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?
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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Stanford, 7-9 Mar. 2007
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
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
## Sample Module Specifications

<table>
<thead>
<tr>
<th>Name</th>
<th>Purpose</th>
<th>Description</th>
<th>Output</th>
<th>Input</th>
<th>Parameters</th>
<th>Issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>fastrack</td>
<td>provide remapped surface space-time data cubes from calibrated solar image time series data for determination of power spectra and travel-time maps</td>
<td>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</td>
<td>3-dimensional data cubes indexed by their nominal (central) times and spatial coordinates at the nominal times</td>
<td>2-dimensional Dopplergrams and/or photograms, calibrated, detrended (?), and mapped to either a standard (orthographic?) projection or a uniform (sky) scale</td>
<td>target locations, target times, assumed rotation model, map projection, map scale, sampling rate, extent and duration of data cube, interpolation scheme?</td>
<td>interpolation; spatial and temporal gap filling, if any; output scaling and precision; noise removal?</td>
</tr>
</tbody>
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