_{los}) Heliographic Frame?	per CR	3600x1440	Archive
	Synchronic Map	B_{vec} (B_{los}) Synoptic Map	?	?	?
	Synchronic Frame	B_{vec} (B_{los}) Magetogram, Synoptic Map, Time	?	?	?
	Daily Synchronic Update	B_{vec} (B_{los}) Heliographic Frame, Synoptic Map	Daily	?	Archive

Synchronic Map/Frame, Daily Update

- Map: “stretch” or “squeeze” a synoptic map to get a “snapshot” of the Sun at certain time.
- Frame: embed a longitude range of magnetogram with region of interest to a synchronic map (for global model of new AR).
- Daily update: embedded magnetogram is always newest and placed at the left edge of the map (for space weather forecast).

Wide MDI Synoptic Carrington Map Centered at CT 1636:200

Stretching of Carrington Longitudes (blue lines) to Heliographic Locations (Colored Curves)

1.0
0.5
0.0
Sine Heliolatitude

1937:290 1936:20 1936:110 1936:200 1936:290 1935:20 1935:11

Carrington (blue) Longitude

MDI Synchronic Map for 1998.05.23_16:03:30

-0.5
-1.0

1937:290 1936:20 1936:110 1936:200 1936:290 1935:20 1935:11

Carrington (blue) Longitude

98.05.23:290 98.05.23:20 98.05.23:110 98.05.23:200 98.05.23:290 98.05.23:20 98.05.23:1

Heliographic (black) Longitude

Bvec vs. Blos: New Challenge

- What is the potential application of a vector "synoptic map"?
- How to average vectors spatially and/or temporally? Is there a limit to the scale of averaging?
- How to present a vector map (resolution, cadence)?
- Etc...

Other Issues

- B_r maps and frames: derived from B_{vec}
- Polar field correction: 2d spatial polynomial fitting (what about B_{vec}?)
- Etc...

Potential Field Extrapolation

- Spherical harmonics expansion coefficient
- 3d PFSS field on a given grid
- WSA result (2.5 degree, 4 hours):
  - Global SW speed, expansion factor, open field line foot point location, etc.
  - Sub-earth point SW speed, expansion factor, open field line foot point location, etc.
  - 1AU SW speed and IMF polarity time series.