

Local Helioseismology in the HMI Pipeline

Wednesday, Mar 7

- 9:00 – 10:00 Ring Diagrams – D. Haber, moderator
- 10:00 – 11:00 Time Distance – T. Duvall, moderator
- 11:00 – 12:00 Farside/Holography – I. González, moderator
- 1:30 – 3:00 HMI data, JSOC data management and analysis, and the global helioseismology pipeline: presentations, tutorials
- 3:30 Organization of working groups
- upstream processing (tracking etc)
 - ring diagrams
 - time distance
 - farside imaging
 - acoustic holography (other)
 - other?



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Local Helioseismology Data Products

Full-disc velocity, sound-speed maps, 0–30 Mm $[v(r, \theta, \varphi), c_s(r, \theta, \varphi)]$	Ring Diagrams	(✓)
	Time-Distance	(✓)
	Holography	?
Synoptic velocity, sound-speed maps, 0–30 Mm	Ring Diagrams	(✓)
	Time-Distance	(✓)
	Holography	?
High-resolution velocity, c maps, 0–30 Mm	Ring Diagrams	?
	Time-Distance	(✓)
	Holography	?
Deep-focus velocity, c maps, 0–200 Mm	Ring Diagrams	?
	Time-Distance	?
	Holography	?
Farside activity index	Ring Diagrams	??
	Time-Distance	??
	Holography	✓



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Accessing data from the AIA/HMI Joint Science Operations Center (JSOC)

Data organized into many data series of similar data records, e.g. full-disc HMI Dopplergrams, tracked data cubes covering selected regions, wave diagnostics for selected times and locations, inversion kernels for selected diagnostics

Ancillary (keyword) data for all records in all series in copies of relational database, the Data Record Management System (DRMS), partially replicated at sites outside JSOC

(Binary) data segments stored in JSOC and other instances of near-line and cached Storage Unit Management System (SUMS)

Arbitrary collections of data records exportable from DRMS/SUMS as FITS files, VO Tables and other formats TBD, or directly to applications, e.g. CoSEC



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Processing Data in the JSOC Environment

General Documentation at <http://jsoc.stanford.edu/trac/wiki>

DRMS names: <http://jsoc.stanford.edu/trac/wiki/DrmsNames>

DRMS API: <http://jsoc.stanford.edu/trac/wiki/DrmsApi>

Module structure: <http://jsoc.stanford.edu/trac/wiki/DrmsModule>

man pages: <http://jsoc.stanford.edu/man/>

Samples: ??? (coming soon...)

(The wiki is only open to access from specified internet domains. If you cannot connect to it from yours, please let us know!)



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Local Helioseismology Team Tasks

- specify required pipeline input data products, including ancillary data and data products (e.g. inversion kernels)
- describe output data products - format, organization, production schedule
- specify algorithms, parameters, and metadata as appropriate for pipeline analysis
- establish testing & validation procedures
- name person(s) responsible for pipeline module implementation, including both algorithm experts and persons familiar with the pipeline system
- establish implementation schedule



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Sample Module Specifications

Name	<i>fastrack</i>	Source	SOI SSSC module
Purpose	provide remapped surface space-time data cubes from calibrated solar image time series data for determination of power spectra and travel-time maps		
Description	for each pixel in a set of projected maps described by their coordinates in an arbitrarily rotating coordinate system at a given time, interpolates the selected data from the corresponding observed images		
Output	3-dimensional data cubes indexed by their nominal (central) times and spatial coordinates at the nominal times		
Input	2-dimensional Dopplergrams and/or photograms, calibrated, detrended (?), and mapped to either a standard (orthographic?) projection or a uniform (sky) scale		
Parameters	target locations, target times, assumed rotation model, map projection, map scale, sampling rate, extent and duration of data cube, interpolation scheme?		
Issues	interpolation; spatial and temporal gap filling, if any; output scaling and precision; noise removal?		



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